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Study Note – 1 | Introduction to Cost Accounting

Meaning of Cost, Costing, Cost Accounting and Cost Accountancy

Cost

It is the monetary value of all sacrifices made to achieve an objective. (i.e. to produce goods and services). Cost refers to the expenditure incurred in producing a product or in rendering a service. It is expressed from the producer or manufacturer's viewpoint. (not that of consumer / end user).

- The amount of expenditure (**actual or notional**)
- incurred on or attributable to
- a specified article, product or activity.

Cost v/s Value v/s Price

BASIS	COST	VALUE	PRICE
Meaning	Expenditure incurred in producing a product or rendering a service	Relative worth of a commodity to an individual at a particular point of time	Amount paid by a consumer for a product or service
Viewpoint	Producer	User	Consumer
Inference	It is a fact	It is an opinion	It is a policy

Costing

- Costing is defined as the technique and process of **ascertaining costs.**

Cost Accounting

Cost Accounting is the classifying, recording and appropriate allocation of expenditure for the determination of the costs of the product or services.

- Cost Accounting is defined as
- "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 periodical statements and reports** for ascertaining and controlling costs."

Cost Accountancy

- Cost Accountancy has been defined as

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- "**the application of** costing and cost accounting principles, methods and techniques
- to the science, art and practice of **cost control and the ascertainment of profitability**.
- It includes the **presentation of information** derived there from for the purpose of managerial decision making."

Cost Unit

- It is a **unit of product, service or time** (or combination of these) in relation to which costs may be ascertained or expressed.
- Cost units are usually the units of physical measurement like number, weight, area, volume, length, time and value.

Product / Service	Cost Unit	Product / Service	Cost Unit
Soaps	Number / Carton	Brickworks	Per 1000 brick
Wire / Cable	Meter / Kilometer	Building	Square foot
Dairy (Milk)	Liter / Bag	Cement	Tonne
Goods transport	Tonne kilometer	Power	Kilowatt hour
Passenger transport	Passenger Kilometer	Paper	Rim
Wood / Gas	Cubic Feet (cft)	Textiles	Meters
Food grains	Kg. / Quintal / Tonne	Road contractors	Per mile / kilometer
Sugar	Per Tonne	Bicycle	Number
Hospital	Per patient day	Pharmaceuticals	1000 tablets
Automobile	Per vehicle / Number	Steel	Tonne

Cost Centers

- It is defined as a **location, person or an item** of equipment (**or group of these**) for which cost may be ascertained and used for the purpose of Cost Control.
- Cost Centers are of two types,
  - **Personal Cost Center:** It consists of a person or group of persons e.g. Mr. X, supervisor, foreman, accountant, engineer, process staffs, mining staffs, doctors etc.
  - **Impersonal Cost Center**: It consists of a location or an item of equipment (or group of these) e.g. Ludhiana branch, boiler house, cooling tower, weighing machine, canteen, and generator set etc.
- **Cost Centers in a manufacturing concern:**

  Two main types of Cost Centers are indicated as below:
  - **Production Cost Center:** It is a cost Center where raw material is handled for conversion into finished product. Here both direct and indirect expenses are incurred. Machine shops, welding shops and assembly shops etc. are examples of production Cost Centers.
  - **Service Cost Center:** It is a cost Center which serves as an ancillary unit to a production cost Center. Payroll processing department, HRD, Power house, gas production shop, material service Centers, plant maintenance Centers etc. are examples of service cost Centers.
- **Profit Centers and investment Centers**

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- A profit Center is a Center where the manager has the responsibility of generating and maximizing profits. In such Centers, the manager is responsible for revenue and cost.
- Investment Centers are those Centers which are concerned with earning an adequate ROI. In such Centers, the manager is responsible for investment, revenue and cost.

Types of Responsibility Centers:

Particulars	Cost Centers	Revenue Centers	Profit Centers	Investment Centers
Meaning	A Center for which a standard amount of cost is pre-determined and used for control.	A Center devoted to raising revenue (no responsibility for production).	A Center whose performance is measured in terms of income earned and cost incurred (profit earning).	A Center responsible for earning profits and also for asset utilization.
Primary responsibility	Cost reduction and cost control	Generation of sale revenue.	Profit earning.	Earning return on investments.
Performance evaluation	Standard cost *Less :* Actual cost	Budgeted revenue *Less* : Actual revenue	Budgeted profits *Less :* Actual profits	Budgeted ROI *Less :* Actual ROI
Other points	Control of cost is subject to – Time Location Product	Also responsible for some expenses related with marketing of products.	It may mean that one division sells its output to another division within the organisation – i.e. inter-divisional transfer pricing.	Value of Investment in this responsibility Center needs to be carefully defined and return on investment to be defined as before tax or after tax, before interest or after interest etc.

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Cost Objects

- Cost object is **anything for which a separate measurement of cost is required**. Cost object may be a product, a service, a project, a customer, a brand category, an activity, a department or a programme etc.

Examples of Cost Object are:

• Product	*Smart phone, Tablet computer, SUV Car, Book etc.*
• Services	*An airline flight from Delhi to Mumbai, Concurrent audit assignment, Utility bill payment facility etc.*
• Project	*Metro Rail project of DMRC, Road projects of NHAI etc.*
• Activity	*Quality inspection of materials, Placing of orders etc.*
• Process	*Refinement of crudes in oil refineries, melting of billets or ingots in rolling mills etc.*
• Department	*Production department, Finance & Accounts, Safety etc*

Cost Drivers

- A Cost driver is a factor or variable **which effect level of cost**.
- Generally, it is an activity which is **responsible for cost incurrence**.
- Level of activity or volume of production is the example of a cost driver.
- An activity may be an event, task, or unit of work etc. **ANYTHING THAT DRIVES COST IS A COST DRIVER.**

Scope of Cost Accounting

Scope of cost accounting consists of the following functions:

- **Costing:**
  Costing is the technique and process of ascertaining costs of products or services. The cost ascertainment procedure is governed by some cost accounting principles and rules. Generally cost is ascertained using some arithmetic process.
- **Cost Accounting:**
  This is a process of accounting for cost which begins with the recording of income and expenditure and ends with the preparation of periodical statement and reports for ascertaining and controlling cost. Cost Accounting is a formal mechanism of cost ascertainment.
- **Cost Analysis:**
  It involves the process of finding out the factors of actual costs varying from the budgeted costs and accordingly fixation of responsibility for cost differences. This also helps in better cost management and strategic decisions.
- **Cost comparisons:**
  Cost accounting also includes comparisons between cost from alternative courses of action such as use of different technology for production, cost of making different products and activities, and cost of same product/ service over a period of time.
- **Cost Control:**

It involves a detailed examination of each cost in the light of advantage received from the incurrence of the cost. Thus, we can state that cost is analyzed to know whether cost is not exceeding its budgeted cost and whether further cost reduction is possible or not.

- **Cost Reports:**
  This is the **ultimate function of cost accounting**. These reports are primarily prepared for use by the management at different levels. Cost Reports helps in planning and control, performance appraisal and managerial decision making.
- **Statutory compliances:**
  Maintaining cost accounting records as per the rules prescribed by the statute. As per the Companies (Cost Accounting Records) Amendment Rules, 2012, Companies governed by the Companies Act has to maintain cost records relating to utilization of materials, labour and other items of cost as applicable to the production, processing, manufacturing or mining activities of the company.

Objectives of Cost Accounting

The main objectives of Cost Accounting are explained as follows:

- **Ascertainment of Cost:**
  There are two methods of ascertaining costs:
  - Post Costing:
    It means analysis of actual information as recorded in financial books. It is accurate and is useful in the case of "Cost plus Contracts" where price is to be determined finally on the basis of actual cost.
  - Continuous Costing:
    It aims at collecting information about cost as and when the activity takes place so that as soon as a job is completed the cost of completion would be known. This involves careful estimates being prepared of overheads. In order to be of any use, costing must be a continuous process.

  Cost ascertained by the above two methods may be compared with the standard costs which are the target figures already compiled on the basis of experience and experiments.

- **Determination of Selling Price:**
  Business enterprises run on a profit making basis. It is thus necessary that the **revenue should be greater than the costs incurred.** Cost accounting provides the information regarding the cost to make and sell the product or services produced. Though the selling price of a product is also influenced by market conditions, which are beyond the control of any business, it is still possible to determine the selling price within the market constraints; hence cost plays a dominating role.

- **Cost Control:**
  To exercise cost control, broadly the following steps should be observed:
  - Determine clearly the objective, i.e., pre-determine the desired results: The target cost and/ or targets of performance should be laid down in respect of each

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department or operation and these targets should be related to individuals who, by their action, control the actual and bring them into line with the targets

- Measure the actual performance: Actual cost of performance should be measured in the same manner in which the targets are set up, i.e. if the targets are set up operation-wise, and then the actual costs should also be collected operation-wise and not cost Center or department-wise as this would make comparison difficult.
- Investigate into the causes of failure to perform according to plan; and
- Institute corrective action.

- **Cost Reduction:**

  It may be defined "as the achievement of

  - **real and permanent reduction in the unit cost** of goods manufactured or services rendered
  - without impairing their suitability for the use intended or diminution in the quality of the product."

  Cost reduction implies the retention of the essential characteristics and quality of the product and thus it must be confined to permanent and genuine savings in the cost of manufacture, administration, distribution and selling, brought about by elimination of wasteful and inessential elements from the design of the product and from the techniques carried out in connection therewith.

  The **three-fold assumptions** involved in the definition of cost reduction may be summarized as under:

  1. There is a **saving in unit cost**.
  2. Such saving is of **permanent nature**.
  3. The **utility and quality of the goods and services remain unaffected**, if not improved.

- **Ascertaining the profit of each activity:** [REVENUE – COST]

  The profit of any activity can be ascertained by **matching cost with the revenue** of that activity. The purpose under this step is to determine costing profit or loss of any activity on an objective basis.

- **Assisting management in decision making:**

  Decision making is defined as

  - a process of **selecting a course of action out of two or more alternative courses**.
  - For making a choice between different courses of action, it is necessary to make a comparison of the outcomes, which may be arrived under different alternatives. Such a comparison has only been made possible with the help of Cost Accounting information. (e.g: Determination of Cost Volume Relationship, shutting down or operating at loss, making or buying from outside)

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Difference between Cost Control (CC) and Cost Reduction (CR)

Cost Control	Cost Reduction
➢ Aims at maintaining the cost in accordance with the set standards	➢ Aims at challenging the set standards and reducing the costs
➢ Seeks to attain lowest possible cost under existing conditions	➢ Challenges the existing conditions and will result in lower cost
➢ Emphasis is on past and present	➢ Emphasis is on present and future
➢ Preventive function	➢ Corrective function
➢ Ends when targets are met	➢ Has no visible end

Difference between Financial Accounting and Cost Accounting

Sr. No.	Particulars	Cost Accounting	Financial Accounting
1.	**Meaning**	It is the application of costing and cost accounting principles, methods & techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived therefrom for the purpose of managerial decision making.	It is the art of recording, classifying and summarizing in a significant manner and in terms of money, transactions and events which are, in part atleast of a financial character and interpreting the results thereof.
2.	**Details Provided**	It provides financial analysis of the business affairs product wise, service wise, element wise, or activity wise.	It gives financial picture and the state of affairs of a business in totality.
3.	**Users of Information**	It renders information for the guidance of management, proper planning, operation control and decision making.	It safeguards the interests of the business, its properties and other concerned like creditors,

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			shareholders, tax authorities.
4.	**Main Objective**	The main object is to ascertain the correct cost of production / Services.	The main object is to ascertain correct profit / loss position and to give a true and fair view of the state of affair of business.
5.	**Time Period**	It is future oriented activity.	It is a post – mortem activity.
6.	**Usefulness**	It forms the basis for managerial decision making like make or buy, continue or shutdown, product mix, etc.	It forms the basis for fulfilling the legal requirements like Income-tax Act, Companies Act, Excise & Customs Act, etc.
7.	**Final Output**	The final output is in the form of a Cost-Sheet.	The final output is in the form of Profit and Loss A/c and Balance Sheet.
8.	**Objective**	Profit Maximization is the objective.	Profit / Loss Ascertainment is the objective.
9.	**Stock Valuation**	Stocks are valued generally at cost.	Stocks are valued at Cost or Net Realizable Value whichever is less.
10.	**Nature of costs**	It considers both historical costs and pre-determined costs and extends to plans and policies to improve future performance.	Generally historical costs are used for recording purposes. Projected financial statements may also be drawn for budgeting purposes.

Difference between Cost Accounting and Management Accounting

Sr. No.	Particulars	Cost Accounting	Management Accounting
1.	**Nature**	It records only the Quantitative Data	It records both the Quantitative and the Qualitative Data

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2.	**Objective**	Recording the cost of production of a product or the cost of rendering a service	To help the management in planning, coordinating and decision making
3.	**Area**	Deals only with Cost Accounting	Has a wider scope and includes areas like financial planning, budgeting, tax planning etc.
4.	**Recording of data**	It uses both past and present figures	It uses past, present and future numbers
5.	**Rule and Regulations**	It follows certain principles and procedures for recording cost information	Tailor made. There are no rules and regulations governing this

Advantages of a cost accounting system

- A cost system **identifies unprofitable activities, losses or inefficiencies** such as wastage of manpower in the form of idle time, wastage of material in the form of spoilage, scrap or wastage of resources in the form of inadequate utilization of plant & machinery, production or service facilities, etc.
- Cost accounting locates the causes for decrease or increase in the profit or loss by **identifying unprofitable products or product lines**.
- Cost accounts furnish suitable data and **information to the management for decision making** such as make or buy, continue or shut down, product mix, to sell below cost or not, accept or reject etc.
- It helps management to **fix the selling price** and to furnish quotations / tenders.
- Application of **Standard Costing & Budgetary Control** techniques help management to achieve optimum level of efficiency and control cost.
- **Variance analysis** locates the areas of inefficiencies which require managerial attention. Thus, saving time and energy through **management by exception**.
- Determination of Cost Centers helps management to **define and fix responsibilities** upon individuals.
- A Cost System provides ready figures for use by the Government, Wage / Labour Tribunals, Trade Unions, etc. for application to problems like price fixation, 'administered price' determination, wage level fixation, settlement of disputes, etc.
- **Cost of closing stock** of raw materials, work-in-progress and finished goods can be easily obtained from cost records and used in the financial accounting to determine the quantum of profit or loss of the business.

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Limitations of Cost Accounting

- Like other branches of accounting, cost accounting is also having certain limitations. The limitations of cost accounting are as follows:
    - **Expensive:**
      It is expensive because analysis, allocation and absorption of overheads require considerable amount of additional work, and hence additional money.
    - **Requirement of Reconciliation:**
      The results shown by cost accounts differ from those shown by financial accounts. Thus Preparation of reconciliation statements is necessary to verify their accuracy.
    - **Duplication Work:**
      It involves duplication of work as organization has to maintain two sets of accounts i.e. Financial Account and Cost Account.
    - **Inefficiency:**
      Costing system itself does not control costs but its usage does.

Installation of a costing system

There is no one readymade cost system, which is suitable for all types of businesses. Therefore a cost system has to be specially designed for an undertaking to meet its specific needs. Before installing a cost system proper care should be taken to study all aspects involved and the needs of the business, otherwise the system will be a misfit and full advantage may not be derived from it.

As in the case of every other form of activity, **it should be considered whether it would be profitable to have a cost accounting system.** Management of an organisation needs complete and accurate information to make decisions. A well Costing system should provide all relevant information as and when required by various stakeholders.

- **Before setting up a system of cost accounting the under mentioned factors should be studied:**
    - **Objective:**
      The objective of costing system, for example whether it is being introduced for fixing prices or for insisting a system of cost control.
    - **Nature of Business or Industry:**
      The Industry in which business is operating. Every business industry has its own peculiar feature and costing objectives.
    - **Organisational Hierarchy:**
      Costing system should fulfil the requirement of different level of management.
    - **Knowing the product:**
      Nature of product determines the type of costing system to be implemented.
    - **Knowing the production process:**

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A good costing system can never be established without the complete knowledge of the production process. This also includes some basic technical know-how and process peculiarity.

- **Information synchronisation:**
  While drafting a costing system, information needs of various other departments should be taken into account. For example in a typical business organisation accounts department needs to submit monthly stock statement to its lender bank, quantity wise stock details at the time filing returns to tax authorities etc.
- **Method of maintenance of cost records:**
  The manner in which Cost and Financial accounts could be inter-locked into a single integral accounting system and in which results of separate sets of accounts, cost and financial, could be reconciled by means of control accounts.
- **Statutory compliances and audit:**
  Records are to be maintained to comply with statutory requirements, standards to be followed (Cost Accounting Standards and Accounting Standards).
- **Information Attributes:** Information generated from the Costing system should be possess all the attributes of an information i.e. complete, accurate, timeliness, confidentiality etc. This also meets the requirements of management information system.

Essentials of a Good Costing System

The essential features, which a good Cost Accounting System should possess, are as follows:

- **Informative and Simple:**
  Cost Accounting System should be tailor-made, practical, simple and capable of meeting the requirements of a business concern. The system of costing should not sacrifice the utility by introducing meticulous and unnecessary details.
- **Accuracy:**
  The data to be used by the Cost Accounting System should be accurate; otherwise it may distort the output of the system and a wrong decision may be taken.
- **Support from Management and subordinates:**
  Necessary cooperation and participation of executives from various departments of the concern is essential for developing a good system of Cost Accounting.
- **Cost-Benefit:**
  The Cost of installing and operating the system should justify the results.
- **Procedure:**
  A carefully phased programme should be prepared by using network analysis for the introduction of the system.
- **Trust:**
  Management should have faith in the Costing System and should also provide a helping hand for its development and success.

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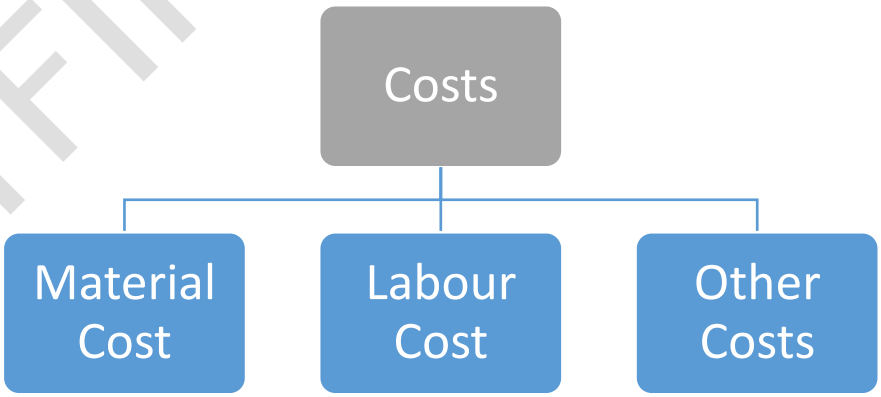
Classification of Costs

Classification of costs means **GROUPING OF COSTS** according to their **common characteristics**. Costs can be classified broadly on the following basis:



A. By Nature or Element



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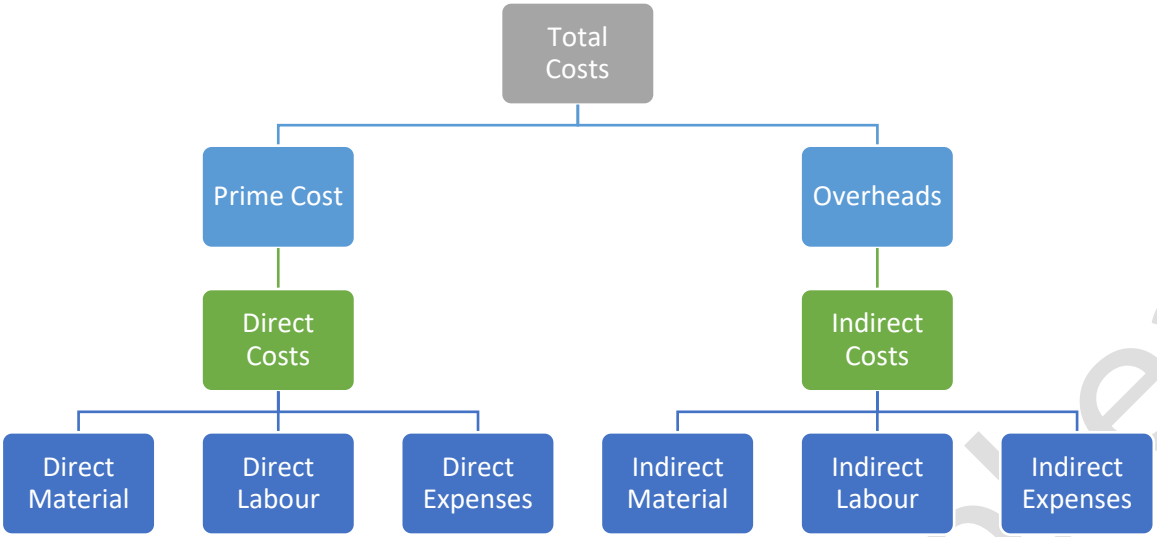
B. By Traceability to object



(1) Direct Materials:

- Materials which are **present in the finished product (cost object)** or
- can be economically identified in the product are called direct materials.
- For example, cloth in dress making; materials purchased for a specific job etc.
- However in some cases a material may be direct but it is treated as indirect, because it is used in small quantities, it is not economically feasible to identify that quantity and those materials which are used for purposes ancillary to the business.

(2) Direct Labour:

- Labour which can be economically identified or
- **attributed wholly** to a
- cost object is called direct labour.
- For example, labour engaged on the actual production of the product or in carrying out the necessary operations for converting the raw materials into finished product.

(3) Direct Expenses:

- It includes **all expenses other than direct material or direct labour**
- which are **specially incurred** for a particular cost object and **can be identified in an economically feasible way**.
- For example, hire charges for some special machinery, cost of defective work.

(4) Indirect Materials:

- Materials which do not normally form part of the finished product (cost object) are known as indirect materials.
- These are —
  - Stores used for maintaining machines and buildings (lubricants, cotton waste, bricks etc.)

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- Stores used by service departments like power house, boiler house, canteen etc.

(5) Indirect Labour :

- Labour costs which **cannot be allocated**
- but **can be apportioned to or absorbed** by cost units or cost Centers is known as indirect labour.
- Examples of indirect labour includes foreman and supervisors; maintenance workers; etc.

(6) Indirect Expenses:

- Expenses other than direct expenses are known as indirect expenses, that cannot be directly, conveniently and wholly allocated to cost Centers.
- Factory rent and rates, insurance of plant and machinery, power, light, heating, repairing, telephone etc., are some examples of indirect expenses.

(7) Overheads:

- **OH = IDM + IDL + IDE**
- It is the aggregate of indirect material costs, indirect labour costs and indirect expenses.
- The main groups into which overheads may be subdivided are the following:
    - **Production or Works Overheads:** Indirect expenses which are incurred in the factory and for the running of the factory. E.g.: rent, power etc.
    - **Administration Overheads:** Indirect expenses related to management and administration of business. E.g.: office rent, lighting, telephone etc.
    - **Selling Overheads:** Indirect expenses incurred for marketing of a commodity. E.g.: Advertisement expenses, commission to sales persons etc.
    - **Distribution Overheads:** Indirect expenses incurred in despatch of the goods E.g.: warehouse charges, packing and loading charges.

C. By Functions

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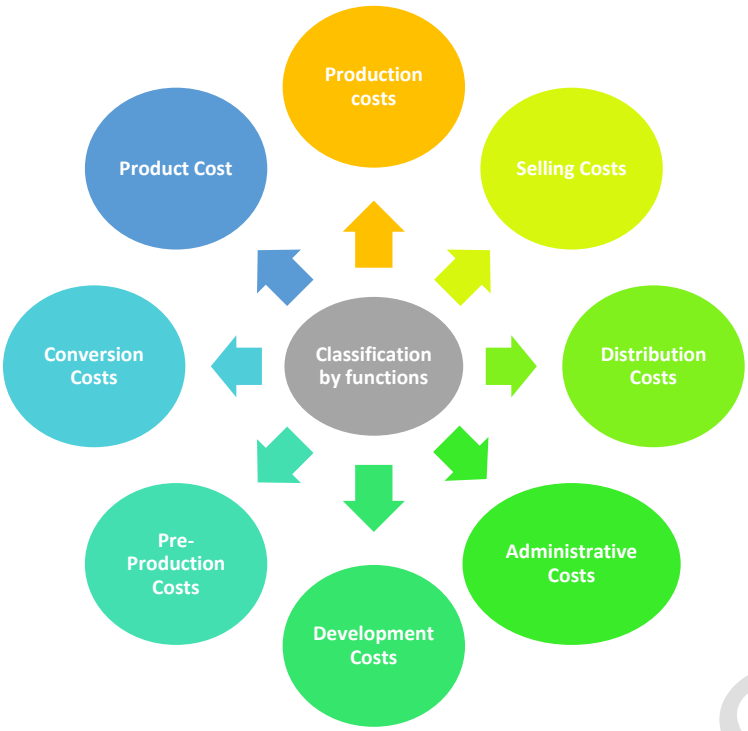

(8) Conversion Costs:

- Cost of transforming direct material into Finished Products. Ex- Direct Labour and Overheads

(9) Production Costs:

- Cost of whole process of Production. Ex - Direct Materials and Conversion Cost.

(10) Selling Costs:

- Cost for creating demand of the product produced. Ex- Advertising Expenses

(11) Distribution Costs:

- Costs starting from packing of the product till reconditioning of empty products. Ex - Freight and Transportation Costs on Sales

(12) Administrative Costs:

- Cost of formulating policy, controlling the organisation, costs not directly related to production. Ex - Salary of Office Staff

(13) Development Costs:

- Development Costs for trial Run. Ex - Research Costs

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(14) Pre- Production Costs:

- Costs starting with implementation of decisions and ending with the commencement of the production process. Ex - Direct Labour and Factory Overheads

(15) Product Costs:

- Costs necessary for production. Ex - Cost of purchase

D. By Variability

Fixed Costs	• Remains constant in total terms • Changes notionally on a per unit basis
Variable Costs	• Varies in total terms in relation to change in volume • Remains constant on a per unit basis
Semi-Variable Costs	• Contains both fixed component and variable component

(16) Fixed costs:

- These are the costs which are incurred for a period, and which, within certain output and turnover limits, tend to be unaffected by fluctuations in the levels of activity (output or turnover).
- They **do not tend to increase or decrease with the changes in output**.
- For example, rent, insurance of factory building etc., remain the same for different levels of production.

(17) Variable Costs:

- These **costs tend to vary with the volume of activity**.
- Any increase in the activity results in an increase in the variable cost and vice-versa. For example, cost of direct labour, etc.

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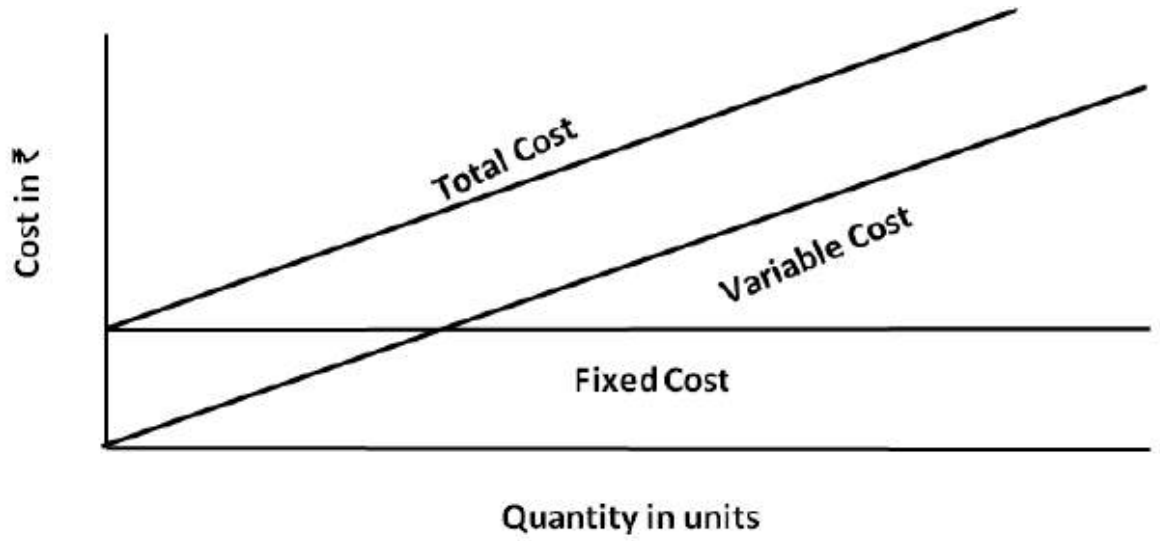

(18) Semi-variable costs:

- These costs **contain both fixed and variable components** and
- are thus **partly affected by fluctuations in the level of activity**.
- Examples of semi variable costs are telephone bills, gas and electricity etc.

E. By Controllability

By Controllability

Controllable | **Uncontrollable**

(19) Controllable Costs:

- Cost that **can be controlled, typically by** a cost, profit or investment Center **manager** is called controllable cost.
- Controllable costs incurred in a particular responsibility Center **can be influenced by the action of the executive heading that responsibility Center**.
- For example, direct costs comprising direct labour, direct material, direct expenses and some of the overheads are generally controllable by the shop level management.

(20) Uncontrollable Costs:

- Costs which **cannot be influenced** by the action of a specified member of an undertaking are known as uncontrollable costs.

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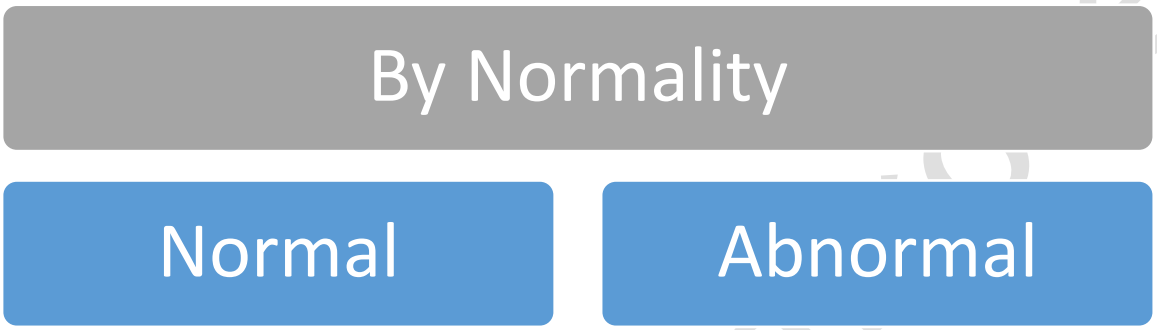
- For example, expenditure incurred by, say, the tool room is controllable by the foreman in-charge of that section but the share of the tool-room expenditure which is apportioned to a machine shop is not to be controlled by the machine shop foreman.

Distinction between Controllable Cost and Uncontrollable Cost:

- The distinction between controllable and uncontrollable costs is not very sharp and is sometimes left to individual judgement.
- In fact no cost is uncontrollable; **it is only in relation to a particular individual** that we may specify a particular cost to be either controllable or uncontrollable.

F. By Normality



(21) Normal Cost:

- It is the cost which is **normally incurred** at a given level of output under the conditions in which that level of output is normally attained.

(22) Abnormal Cost:

- It is the cost which is **not normally incurred** at a given level of output in the conditions in which that level of output is normally attained.
- It is **charged to Costing Profit and loss Account**.

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G. Classification for decision making purposes

(23) Pre-determined Cost:

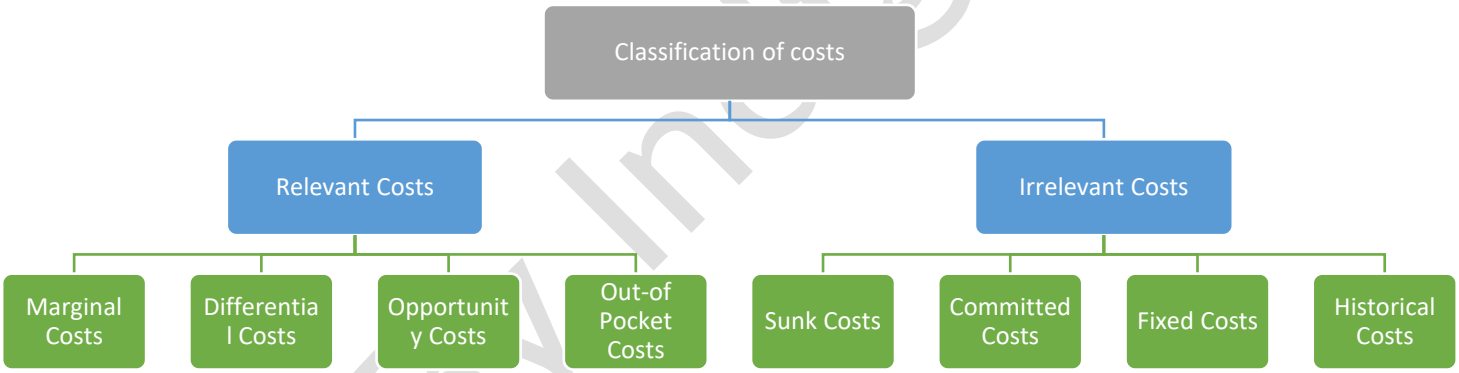
- A cost which is **computed in advance before production or operations start**, on the basis of specification of all the factors affecting cost, is known as a pre-determined cost.

(24) Standard Cost:

- A pre-determined cost, which is calculated from managements **'expected standard of efficient operation'** and the relevant necessary expenditure.
- It may be used as a basis for price fixing and for cost control through variance analysis.

(25) Marginal Cost:

- 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.

(26) Estimated Cost :

- Kohler defines estimated cost as
- "the **expected cost** of manufacture,or acquisition, often in terms of a unit of product computed **on the basis of information available in advance** of actual production or purchase".
- Estimated costs are prospective costs since they refer to prediction of costs.

(27) Differential Cost (Incremental and decremental costs):

- It represents the change (increase or decrease) in total cost (variable as well as fixed) due to change in activity level, technology, process or method of production, etc.

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- For example if any change is proposed in the existing level or in the existing method of production, the increase or decrease in total cost or in specific elements of cost as a result of this decision will be known as incremental cost or decremental cost.

(28) Imputed Costs:

- These costs are **notional costs** which **do not involve any cash outlay**.
- Interest on capital, the payment for which is not actually made, is an example of
    - imputed cost.
- These costs are similar to opportunity costs.

(29) Capitalised Costs:

- These are costs which are initially recorded as assets and subsequently treated as expenses.

(30) Product Costs:

- These are the costs which are associated with the purchase and sale of goods (in the case of merchandise inventory).
- In the production scenario, such costs are associated with the acquisition and conversion of materials and all other manufacturing inputs into finished product for sale.
- Hence,
    - under marginal costing -> variable manufacturing costs and
    - under absorption costing -> total manufacturing costs (variable and fixed) constitute inventoriable or product costs.

(31) Opportunity Cost:

- This cost refers to the value of sacrifice made or benefit of opportunity foregone in accepting an alternative course of action.
- For example, a firm financing its expansion plan by withdrawing money from its bank deposits. In such a case the loss of interest on the bank deposit is the opportunity cost for carrying out the expansion plan.
- Opportunity cost is the **benefit foregone from the next best alternative.**

(32) Out-of-pocket Cost:

- It is that portion of total cost, which involves cash outflow.
- This cost concept is a **short-run concept** and is used in decisions relating to fixation of selling price in recession, make or buy, etc.
- Out-of-pocket costs can be avoided or saved if a particular proposal under consideration is not accepted.

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(33) Shut down Costs:

- Those costs**, which continue to be, incurred even when a plant is temporarily shutdown** e.g. rent, rates, depreciation, etc.
- These costs cannot be eliminated with the closure of the plant.
- In other words, all fixed costs, which cannot be avoided during the temporary closure of a plant, will be known as shut down costs.

(34) Sunk Costs:

- Historical costs incurred in the past **are known as sunk costs**.
- They **play no role in decision making** in the current period.
- For example, in the case of a decision relating to the replacement of a machine, the written down value of the existing machine is a sunk cost and therefore, not considered.

(35) Absolute Cost:

- These costs refer to the cost of any product, process or unit **in its totality.**
- When costs are presented in a statement form, various cost components may be shown in absolute amount or as a percentage of total cost or as per unit cost or all together.
- Here the costs depicted in absolute amount may be called absolute costs and are base costs on which further analysis and decisions are based.

(36) Discretionary Costs:

- Such costs are **not tied to a clear cause and effect relationship between inputs and outputs**.
- They usually arise from periodic decisions regarding the maximum outlay to be incurred.
- Examples include advertising, public relations, executive training etc.

(37) Period Costs:

- These are the costs, which are **not assigned to the products**
- but are **charged as expenses against the revenue**
- **of the period in which they are incurred**.
- All **non-manufacturing costs** such as general and administrative expenses, selling and
    - distribution expenses are recognised as period costs.

(38) Engineered Costs:

- These are costs that result specifically from a clear cause and effect relationship between inputs and outputs. The relationship is usually personally observable.
- Examples of inputs are direct material costs, direct labour costs etc.

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- Examples of output are cars, computers etc.

(39) Explicit Costs:

- These costs are **also known as out of pocket costs** and refer to costs involving immediate payment of cash.
- Salaries, wages, postage and telegram, printing and stationery, interest on loan etc. are
    - some examples of explicit costs involving immediate cash payment.

(40) Implicit Costs:

- These costs **do not involve any immediate cash payment**.
- They are not recorded in the books of account.
- They are also known as **economic costs.**

Methods of Costing

Different industries follow different methods of costing because of the differences in the nature of their work. The various methods of costing are as follows:

- **Job Costing** - In this case each job is treated as distinct from other and the cost of each job is calculated separately. e.g. Scooter Servicing, fabrication workshop, ship building, etc.

- **Batch Costing** - It is a variation of job costing. A batch is considered as a job and the cost of each batch is calculated separately. e.g., Pharmaceutical Companies, toothpastes, spare parts etc.

- **Contract Costing** - It is another variation of job costing, but the job is of a big size relating to civil construction or mechanical erection etc. and involves a longer period to complete. Say more than a year. e.g. Construction of Bridges, Dams, Housing Complexes, Road Building, etc.

- **Process Costing/Operation Costing** - This method is applied where different processes are involved in a sequence to manufacture a particular product. Cost for each such process is required to be calculated separately. e.g., Sugar factories, paper industries, etc.

- **Unit/Single/Output Costing** - This method is applied where a continuous production of identical items is done. e.g., News paper Printing, Scooter manufacturing, coal mining etc. This is the simplest form of costing method.

- **Operating Costing** - It is applied to service industries like transportation of goods & passengers, hospitals, hotels, health clubs and other service centers.

- **Multiple Costing** - A combination of above different methods of costing may be used as per the need and suitability of the organisation. It is called as " Multiple Costing ". It is not a separate method of costing but use of a combination of different methods of costing.

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Techniques of Costing

- **Absorption costing:** It is the practice of charging all costs both variable and fixed to operations, processes or products. It is also referred to as total costing since the total costs are allotted to the cost units. It differs from marginal cost where fixed costs are excluded.

- **Marginal Costing**: It is the practice of charging only the variable cost to cost units and the fixed costs attributable to the relevant period are written off in full against the contribution for that period. It is a valuable tool for decisions like product pricing, product mix, preparing budgets etc.

- **Standard Costing:** It is a technique whereby; standard costs and revenues are pre-determined and later on compared with actual costs and revenues. Standard costing is extremely helpful for cost control and is generally used along with budgetary control.

- **Uniform Costing**: It is the practice of using the same costing system i.e. the same basic methods, principles, and techniques, by several firms in an industry. This enables comparison of performance of different firms.

- **Direct Costing:** It is the practice of charging all direct cost to operations, processes or products leaving all indirect cost to be written off against profits of the period in which they are arise. The difference between the direct costing and marginal costing is so insignificant that usually both the terms are used inter - changeably.

Coding System

Code is defined as

- "a **system of symbols** designed to be applied to a classified set of items to give a brief account reference, facilitating entry collation and analysis"
- Hence cost classification forms the basis of any cost coding. It helps us understand the characteristic of any cost through a short symbolised form.
  - **Advantages of a coding system:** The following are some of the advantages of a well-designed coding system:

    (a) Short and simple: Since the code is, most of the times, briefer than a description, it saves time when systems are worked upon manually and in case the system is computerised it reduces the data storage capacity. The illustration above demonstrates this advantage very clearly.

    (b) Clarity: A code helps in reducing ambiguity. In case two professionals understand the same item differently a code will help them objectively.

    (c) Computer friendly: Unlike detailed descriptions, a code facilitates data processing in computerised systems.

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❖ **The requirements for an efficient coding system**

(a) Unique: Every number used in the code should be unique and certain, i.e. it should be easily identified from the structure of the code.

(b) Flexibility: Elasticity and comprehensiveness is an absolute must for a well-designed coding system. It should be possible to identify a code for every item and the coding system should be capable of expanding to accommodate new items.

(c) Brief: The code should be brief and meaningful.

(d) Centralised: The maintenance of the coding system should be centrally controlled. It should not be possible for individuals to independently add new codes to the existing coding system.

(e) Similarity: Codification systems should be of the same length. The lawmakers envisage the needs for bringing out the new legislation for creation of the Limited Liability Partnership to meet with the contemporary growth of the Indian economy.

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Study Note – 2 | Cost Ascertainment - Elements of Costs

2.1 Material Cost

Meaning of Material Cost

The general meaning of material is all commodities/ physical objects supplied to an organization to be used in producing or manufacturing of finished or intermediate goods.

Generally, materials constitute a major portion of the cost of production in a manufacturing concern. Proper care and control are therefore required for purchase of materials, storage of materials and issue of materials in order to keep the material cost in control.

A. Direct Materials

Direct Materials are those materials which enter into and form part of the product and include -

- all materials specifically required for a job order or process
- all materials transferred from one process to another process
- primary packing materials etc.

B. Indirect Materials

Indirect Materials are materials which are not directly traceable to finished products such as consumable stores used in operations, lubricating oil, grease, fuel oil, etc.

C. Direct Material vs Indirect Material

This grouping under direct and indirect is quite often on **the basis of materiality**. Sometimes direct cost may be of such a small value that the cost of maintaining and collecting this data will be more than the cost of material itself. In such a case, the material may be conveniently classified as indirect material.

Material Control – Objectives

The objectives of a system of material control are the following:

- Minimizing interruption in production process by ensuring that no activity, particularly production, suffers from interruption for want of materials and stores.
- Optimization of Material Cost by ensuring that the materials are procured at the lowest cost while also ensuring the quality of the material. Further, other related cost such as holding cost, ordering cost etc., also should be reduced.
- Reduction in wastages and losses
- Providing adequate and reliable information for costing, decision making and other control purposes.
- Completion of order in time: Proper material management is very necessary for fulfilling orders of the firm. This adds to the goodwill of the firm.

Elements of Material Control

Material control involves efficient functioning of the following operations:

- Purchasing of materials
- Receiving of materials
- Inspection of materials
- Storage of materials
- Issuing materials
- Maintenance of inventory records
- Stock audit

Purchase of Material

A. Bill of Material

- It is also known as **Materials Specification List or Materials List.**

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- It is a **detailed list** specifying the **standard quantities and qualities** of materials and components **required** for producing a product or carrying out of any job.
- The materials specification list is **prepared by the product development team** commonly known as engineering or **planning department** in a standard form.
- It serves as an **advance intimation to the Purchase department** to make the purchases from time to time, so that the material can be kept ready at the time of manufacture or execution of a service order.
- **Use of "Bill of Materials"** by various departments in the following ways :
    - **To the Stores Department :**
        - To provide a basis for preparing materials purchase requisitions.
        - To act as authorisation for issuing total material requirement.
        - To reduce paperwork and clerical activity in verification of each and every item of materials to be issued.
    - **To the Cost Accounts Department :**
        - To prepare budgets or estimates of materials cost for jobs / processes / products.
        - To compute materials cost variances, analyse reasons and hence control excess cost of material used.
    - **To the Production Control Department :**
        - To control usage of materials.
        - To save time otherwise spent in preparing separate requisitions of material.
    - **To the Engineering or Planning Department :**
        - For record, reference and control purposes.

B. Material Requisition Note

- It is also known as **material requisition slip**.
- It is a voucher of **authority used to get materials issued from store**.
- Generally, it is **prepared by the production department.**
- Material requisition generally includes information such as Number and date of requisition, Department demanding the material, Particulars of materials Quantity demanded, Unit Cost, Total Cost, Signature of the requesting authority; etc.
- A specimen form of material requisition is given below :-

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ABC Co. Ltd.
MATERIAL REQUISITION

Production Order No. :
Standing Order No. :
Bill of Material No. :

No. :
Date :
Department :

Particulars	Code No.	Quantity	Cost	
			Rate Rs.	Amount Rs.

Issued and Authorized by	Received by	Bin Card posted by	Stores ledger posted by	Priced by

C. Difference between Bill of Material and Material Requisition Note

Particulars	Bill of Materials	Materials Requisition
1. Meaning	It is a comprehensive list of materials with exact description and specifications required for a job or other production units.	It is a formal written demand / request, usually from the production department to stores for the supply of specified materials, stores etc.
2. Information contents	This provides information about required quantities and if there is any deviation from the standards, it can easily be detected.	It provides information on actual quantities of materials consumed by production departments.
3. Origination	It is prepared by the Engineering or Planning Department in a standard form.	It is prepared by production department and is further signed by the storekeeper for actual issue of materials.
4. Purposes	It acts as a single authorisation for the issue of all materials and stores items mentioned in it.	It authorises storekeeper to issue the requisitioned materials and record the same in bin card.

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Particulars	Bill of Materials	Materials Requisition
	It provides an advance intimation to stores dept. about the requirement of the materials. It reduces paperwork by serving as a work order to the production department and a document for computing the cost of materials for a particular job or work order to the cost department.	The purpose of materials requisition note is to draw material from the store by concerned departments.

D. Purchase Requisition

- This is a document which **authorizes the purchase department to order for the materials** specified in the note.
- A purchase requisition is a form **used for making a formal request** to the purchasing department to purchase materials.
- This form is **usually filled up by the storekeeper** for regular materials and by the departmental head for special materials (not stocked as regular items).

E. Inviting Quotation/ Request for proposal (RFP)

- After receipt of duly authorised purchase requisition from the store department or other departments, role of purchase department comes into play.
- Materials purchase department has to decide
  - ***What to purchase?***
  - ***When to purchase?***
  - ***How much to purchase?***
  - ***From where to purchase?***
  - ***At what price to purchase.?***
- To answer these questions, purchase department makes an enquiry into the market for the required material and send an RFP to the vendors and invites quotations from them.

F. Selection of Quotation/ Proposal

- After invitation of tender from the vendors, interested vendors who are fulfilling all the criteria mentioned in the tender notice send their price **quotations/proposals** to the purchase department.
- On the receipt of quotations, a **comparative statement is prepared.**
- For selecting material suppliers, the **factors which the purchase department keeps in its mind** are—
  - price,
  - quantity,
  - quality offered,
  - time of delivery,

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- mode of transportation,
- terms of payment,
- reputation of supplier etc.

G. Preparation and execution of Purchase Orders

- Upon **selection of the best quotation**, the purchase manager or concerned officer proceeds to issue the formal purchase order.
- It is a **written request to the supplier**
  - to supply **specified materials**
  - at **specified rates** and
  - within a **specified period**.

H. Receipt and inspection of materials (Goods Received Note and Material Return Note)

- **Upon receipt** of materials along with relevant documents the Stores Department arranges for the **inspection of the materials** for its conformity with purchase order.
- After **satisfactory inspection** materials are received and **Goods Received Note** is issued.
- If some materials are **not found in good condition or are not in conformity** with the purchase order are **returned back** to the vendor along with a **Material Returned Note**.

I. Checking and passing of bills for payment

- The invoice received from the supplier is sent to the accounts section to check authenticity and mathematical accuracy. The quantity and price are also checked with reference to goods received note and the purchase order respectively.
- The **accounts section after checking its accuracy finally certifies and passes the invoice for payment**.

Valuation of Material Receipts

Ascertainment of cost of material purchased is called valuation of materials of material receipts. Cost of material includes cost of purchase net of trade discounts, rebates, duty draw-back, input credit availed, etc. and other costs incurred in bringing the inventories to their present location and condition. Treatment of items associated with purchase of materials is as under:

A. Discounts and Subsidy

- **Trade Discount**
  Trade discount is **deducted from the purchase price** if it is not shown as deduction in the invoice.
- **Quantity Discount**
  Like trade discount quantity discount is also shown as deduction from the invoice. It is **deducted from the purchase price** if not shown as deduction.
- **Cash Discount**
  Cash discount is **not deducted from the purchase price**.
- **Subsidy/ Grant/ Incentives**
  Any subsidy/ grant/ incentive received from the Government or from other sources is **deducted from the cost of purchase.**

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B. Duties and Taxes

- **Road Tax/ Toll Tax**
  Road tax/ Toll tax if paid by the buyer then it is **included with the cost of purchase**.
- **Goods and Service Tax (GST)**
  CGST/SGST is paid on **intra-state** supply and collected from the buyers. Similarly, **IGST** is paid on **inter-state** supply and collected from the buyers.
  - GST is **excluded** from the cost of purchase if credit for the same is available.
  - Unless mentioned specifically it should not form part of cost of purchase.
- **Basic Custom Duty**
  Basic Custom duty is paid on import of goods from outside India. It **is added** with the purchase cost.

C. Penalty and Charges

- **Demurrage**
  Demurrage is a **penalty** imposed by the transporter for delay in uploading or offloading of materials. It is an **abnormal cost and not included with cost of purchase.**
- **Detention charges/ Fine**
  Detention charges/ Fine is imposed for non-compliance of rule or law by any statutory authority. It is an **abnormal cost and not included with cost of purchase.**
- **Penalty**
  Penalty of any type is not included with the cost of purchase

D. Other expenditures

- **Insurance charges**
  Insurance charges are paid for protecting goods during transit. It is **added** with the cost of purchase.
- **Commission or brokerage paid**
  Commission or brokerage paid is **added** with the cost of purchase.
- **Freight inwards**
  It is **added** with the cost of purchase as it is directly attributable to procurement of material.
- **Cost of containers**
  Treatment of cost of containers are as follows:
  - **Non-returnable containers:** The cost of containers is **added** with the cost of purchase of materials.
  - **Returnable Containers:**
    - If on return of containers **cost of containers is returned back,** then in this case cost of containers is **not added** with the cost of purchase.
    - If the amount of refund on returning the container is less than the amount paid, then **only short fall is added** with the cost of purchase.
- **Shortage**
  Shortage in materials are treated as follows:
  - **Shortage due to normal reasons: Good units absorb the cost of shortage due to normal reasons**. Losses due to breaking of bulk, evaporation, due to unavoidable conditions etc. are the reasons of normal loss.

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- **Shortage due to abnormal reasons:** shortage arises due to abnormal reasons such as material mishandling, pilferage, due to avoidable reasons are not absorbed by the good units. Losses due to abnormal reasons are **debited to costing profit and loss account.**

MATERIAL STORAGE & RECORDS

Proper storing of materials is of primary importance. 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 of materials. Apart from preservation of quality, the storekeeper also has to ensure safe custody of the material. It should be the function of storekeeper that the right quantity of materials always should be available in stock.

The record of stores may be maintained in three forms:

- **Bin Cards**
- **Stock Control Cards**
- **Store Ledger**

A. Bin Cards

- It is a **quantitative record** of inventory which shows the quantity of inventory available in a particular bin.
- **Bin refers to a box/ container/ space where materials are kept.**
- **Card is placed with each of the bin** (space) to record the details of material like receipt, issue and return. It is maintained by store department.
- **Advantages:**
  - There would be **fewer chances of mistakes** being made as entries are made at the same time as goods received or issued by the person actually handling the materials.
  - 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.
  - Identification of the different items of materials is facilitated by reference to the Bin Card the bin or storage receptacle.
- **Disadvantages:**
  - Store records are dispersed over a wide area.

B. Stock Control Cards:

- It is also a **quantitative record** of inventory **maintained by stores department** for every item of material.
- In other words, it is a record which shows the overall inventory position in store.
- Recording includes receipt, issue, return, in hand and order given.
- **Advantages:**
  - Records are kept in a more compact manner so that reference to them is facilitated.
  - Records can be kept in a neat and clean way by men solely engaged in clerical work so that a division of workers between record keeping and actual material handling is possible.

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

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

C. Stores Ledger

- It is a record of all receipts, issues and balances of materials along with the rates and their values.
- Separate ledger sheets are maintained in stores ledger for each item of material.
- The ledger sheets are generally in loose leaf form in binders to allow flexibility.
- It serves as a quantitative and value wise record of materials in stores.

D. Difference between Bin Card and Stores Ledger

Particulars	Bin Card	Stores Ledger
1. Maintained by	Storekeeper	Cost Accounting Department
2. Nature	Stores Recording Document	Accounting Record
3. Contents	Quantitative only	Quantitative cum financial
4. Time of recording	At the time of transaction	After the transaction takes place
5. Source documents used	Posted from material requisition slips Goods received notes etc.	Posted from material requisition slips Goods received notes etc.
6. Manner of posting	Each transaction is recorded individually.	Transactions are posted on periodic basis.

Inventory Control

The Chartered Institute of Management Accountants (CIMA) defines Inventory Control as **"The function of ensuring that sufficient goods are retained in stock to meet all requirements without carrying unnecessarily large stocks."**

- The objective of inventory control is to make a **balance between sufficient stock and over-stock.**
- The stock maintained should be **sufficient to meet the production** requirements so that uninterrupted production flow can be maintained. Insufficient stock not only pause the production but also cause a loss of revenue and goodwill.
- On the other hand, Inventory requires some funds for purchase, storage, maintenance of materials with a risk of obsolescence, pilferage etc.

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➢ **A trade-off between Stock-out and Over-stocking is required.**



Inventory Control- By Setting Quantitative Levels

A. Re-order Stock Level (ROL)

- This level **lies between minimum and the maximum levels** in such a way that before the material ordered 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.
- It is calculated as:

ROL = Maximum Consumption × Maximum Re-order Period

  - Maximum Consumption = The maximum rate of material consumption in production activity
  - Maximum Re-order period = The maximum time to get order from supplier to the stores
- This can also be calculated alternatively as below:

ROL = Minimum Stock Level + (Average Rate of Consumption × Average Re-order period)

  - Minimum Stock Level = Minimum Stock level that must be maintained all the time.
  - Average Rate of Consumption = Average rate of material consumption in production activity. It is also known as normal consumption/ usage
  - Average Re-order period = Average time to get an order from supplier to the stores. It is also known as normal period. (Re-order period is also known as Lead time)

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B. Re-Order Quantity

- Re-order quantity is the quantity of materials for which purchase requisition is made by the store department.
- While setting the quantity to be re-ordered, consideration is given to the maintenance of minimum level of stock, re-order level, minimum delivery time and the most important the cost.
- Hence, the **quantity should be where, the total of carrying cost and ordering cost be at minimum.**
- For this purpose, **an economic order quantity** should be calculated.

C. Economic Order Quantity (EOQ)

- The size of an order for which **total of ordering and carrying cost are at minimum**.
    - **Ordering Cost:** The costs which are associated with the purchase or order of materials. It includes cost to invite quotations, documentation works like preparation of purchase orders, employee cost directly attributable to the procurement of material, transportation and inspection cost etc.

    - **Carrying Cost:** The costs for holding/ carrying of inventories in store. It includes the cost of fund invested in inventories, cost of storage, insurance cost, obsolescence etc.
- The Economic Order Quantity (EOQ) is calculated as below:

$$EOQ = \sqrt{\frac{2 \times \text{Annual Requirement (A)} \times \text{Cost per order (O)}}{\text{Carrying Cost per unit per annum (C)}}}$$

    - Annual Requirement (A)- It represents demand for Raw material or Input for a year.
    - Cost per Order (O) - It represents cost of placing an order for purchase.
    - Carrying Cost (C) – It represents cost of carrying average inventory on annual basis.

- **Assumptions underlying E.O.Q.:**
    - Ordering cost per order and carrying cost per unit per annum are known and they are fixed.
    - Anticipated usage of material in units is known.
    - Cost per unit of the material is constant and is known as well.
    - The quantity of material ordered is received immediately i.e. the lead time is zero.

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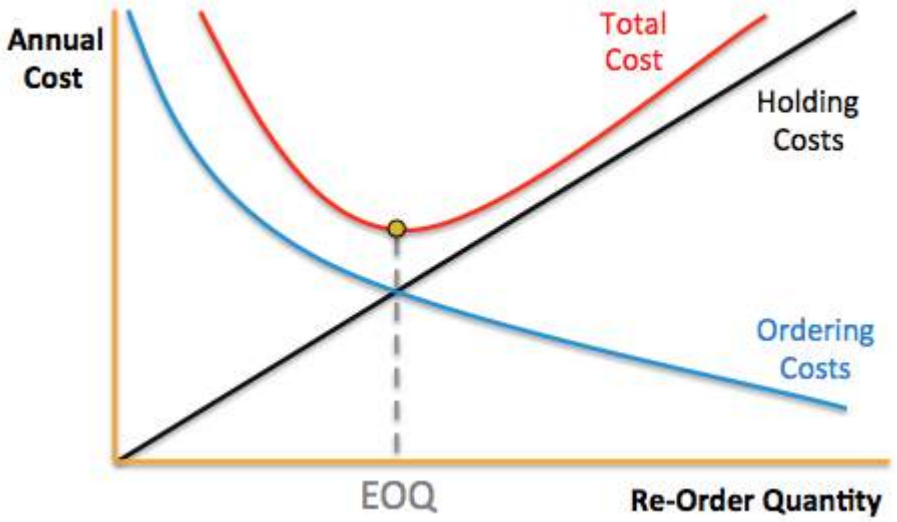

D. Minimum Stock Level

- It is lowest level of material stock, 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 calculated as below:

Minimum Stock Level = Re-order Stock Level - (Average Consumption Rate × Average Re-order Period)

E. Maximum Stock Level

- It is the highest level of quantity for any material which can be held in stock at any time.
- Any quantity beyond this level cause extra amount of expenditure due to engagement of fund, cost of storage, obsolescence etc.
- It can be calculated as below:

Maximum Stock Level = Re-order Level + Re-order Quantity - (Minimum Consumption Rate × Minimum Re-order Period)

Here, Re-order Quantity may be EOQ

F. Average Inventory Level

- This is the quantity of material that is normally held in stock over a period.
- It is also known as normal stock level.
- It can be calculated as below :

Average Stock Level = Minimum Stock Level + 1/2 Re-order Quantity

- Alternatively, it can be calculated as below :

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

G. Danger level

- It is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made.
- It can be calculated as below :

Danger Level = Average Consumption* × Lead time for emergency purchase

H. Buffer Stock

- Some quantity of stock may be kept for contingency to be used in case of sudden order; such stock is known as buffer stock.

I. Just in Time (JIT) Inventory Management

- JIT is a system of inventory management with an approach to have zero inventories in stores.
- According to this approach **material should only be purchased when it is actually required for production.**
- JIT is based on **two principles**
  - Produce goods only when it is required and
  - the products should be delivered to customers at the time only when they want.
- It is also known as **'Demand pull'** or **'Pull through'** system of production.
- In this system, production process actually starts after the order for the products is received.
- Based on the demand, production process starts and the requirement for raw materials is sent to the purchase department for purchase.

Inventory Control-On the basis of Relative Classification

A. ABC Analysis

- This method of stores control is based on the concept of **"Management by exception" or "Selective Inventory Management".**
- It is an analytical method of material control that aims at **concentrating efforts in those sectors where attention is needed most.**
- Under this method, the total number of items of materials are **classified into three categories namely A, B, and C according to their value, availability, importance, etc.**
  - It is generally observed that a very less percentage of the total items (say 5 to 10%) account for a high percentage of the total value of materials consumed (say 60 to 70%). These items are classified under category 'A'.
  - Similarly, the items which account for 15 to 20% of the total number of items may have 15 to 20% of the total value of materials, which are classified under category 'B'.

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    - The another set of items which are around 60 to 70% in terms of quantity may hardly account for 5 to 10% of the total value of materials consumed during the year, these are classified under category ' C '.
- Once the total number of items are grouped under these three categories, the management can now focus their attention more on category 'A' items and relatively low on category 'B' and 'C' items.

- **Advantages of ABC analysis :** The advantages of ABC analysis are the following:
    - Continuity in production
    - Lower cost
    - Less attention required 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.
    - Systematic working

B. Fast Moving, Slow Moving and Non-Moving (FSN) Inventory

- Under this system, inventories are controlled by **classifying them on the basis of frequency of usage.**
    - **Fast Moving :** This category of items is placed nearer to store issue point and the stock is reviewed frequently for making of fresh order.
    - **Slow Moving :** This category of items is given stored little far and stock is reviewed periodically for any obsolescence and may be shifted to Non-moving category.
    - **Non-Moving :** This category of items is kept for disposal. This category of items is reported to the management and an appropriate provision for loss may be created.

C. Vital, Essential and Desirable (VED)

- Under this system of inventory analysis, inventories are **classified on the basis of its criticality** for the production function and final product.
    - **Vital :** Items are **classified as vital when its unavailability can interrupt the production** process and cause a production loss. Items under this category are strictly controlled by setting re-order level.
    - **Essential :** Items under this category are essential but not vital. The **unavailability may cause sub standardisation and loss of efficiency** in production process. Items under this category are reviewed periodically and gets the **second priority**.
    - **Desirable :** Items under this category are optional in nature, **unavailability does not cause any production or efficiency loss**.

D. High Cost, Medium Cost, Low Cost (HML)Inventory

- Under this system, inventory is **classified on the basis of the cost of an individual item**, unlike ABC analysis where inventories are classified on the basis of overall value of inventory.
- A range of cost is used to classify the inventory items into the **three categories**.
- **High Cost inventories are given more priority for control, whereas Medium cost and Low-cost items are comparatively given lesser priority.**

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Using Ratio Analysis

A. Input Output Ratio

- It is the **ratio of quantity of input of material to Output units**.
- This ratio **enables comparison** of actual consumption with standard consumption.

B. Inventory Turnover Ratio

- This ratio is useful for finding fast moving and slow-moving items.

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

$$\text{Average stock} = 1/2\ (\text{opening stock} + \text{closing stock})$$

$$\text{Average no. of days of Inventory holding} = \frac{360\ \text{days}/12\ \text{months}}{\text{Inventory Turnover Ratio}}$$

- High inventory turnover ratio indicates that the material in the question is a fast moving one.
- A low turnover ratio indicates over investment and locking up of the working capital in inventories.

Physical Control

A. 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 even the re-ordering level, and
  - the **other to keep the remaining quantity**.
- **Issues are made out of the larger part**;
- **As soon as it becomes necessary to use quantity out of the smaller part of the bin, fresh order is placed.**

B. Establishment of system of budgets

- To control investment in the inventories, the exact quantity of various types of inventories and the time when they would be required can be known based on which a requirement budget can be prepared.
- Such a budget will discourage the unnecessary investment in inventories.

C. Perpetual inventory records

- The system of **material control while it is in storage on a continuous basis is known as "Perpetual Inventory System"**.
- In this case, the **balance of materials in hand can be noted at any point of time.**
- The two main functions of the perpetual inventory system are:
  - Recording store receipts and issue so as to determine at any time the stock in hand, in quantity or value or both, without the need for physical count of stock.

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- Continuous verification of the physical stock with reference, to the balance recorded in the store's records, at any frequency, as convenient for the management.

- **Advantages of perpetual inventory**
  - Physical stocks can be counted and book balances adjusted **as and when desired** without waiting for the entire stock-taking to be done.
  - **Discrepancies are easily located** and thus corrective action can be promptly taken to avoid their recurrence.
  - A systematic review of the perpetual inventory reveals the existence of surplus, dormant, obsolete and slow-moving materials, so that **remedial measures may be taken in time**.

D. Continuous Stock Verification

- The system of continuous stock-taking consists of **physical verification of items** of inventory.
- The stock verification **may be done by internal audit department** but are independent of the store and production staff.
- Stock verification are done at **appropriate interval of time without prior notice.**
- The **element of surprise**, that is essential for effective control of the system.

- **Advantages of continuous stock-taking:**
  - Closure of normal functioning is not necessary.
  - Stock discrepancies are likely to be brought to the notice and corrected much earlier than under the annual stock-taking system.
  - The system generally has a sobering influence on the stores staff because of the element of surprise present therein.
  - The movement of stores items can be watched more closely by the store's auditor so that chances of obsolescence buying are reduced.
  - Final Accounts can be ready quickly. Interim accounts are possible quite conveniently.

MATERIAL ISSUE PROCEDURE

A. Material Requisition Note

- It is also known as **material requisition slip**.
- It is a voucher of **authority used to get materials issued from store**.
- Generally, it is **prepared by the production department.**

B. Material Transfer Note

- Sometimes **excess material remaining** on one job is **transferred to another job** directly **without returning the material to the stores.**
- When such material is transferred, a **Material Transfer Note is prepared** indicating the job number to which the materials are transferred.
- This transaction **does not affect the stores department** and **no entry is made in the store's** ledgers.

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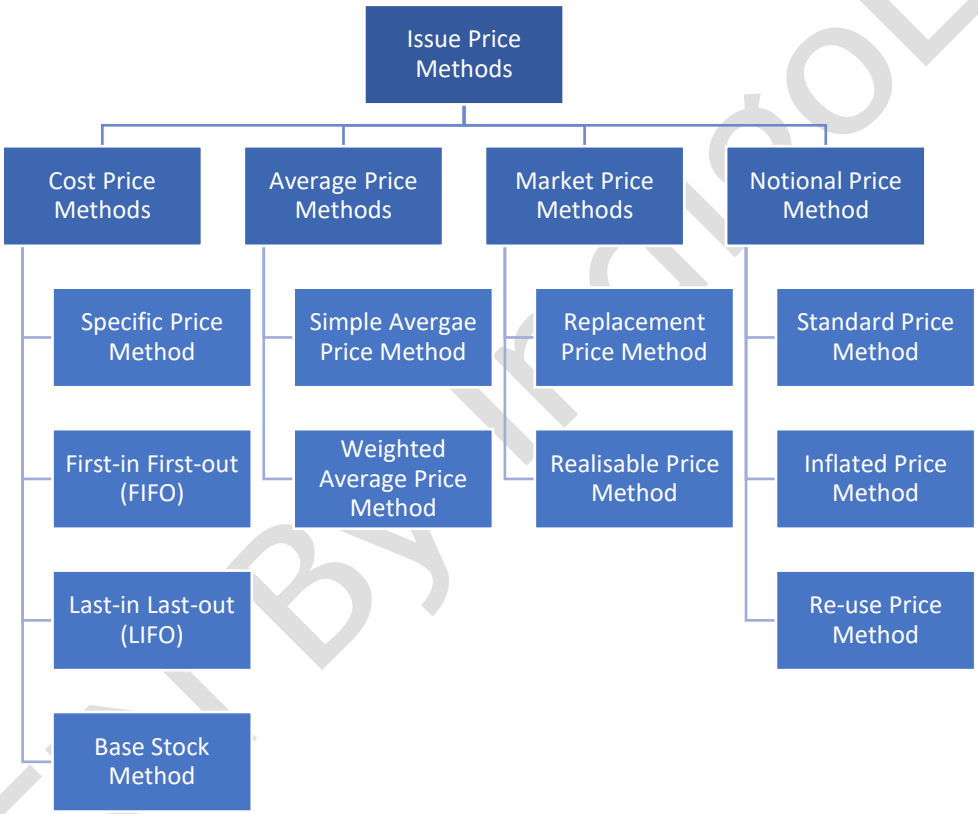
C. Material Return Note :

- Where any surplus material is **returned to stores** a Material Return Note is prepared.
- It is also known as a **Shop Credit Note** or alternatively as a **Stores Debit Note**.

VALUATION OF MATERIAL ISSUES

- Materials 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 tackling this situation.
- As per the Accounting Standard No. 2 on "Valuation of Inventories", issued by ICAI, it. is recommended that the Historical Cost of inventories should normally be determined by **using FIFO, or Average Cost formulae.**



Cost Price Methods

A. Specific Price Method

- Under this method, the specific price of materials issued to a particular job is charged to the job. This method is used where materials are purchased specifically for a job.

B. First-in First-out Method

- Under this method, materials purchased first are to be issued first. Materials from the second lot will be issued only when the first lot is completely exhausted.

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C. Last-in Last-out Method

- Under this method, materials that are purchased last are issued to the production first.

D. Base Stock Method

- Under this method, **a minimum quantity of stock is always valued at a fixed price based upon the earliest lot of materials**.
- It is **used as Base Stock or Reserve Stock** to meet emergency consumption requirements.
- The **quantity in excess of the base stock may be valued using any of the above methods**.
- This is more a method of valuing inventory than a method of valuing issues since Base Stock is valued at earliest price and balance stock is valued using any of the above methods.
- This method is **not an independent method as it uses FIFO or LIFO or any other method.** Its advantages and disadvantages therefore will depend upon the use of the other method viz., FIFO or LIFO.

Average Price Methods

A. Simple Average Price Method

- Under this method, materials issued are valued at **average price**, which is calculated by dividing the total of rates at which different lot of materials are purchased by total number of lots.
- In this method **quantity purchased in each lot is ignored**.
- This method is suitable when the materials are received in uniform lots of similar quantity, and prices do not fluctuate considerably.

B. Weighted Average Price Method

- Unlike Simple Average Price method, this method **gives due weightage to quantities** also.
- Under this method, issue price is calculated dividing sum of products of price and quantity by total number quantities.
- This method is useful in case when quantity purchased under each lot is different and price fluctuates frequently.

Market Price Methods

A. Replacement Price Method

- Under this method, materials are issued at a price at which they are available in the market at the time of such issues.

B. Realizable Price Method

- Under this method, material issues are priced at a value which the material would realize if sold in the market.

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Notional Price Methods

A. Standard Price Method

- Under this method, standard price in respect of each type of material is fixed and all the issues are valued at standard price.

B. Inflated Price Method

- In case material suffers loss in weight due to natural or climatic factors, e.g., evaporation, the issue price of the material is inflated to cover up the losses.

C. Re-use Price Method

- When materials are rejected and returned to the stores or a processed material is put to some other use, then for the purpose it is meant, then such materials are priced at a rate quite different from the price paid for them originally. There is no final procedure for valuing use of material.

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Treatment of Various types of Losses			
Type of Loss	**Meaning**	**Treatment of Normal Loss**	**Treatment of Abnormal Loss**
Waste	The portion of raw material **which is lost during storage or production and discarded**. The waste may or may not have any value.	Cost of normal waste is **absorbed by good production units.**	The cost of abnormal loss is **transferred to Costing Profit and loss account.**
	Scrap	The cost of scrap is **borne by good units.** **Any income arises on account realisable value is deducted from the cost.**	The cost of abnormal loss is **transferred to Costing Profit and loss account (**net of any sales realisaiton from scrap)**.**

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Spoilage	The 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**.	The cost of normal spoilage is **borne by good units.** **Any income arises on account realisable value is deducted from the cost.**	The cost of abnormal loss is **transferred to Costing Profit and loss account (**net of any sales realisaiton from scrap)**.**

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Defective	It signifies those units or portions of production which **do not meet the quality standards**. **Reworks** Defectives **which can be re-made** as per the quality standard by using additional materials are known as reworks. **Rejects** Defectives **which cannot be brought up to the quality** standards are known as rejects. The rejects may either be disposed- off or re-cycled for production process.	The cost of normal spoilage is **borne by good units.** **Any income arises on account realisable value is deducted from the cost.**	The cost of abnormal loss is **transferred to Costing Profit and loss account (**net of any sales realisaiton from scrap)**.**
Obsolescence	Obsolescence is defined as "the loss in the intrinsic value of an asset due to its supersession".	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.	

Illustrations

Illustration - 1

At what price per unit would Part No. A 32 be entered in the Stores Ledger, if the following invoice was received from a supplier:

Invoice	**Amount(Rs.)**

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200 units Part No. A 32@ Rs. 5	1,000
Less: 20% discount	(200)
	800
Add: SGST @ 12%	96
	896
Add: Packing charges(5 non-returnable boxes)	50
	946

1. A 2% cash discount will be given if payment is made in 30 days.

Documents substantiating payment of SGST is enclosed for claiming Input credit.

Illustration -2

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

Particulars	**Amount (Rs.)**
Chemical A: 10,000 kgs. at Rs.10 per kg.	1,00,000
Chemical B: 8,000 kgs. at Rs. 13 per kg.	1,04,000
Basic custom duty @ 10% (Credit is not allowed)	20,400
Railway freight	3,840
Total cost	**2,28,240**

A shortage of 500 kgs. in chemical A and 320 kgs. In chemical B is noticed due to normal breakages.

You are required to determine the rate per kg. of each chemical, assuming a provision of 2% for further deterioration.

Illustration - 3

Compute E.O.Q. and the total variable cost for the following:

Annual Demand = 5,000 units

Unit price = Rs. 20.00

Order cost = Rs. 16.00

Storage rate = 2% per annum

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Interest rate = 12% per annum

Obsolescence rate = 6% per annum

Determine the total cost that would result for the items if an incorrect price of Rs.12.80 is used.

Illustration - 4

Anil & Company buys its annual requirement of 36,000 units in 6 instalments.

Each unit costs Re.1 and the ordering cost is Rs.25.

The inventory carrying cost is estimated at 20% of unit value.

Find the total annual cost of the existing inventory policy.

How much money can be saved by Economic Order Quantity?

Illustration - 5

A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 20X1:

(i) Annual demand of Alpha 8,000 units

(ii) Cost of placing an order Rs. 200 per order

(iii) Cost per unit of Alpha Rs. 400

(iv) Carrying cost p.a. 20%

The company has been offered a quantity discount of 4 % on the purchase of 'Alpha' provided the order size is 4,000 components at a time.

Required:

(i) Compute the economic order quantity

(ii) Advise whether the quantity discount offer can be accepted.

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Illustration - 6

The complete Gardener is deciding on the economic order quantity for two brands of lawn fertilizer. Super Grow and Nature's Own. The following information is collected:

	FERTILIZER	
	Super Grow	Nature's Own
Annual demand	2,000 bags	1,280 bags
Relevant ordering cost per purchase order	Rs.1,200	Rs. 1,400
Annual relevant carrying cost per bag	Rs. 480	Rs. 560

Required:

(i) Compute EOQ for Super Grow and Nature's own.

(ii) For the EOQ, what is the sum of the total annual relevant ordering costs and total annual relevant carrying costs for Super Grow and Nature's own?

(iii) For the EOQ, compute the number of deliveries per year for Super Grow and Nature's own.

Illustration - 7

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,

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(b) Minimum level,

(c) Maximum level,

(d) Average stock level

Illustration – 8

From the details given below, calculate:

(i) Re-ordering level

(ii) Maximum level

(iii) Minimum level

(iv) Danger level.

Re-ordering quantity is to be calculated on the basis of following information:

Cost of placing a purchase order	Rs. 20
Number of units to be purchased during the year	5,000 units
Purchase price per unit (inclusive of transportation cost)	Rs. 50
Annual cost of storage per unit	Rs. 5
Details of lead time	
Average	10 days
Maximum	15 days
Minimum	5 days
Emergency purchases	4 days
Rate of consumption	
Average	15 units per day
Maximum	20 units per day

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Illustration – 9

A Company uses three raw materials A, B and C for a particular product for which the following data apply:

Raw Material	Usage per unit of Product (Kgs.)	Re-order quantity (Kgs.)	Price per Kg.	Delivery period (in weeks)			Re-order level (Kgs)	Minimum level (Kgs.)
				Minimum	Average	Maximum		
A	10	10,000	10	1	2	3	8,000	?
B	4	5000	30	3	4	5	4750	?
C	6	10000	15	2	3	4	?	2000

Weekly production varies from 175 to 225 units, averaging 200 units of the said product. What would be the following quantities:

(i) Minimum stock of A,

(ii) Maximum stock of B,

(iii) Re-order level of C,

(iv) Average stock level of A.

Illustration - 10

M/s Tyrotubes trades in four-wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year-end 2018-19, the report of sales manager revealed that M/s Tyrotubes experienced stock-out of tyres.

The stock-out data is as follows:

Stock-out of Tyres	No. of times
100	2
80	5
50	10
20	20
10	30

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0	33

M/s Tyrotubes loses Rs.150 per unit due to stock-out and spends Rs.50 per unit on carrying of inventory. Determine Optimum safest stock level.

Illustration - 11

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

Number 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	100.00	100	100

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

Illustration – 12

The following data are available in respect of material X for the year ended 31st March 2019.

Opening stock	90,000
Purchases during the year	2,70,000
Closing stock	1,10,000

Calculate:

Inventory turnover ratio, and

The number of days for which the average inventory is held.

Illustration – 13

From the following data for the year ended 31st December 2018, calculate the inventory turnover ratio of the two items and put forward your comments on them.

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	Material A (Rs.)	Material B (Rs.)
Opening stock 1.1.2018	10,000	9,000
Purchase during the year	52,000	27,000
Closing stock 31.12.2018	6,000	11,000

Illustration – 14

Day of month	**In stock**				**Issues**	
	Details	Units	Per unit	Amount (Rs.)	Issued to	Units
1	Opening stock	1,000	10	10,000		
2					Job A	500
3	Purchase	1,500	8	12,000		
4					Job A	500
4					Job B	1000
5					Job C	200
6	Purchase	1,000	9	9,000		
	Total Purchases	3,500			Total Issues	2,200

Compute the value of issues made to Job A, Job B, Job C respectively.

Also compute the value of Closing stock under

i) FIFO
ii) LIFO
iii) Weighted Average method

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Illustration – 15

'AT' Ltd. furnishes the following store transactions for September, 20X1:

Date	Particulars	Units	Amount
1-9-X1	Opening balance	25	162.5
4-9-X1	Issues Req. No. 85	8	-
6-9-X1	Receipts from B & Co. GRN No. 26	50	5.75
7-9-X1	Issues Req. No. 97	12	-
10-9-X1	Return to B & Co.	10	-
12-9-X1	Issues Req. No. 108	15	-
13-9-X1	Issues Req. No. 110	20	-
15-9-X1	Receipts from M & Co. GRN. No. 33	25	6.10
17-9-X1	Issues Req. No. 121	10	-
19-9-X1	Received replacement from B & Co.GRN No. 38	10	-
20-9-X1	Returned from department, material of M & Co. MRR No. 4	5	-
22-9-X1	Transfer from Job 182 to Job 187 in the dept. MTR 6	5	-
26-9-X1	Issues Req. No. 146	10	-
29-9-X1	Transfer from Dept. "A" to Dept. "B" MTR 10	5	-
30-9-X1	Shortage in stock taking	2	-

Write up the priced stores ledger on FIFO method and discuss how would you treat the

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shortage in stock taking.

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Illustration - 16

'AT' Ltd. furnishes the following store transactions for September, 20X1:

Date	Particulars	Units	Amount
1-9-X1	Opening balance	25	162.5
4-9-X1	Issues Req. No. 85	8	-
6-9-X1	Receipts from B & Co. GRN No. 26	50	5.75
7-9-X1	Issues Req. No. 97	12	-
10-9-X1	Return to B & Co.	10	-
12-9-X1	Issues Req. No. 108	15	-
13-9-X1	Issues Req. No. 110	20	-
15-9-X1	Receipts from M & Co. GRN. No. 33	25	6.10
17-9-X1	Issues Req. No. 121	10	-
19-9-X1	Received replacement from B & Co.GRN No. 38	10	-
20-9-X1	Returned from department, material of M & Co. MRR No. 4	5	-
22-9-X1	Transfer from Job 182 to Job 187 in the dept. MTR 6	5	-
26-9-X1	Issues Req. No. 146	10	-
29-9-X1	Transfer from Dept. "A" to Dept. "B" MTR 10	5	-
30-9-X1	Shortage in stock taking	2	-

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Write up the priced stores ledger on FIFO method and discuss how would you treat the shortage in stock taking.

2.2 & 2.3 Employees Cost and Direct Expenses

Introduction

To manufacture a product or to make provision for service, the role of human exertion is inevitable. The term used for human resources may include workers, employees, labourers, staffs etc. The compensation paid, either in monetary terms or in kind and facility is known as wages. Cost of paying wages to workers is popularly known as labour cost as it relates to labour (exertion) they put for manufacturing of product or provision of services; hence, employee cost is also interchangeably known as labour cost. In a nutshell, employee cost is wider term which includes wages, salary, bonus, incentives etc. paid to an employee and charged to a cost object as labour cost.

Employee (Labour) Cost

Benefits paid or payable to the employees of an entity, whether permanent, or temporary for the services rendered by them. Employee cost includes payments made in cash or kind. Employee cost includes the following:

- Wages and salary
- Allowances and incentives
- Payment for overtimes
- Employer's contribution to Provident fund and other welfare funds
- Other benefits (leave with pay, free or subsidised food, leave travel concession etc.) etc

Classification of Employee (Labour) Cost

Employee cost are broadly classified as direct and indirect employee cost

1. **Direct Employee (Labour) Cost**
   Benefits paid or payable to the employees which can be attributed to a cost object in an economically feasible manner. This can be easily identified and allocated to an activity, contract, cost centre, customer, process, product etc
2. **Indirect Employee (Labour) Cost**
   Benefits paid or payable to the employees, which cannot be directly attributable to a particular cost object in an economically feasible manner.

Sl.No	Direct Employee Cost	Indirect Employee Cost
1.	It is the cost incurred in payment of employees who are directly engaged in the production process.	Cost incurred for payment of employee who are not directly engaged in the production process.
2.	Direct employee cost can be easily	Indirect employee cost is apportioned on some

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	identified and allocated to cost unit	appropriate basisIndirect employee cost is apportioned on some appropriate basis
3.	Direct employee cost varies with the volume of production and has positive relationship with the volume	Indirect employee cost may not vary with the volume of production

Employee (Labour) Cost Control

Employee costs are associated with human beings. To control employee costs one has to understand human behavior. Employee cost control means control over the cost incurred on employees. Control over employee costs does not imply control over the size of the wage bill; it also does not imply that wages of each employee should be kept as low as possible.

The aim should be to keep the wages per unit of output as low as possible.This can only be achieved by giving employees appropriate compensation to encourage efficiency so that optimum output can be achieved in effective manner.

A well-motivated team of employees can bring about wonders. Each concern should, therefore, constantly strive to raise the productivity of employee. The efforts for the control of employee costs should begin from the very beginning. There has to be a concerted effort by all the concerned departments.

Sl.No	Department	Functions
1.	Personnel Department	i) On receipt of employee requisition from the various departments it searches for the required skills and qualification. ii) It ensures that the persons recruited possess the requisite qualification and skills required for the job. iii) Arranges proper training for the newly recruited employees and workshops for existing employees. iv) Maintains all personal and job related records of the employees. v) Evaluation of performance from time to time

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2.	Engineering and Work Study Department	i) Prepares plans and specifications for each job. ii) Providing training and guidance to the employees. iii) Supervises production activities. iv) Conducts time and motion studies. v) Undertakes job analysis. vi) Conducts job evaluation.
3.	Time Keeping Department	i) Concerned with the maintenance of attendance records i.e. time keeping and ii) Time spent by an employee on various jobs i.e. time booking etc.
4.	Payroll Department	i) The preparation of payroll of the employees. ii) It disburses salary and wage payments.
5.	Cost Accounting Department	i) Accumulation and classification of employee costs. ii) Analysis and allocation of costs to various cost centres or cost objects

Factors for the Control of Employee Cost

To exercise an effective control over the employee costs, the essential requisite is efficient utilisation of employee and allied factors. The main points which need consideration for controlling employee costs are the following

- Assessment of manpower requirements.
- Control over time-keeping and time-booking.
- Time & Motion Study.
- Control over idle time and overtime.
- Control over employee turnover.

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- Wage and Incentive systems.
- Job Evaluation and Merit Rating.
- Employee productivity.

Collection of Employee Costs

The task of collecting employee costs is performed by the Cost Accounting Department which record separately wages paid to direct and indirect employee. It is the duty of this department to ascertain the effective wages per hour in each department and to analyse the total payment of wages of each department into

- the amount included in the direct cost of goods produced or jobs completed
- the amount treated as indirect employee and thus included in overheads; and
- the amount treated as the cost of idle time and hence loss.
- the amount treated as abnormal loss/ gain and to be transferred to profit and loss account

Through this process costs of various jobs are ascertained. Naturally, in this the proper recording of time spent by the employees is essential.

Attendance and Payroll Procedures

Attendance Procedure / Time-keeping

It refers to correct recording of the employees' attendance time. Students may note the difference between "time keeping" and "time booking". The latter refers to break up of time on various jobs while the former implies a record of total time spent by the employees in a factory.

1. **Objectives of Time-keeping**

   Correct recording of employees' attendance time is of utmost importance where payment is made on the basis of time worked.

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

   - For the preparation of payrolls
   - For calculating overtime.
   - For ascertaining and controlling employee cost.
   - For ascertaining idle time.
   - For disciplinary purposes.
   - For overhead distribution

2. **Methods of Time-keeping**

   There are various methods of time-keeping, which may be categorized into manual and mechanical methods. The choice of a particular method depends upon the requirements and policy of an entity; but whichever method is followed, it should make a correct record of the time by incurring minimum possible expenditure and it should minimise the risk of fraudulent payments of wages. The examples of time keeping methods are follows

   a. **Manual Methods**

      i. **Attendance Register method**

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Under this method, an attendance register is kept to record the arrival and departure time of an employee. This method is simple and expensive and is suitable for small organisations. However, this method may lead to dishonest practice of time manipulation by way of recording wrong time and back date entry in collusion with time keeper

ii. **Metal Disc/ Token method**

This method of time recording is very old and is almost obsolete in practice. Under this method, each employee is allotted a metal disc or a token with a hole bearing his identification number. The token is kept or handed to the time keeper who record the token number in his register. Like attendance register method, this method also has some disadvantages like error in recording, proxy attendance etc.

b. Mechanical/ Automated Methods

i. **Punch Card Attendance**

Under this method, each employee is provided a card for marking attendance. A punch card contains data related with the employee in digital form. In punch card attendance system, an employee needs to either insert or wave his card to a card reader which then ensures whether the correct person is logging in and/or out. This system does not require to employ any time keeper and minimises the risk of recording error and time manipulation

ii. **Bio- Metric Attendance system**

Under bio-metric attendance system attendance is marked by recognizing an employee on the basis of physical and behavioral traits. An employee's unique identity like finger print, face and retina image etc. are kept in a database which is matched at the time of marking of attendance before the attendance device for this purpose. Bio-metric attendance system includes fingerprint recognition system, face recognition system, Time and attendance tracking technology etc. This system reduces the risk of time manipulation and proxy attendance. However, it may not be suitable for small organisations due to cost associated with set-up and maintenance.

3. Requisites of a Good Time-keeping System

A good time-keeping system should have following requisites

- System of time-keeping should be such which should not allow proxy for another employee under any circumstances.
- There should also be a provision of recording of time of piece employees so that regular attendance and discipline may be maintained. This is necessary to maintain uniformity of flow of production.
- Time of arrival as well as time of departure of employees should be recorded so that total time of employees may be recorded and wages may be calculated accordingly.
- As far as possible, method of recording of time should be mechanical so that chances of disputes regarding time may not arise between employees and the time-keeper.
- Late-comers should record late arrivals. Any relaxation by the time-keeper in this regard will encourage indiscipline.
- The system should be simple, smooth and quick. Unnecessary queuing for marking attendance should be avoided.
- The system should be reviewed and maintained periodically to prevent any error.

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Time Booking

Time keeping just records the time spent by an employee in the premises for production but it does not show how much time a person spent on a particular job. Time booking refers to a method wherein each activity of an employee is recorded. This data recorded is further used for measure the time spent on a particular job for costing, measurement of efficiency, fixation of responsibility etc.

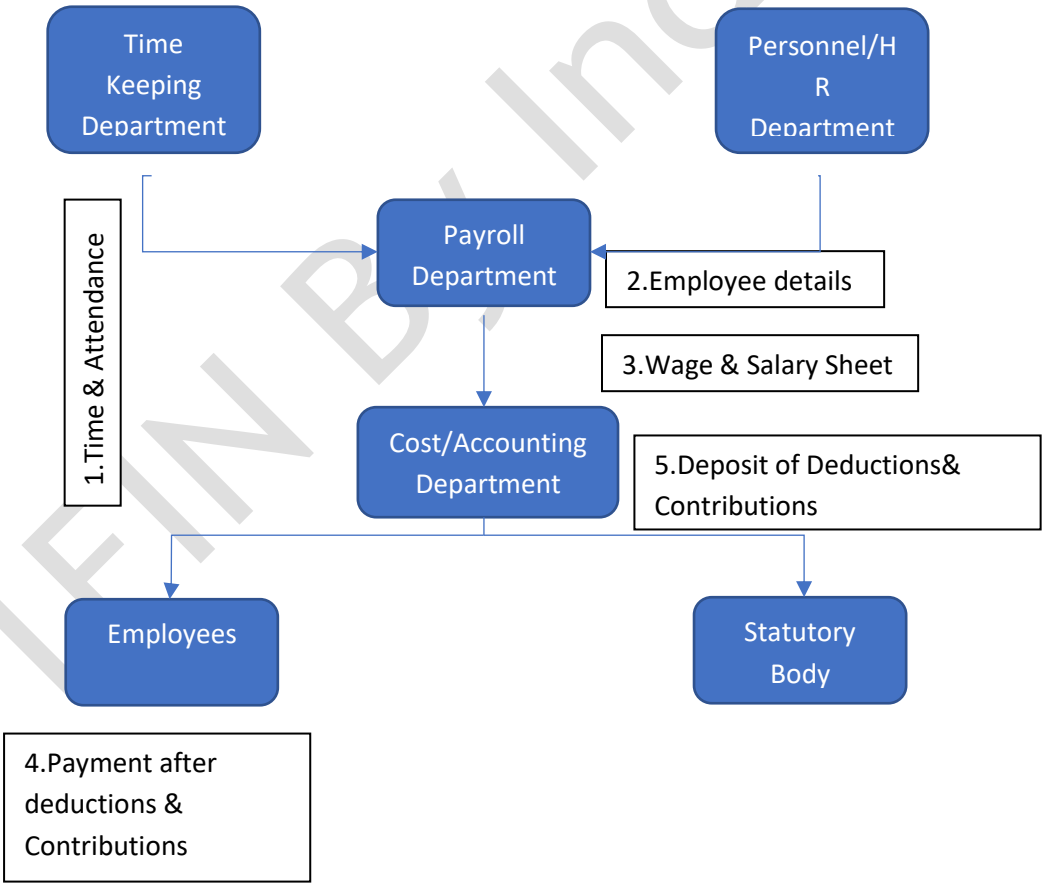
Time booking for costing: The time spent on a particular job or activity is used to compute the cost of the job or activity.

Time booking to measure efficiency: The efficiency of the employees is measures by comparing the actual time taken by an employee with the standard time that should have been taken.

Time booking for fixation of responsibility: The time booked data is used to analyse the variance in time taken by an employee on a particular job or process with respect to standard time to see the reasons for the variance. The reasons for variance is further classified as controllable and uncontrollable. The controllable reasons are those which can be avoided by due care and efficiency. On the other hand, uncontrollable reasons cannot be avoided under the normal circumstances.

Payroll Procedure

Steps included in this process are as under



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1. **Attendance and Time details**
   A detailed sheet of number of days or hours worked by each employee (in case of time based payment) and units or percentage of work (in case of piece rate) as reflected by the time keeping methods are sent to the payroll department by the time keeping department.
   Further, payroll department with the help of time booking records calculate any further incentives such as overtime payment, bonus to be paid to the
   employees.
2. **List of employees and other details**
   A list of employees on roll and the rate at which they will be paid is sent by the personnel/ HR department. Payroll department should ensure that no unauthorised or bogus employee is paid.
3. **Computation of wages and other incentives**
   Payroll department based on the details provided by the time keeping department and personnel department calculate wages/ salary to be paid to the employees. Payroll department prepares pay slip for all employees authorized by the personnel department and forward the same to the cost/ accounting department for further deductions and payment.
4. **Payment to the employees**
   Cost/ accounting department deduct all statutory deduction such as employee's contribution to provident fund and employee state insurance (ESI) scheme, TDS on salary etc. After all deductions wages/ salary is paid to the employees
5. **Deposit of all statutory liabilities**
   All statutory deduction made from wages/ salary of the employees alongwith employer's contributions such as provident fund and employee state insurance scheme are paid to the respective statutory bodies

Idle Time

The time during which no production is carried-out because the worker remains idle but are paid. In other words, it is the difference between the time paid and the time booked. Idle time can be normal or abnormal. The time for which employees are paid includes holidays, paid leaves, allowable rest or off time etc.

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

Sl.no	Causes	Treatment
1	The time lost between factory gate and the place of work,	It is treated as a part of cost of production. Thus, in the case of direct workers an allowance for normal idle time is considered setting of standard hours or standard rate

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2	The interval between one job and Another	In case of indirect workers, normal idle time is considered for the computation of overhead rate
	The setting up time for the machine,	
	Normal rest time, break for lunch etc.	

2. Abnormal idle time

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

Sl.no	Causes	Treatment
1	Idle time may also arise due to abnormal factors like lack of coordination	Abnormal idle time cost is not included as a part of production cost and is shown as a separate item in the Costing Profit and Loss Account.
2	Power Failure, Breakdown of machines	
3	Non-availability of raw materials, strikes, lockouts, poor supervision, fire, flood	The cost of abnormal idle time should
4	etc.	be further categorised into controllable and uncontrollable. For each category, the break-up of cost due to various factors should be separately shown. This would help the management in fixing responsibility for controlling idle time.
A	The causes for abnormal idle time should be further analysed into controllable and uncontrollable	
B	**Controllable abnormal idle time** refers to that time which could have been put to productive use had the management been more alert and efficient. All such time which could have been avoided is controllable idle time	Management should aim at eliminating controllable idle time and on a long-term basis reducing even the normal idle time. This would require a detailed analysis of the causes leading to such idle time.
	Uncontrollable abnormal idle time refers to time lost due to abnormal causes, over which management does not have any control e.g., breakdown of machines, flood etc. may be cha-racterised as uncontrollable idle time.	

Overtime

Work done beyond normal working hours is known as 'overtime work'. Overtime payment is the amount of wages paid for working beyond normal working hours. Overtime payment consist of two elements- (i) Normal wages for overtime work and (ii) Premium payment for overtime work.

$$Overtime\ Payment = Wages\ paid\ for\ overtime\ at\ normalrate\ +\ Premium\ (extra)$$

$$payment\ for\ overtime\ work$$

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1. **Overtime premium**

The rate for overtime work is higher than the normal time rate; usually it is at double the normal rates. The extra amount so paid over the normal rate is called overtime premium.

Rate and conditions for overtime premium may either be fixed by an entity itself or it may be required by any statute in force. The overtime premium should not be less than the premium calculated as per the statute

Occasional overtime is a healthy sign as it indicates that the firm has the optimum capacity and that the capacity is being fully utilised. But persistent overtime is rather a bad sign because it may indicate either (a) that the firm needs larger capacity in men and machines, or (b) that men have got into the habit of postponing their ordinary work towards the evening so that they can earn extra money in the form of overtime wages

Causes of Overtime and Treatment of Overtime premium in cost accounting

Sl.No	Causes	Treatment
1	The customer may agree to bear the entire charge of overtime because urgency of work.	If overtime is resorted to at the desire of the customer, then overtime premium may be charged to the job directly.
2	Overtime may be called for to make up any shortfall in production due to some unexpected development	If overtime is required to cope with general production programmes or for meeting urgent orders, the overtime premium should be treated as overhead cost of the particular department or cost centre which works overtime.
3	Overtime work may be necessary to make up a shortfall in production due to some fault of management	If overtime is worked in a department due to the fault of another department, the overtime premium should be charged to the latter department
4	Overtime work may be resorted to, to secure an out-turn in excess of the normal output to take advantage of an expanding market or of rising demand	Overtime worked on account of abnormal conditions such as flood, earthquake etc., should not be charged to cost, but to Costing Profit and Loss Account.

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Labour Utilisation

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

Identification of Utilisation of labours with Cost Centres

For the identification of utilisation of labour with the cost centre, a wage analysis sheet is prepared. Wage analysis sheet is a statement in which total wages paid are analysed according to cost centre, jobs, work orders etc. The data for analysis is provided by wage sheet, time card, piece work cards and job cards

The preparation of such sheet serves the following purposes

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

Identification of labour hours with work order or batches or capital job

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

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

System of Wage Payment and Incentive

There exist several systems of employee wage payment and incentives, which can be classified under the following heads

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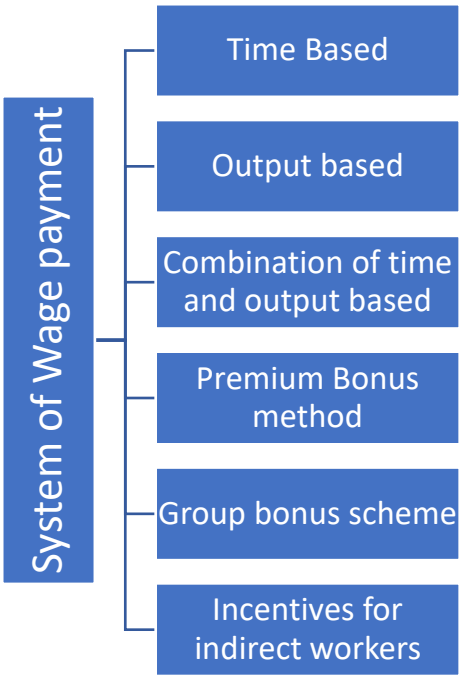

Time based (Time Rate System)

Straight Time Rate System: Under this system, the workers are paid on time basis i.e. hour, day, week, or month. The amount of wages due to a worker are arrived at by multiplying the time worked (including normal idle period) by rate for the time.

Time based wages payment is suitable for the employees (i) whose services cannot be directly or tangibly measured, e.g., general helpers, supervisory and clerical staff etc. (ii) engaged in highly skilled jobs, (iii) where the pace of output is independent of the operator, e.g., automatic chemical plants.

Wages under time rate system is calculated as under:

$$Wages = Time\ Worked\ (Hours/\ Days/\ Months) \times Rate\ for\ the\ time$$

Output Based (Piece Rate System)

Straight Piece Rate System: Under this system, each operation, job or unit of production is termed a piece. A rate of payment, known as the piece rate or piece work rate is fixed for each piece. The wages of the worker depend upon his output and rate of each unit of output; it is in fact independent of the time taken by him. The wages paid to a worker are calculated as

$$Wages = Number\ of\ units\ produced \times Rate\ per\ unit$$

Premium Bonus Method

Under these methods, standard time is established for performing a job. The worker is guaranteed his daily wages (except in Barth System), if his output is below and upto standard. In case the task

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is completed in less than the standard time, the saved time is shared between the employee and the employer.

1. **Halsey Premium Plan**
   Under Halsey premium plan a standard time is fixed for each job or process. If there is no saving on this standard time allowance, the worker is paid only his day rate. He gets his time rate even if he exceeds the standard time limit, since his day rate is guaranteed

   If, however, he does the job in less than the standard time, he gets a bonus equal to 50 percent of the wages of time saved; the employer benefits by the other 50 percent. The scheme also is sometimes referred to as the Halsey fifty percent plan. Earnings under Halsey Premium plan is calculated as under

   $$Wages = Time\ taken \times Time\ rate + 50\%\ of\ time\ saved \times Time\ rate$$

   Advantages :
   - Time rate is guaranteed while there is opportunity for increasing earnings by increasing production
   - The system is equitable in as much as the employer gets a direct return for his efforts in improving production methods and providing better equipment.

   Disadvantages :

   - Incentive is not so strong as with piece rate system. In fact the harder the worker works, the lesser he gets per piece
   - The sharing principle may not be liked by employees

2. **Rowan Premium Plan**
   According to this system a standard time allowance is fixed for the performance of a job and bonus is paid if time is saved.
   Under Rowan System the bonus is that proportion of the time wages as time saved bears to the standard time.

   $$Time\ taken \times Rate\ per\ hour + \frac{Time\ Saved}{Time\ Allowed} \times Time\ taken \times Rate\ per\ hour$$

   Advantages
   - It is claimed to be a fool-proof system in as much as a worker can never double his earnings even if there is bad rate setting
   - It is admirably suitable for encouraging moderately efficient workers as it provides a better return for moderate efficiency than under the Halsey Plan
   - The sharing principle appeals to the employer as being equitable

   Disadvantages

   - The system is a bit complicated
   - The incentive is weak at a high production level where the time saved is more than 50% of the time allowed.
   - The sharing principle is not generally welcomed by employees.

Absorption of Wages

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Elements of wages

In common parlance, the term 'wages' represents monetary payment which an employee receives at regular intervals for the services rendered. Strictly speaking, however, from the point of view of the employer and the cost to the industry, wages should be taken to include also non-monetary benefits which an employee receives by virtue of employment. Such non-monetary benefits may include:

- Medical facilities;
- Educational and training facilities;
- Recreational and sports facilities;
- Housing and social welfare; and
- Cost of subsidised canteen and co-operative societies

Such benefits are generally given in an industrial establishment. In some cases, the provision of benefits is compulsory. Therefore, while computing the wage cost per worker, the monetary value of such non-monetary benefits should also be taken into account.

Dearness allowance is an allowance provided to cover the increase in cost of living from one period to another. This allowance is calculated either as percentage of the basic wage or as a fixed amount for the days worked. In either case, the percentage or the fixed amount is subject to revision whenever the cost of living index or consumer price Index rises or falls by a certain figure as agreed to by the employer with the Employee union. When permanent rise in the cost of living index occurs, a part of the dearness allowance is often absorbed in the basic wage.

Overtime allowance is an allowance paid for the extra hours worked at the rates laid down in the Factories Act. In certain industries, where special allowance for the working conditions, tool maintenance, etc., are paid they are also considered as part of wages.

Production Bonus is an incentive payment made to workers for efficiency that results in production above the standard. There are different methods of computing incentives. Under the Payment of Bonus Act, a worker is entitled to compulsory bonus of 8.33% wages earned in the relevant year or ` 100 (whichever is greater). The bonus may be upto 20% of wages depending upon the quantum of profits calculated as per the Act.

Component of wages cost or wages for costing purposes

In addition to wages (including allowances, such as D.A.) that are paid to workers, a firm may have to spend on many other items (such as premium to the ESI or provident fund or bonus).
Further, the worker does not spend all the time for which he is paid on productive work.
This is because he is entitled to weekly holiday and various type of leave. There is also a certain amount of unavoidable idle time.

But in the case of direct workers, two alternatives are possible. The additional charges may be treated as overheads. Alternatively, the wage rates being charged to job may be computed by including such payments; automatically then, such payments will be charged to the work done along with wages of the worker. (It should be remembered that such wage rate will be only for costing purposes and not for payment to workers). The total of wages and additional payment should be divided by effective hours of work to get such wage rates for costing purposes

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Holiday and leave wages

One alternative to account for wages paid on account of paid holiday and leave can be to include them as departmental overheads. In such a case, it is necessary to record such wages separately from "worked for wages". Such a segregation can be made possible by providing a separate column in the payroll for holiday and leave wages in the same way as there are columns for dearness allowance, provident fund deductions, etc. If, however, a separate or additional column cannot be provided for this purpose it would be necessary to analyse the payroll periodically to ascertain how much of the total payment pertains to "worked for wages" and how much is attributed to leave and holiday wages.

Another way could be to inflate the wage rate for costing purposes to include holiday and leave wages. This can be done only in the case of direct workers.

Night shift allowance

In some cases, workers get extra payment if they work at night. Since the extra payment is not for any particular job, therefore such a payment should be treated as part of overheads.

Absorption rates of Employee cost

Employee cost as stated above include monetary compensation and non-monetary benefits to workers. Monetary benefits include, basic wages, D.A., overtime pay, incentive or production bonus contribution to employee provident fund, House Rent Allowance, Holiday and vacation pay etc. The non-monetary benefits include medical facilities, subsidized canteen services, subsidized housing, education and training facilities

Accounting of monetary and non-monetary benefits to indirect workers does not pose any problems because the total of monetary and non-monetary benefits are treated as overhead and absorbed on the basis of rate per direct employee hour, if overheads are predominantly employee oriented. For direct workers, the ideal method is to charge jobs or units produced by supplying per hour rate calculated as below:

$$Rate\ per\ hour = \frac{Total\ estimated\ monetary benefits\ and\ cost of non\ monetary\ benefits}{Budgeted\ direct\ employee\ hour - Normal\ idle time}$$

Another alternative method is to treat the monetary benefits other than basic wages and dearness allowance as well as cost of non-monetary benefits as overheads.

Efficiency Rating Procedures

Efficiency is usually related with performance and may be computed by comparing the time taken with the standard time allotted to perform the given job/task.

If the time taken by a worker on a job equals or less than the standard time, then he is rated efficient.

In case he takes more time than the standard time he is rated as inefficient

$$\boldsymbol{Efficiency\ in\ \%} = \frac{\boldsymbol{Time\ allowed\ as\ per\ standard}}{\boldsymbol{Time\ Taken}} \times \mathbf{100}$$

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For efficiency rating of employees, the following procedures may be followed

Determining standard time/performance standards

The first step is to determine the standard time taken by a worker for performing a particular job/task. The standard time can be determined by using Time & Motion study or Work study techniques. While determining the standard time for a job/task a heterogeneous group of workers is taken and contingency allowances are added for determining standard time

Measuring Actual Performance of workers

For computing efficiency rating it is necessary to develop a procedure for recording the actual performance of workers. The system developed should record the output of each worker along with the time taken by him.

Computation of efficiency rating

The efficiency rating of each worker can be computed by using the above mentioned Formula

Employee Productivity

Productivity is generally determined by the input/output ratio. In case of employees, it is calculated as below:

$$\frac{\textit{Standard time for doing actual work}}{\textit{Actual time taken}}$$

Employee productivity is used for measuring the efficiency of individual workers. It is an index of efficiency in the utilisation of human resources, materials, capital, power and all kinds of services and facilities.

It is measured by the output in relation to input. Productivity can be improved by reducing the input for a certain quantity or value of output or by increasing the output from the same given quantity or value of input.

Factors for increasing Employee productivity

The important factors which must be taken into consideration for increasing employee productivity are as follows

- Employing only those workers who possess the right type of skill.
- Placing a right type of person to a right job.
- Training young and old workers by providing them the right types of opportunities
- Taking appropriate measures to avoid the situation of excess or shortage of employees.
- Carrying out work study for fixation of wages and for the simplification and standardisation of work.

Employee Turnover

Employee turnover or labour turnover in an organisation is the rate of change in the composition of employee force during a specified period measured against a suitable index.

The standard of usual employee turnover in the industry or locality or the employee turnover rate for a past period may be taken as the index or norm against which actual turnover rate is compared.

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There are three methods of calculating Employee turnover which are given below

Replacement Method

This method takes into consideration actual replacement of employees irrespective of number of persons leaving the organisation. Employee Turnover under this method is calculated as under

$$\frac{Number\ of\ employees\ Replaced\ during\ the\ period}{Average\ number\ of\ employees\ during\ the\ period\ on\ roll} \times 100$$

New employees appointed on account of expansion plan of the organisation are not included in number of replacements

Separation Method

In this method employee turnover is measured by dividing the total number of employees separated during the period by the average total number of employees on payroll during the same period. Employee Turnover under this method is calculated as under

$$\frac{Number\ of\ employees\ Separated\ during\ the\ period}{Average\ number\ of\ employees\ during\ the\ period\ on\ roll} \times 100$$

Flux Method

This method takes both the number of replacements as well as the number of separations during the period into account for calculation of employee turnover. Employee Turnover under this method is calculated as under:

$$\frac{Number\ of\ employees\ Separated + Number\ of\ employees\ Replaced\ during\ the\ period}{Avg.\ No.\ of\ employees\ during\ the\ period\ on\ roll} X100$$

Employee turnover due to new recruitment: Generally, employees recruited on account of expansion of an organisation, are not considered for calculation of employee turnover. But it is considered that the newly recruited employees are also responsible for changes in the composition or work force. Due to this feature, some management accountants feel to take new recruitment for calculating employee turnover

The total number of workers joining, including replacements, is called accessions

When number of accessions are considered for measuring employee turnover, the employee turnover rate by Flux method may be computed by using any one of the following expressions

$$\frac{No.\ of\ Separation + No.\ of\ Replacements + No.\ of\ new\ Joinings}{Average\ no.\ of\ employees\ during\ the\ period\ on\ roll} \times 100$$

$$Or$$

$$\frac{No.\ of\ Separations + No.\ of\ Accessions}{Average\ no.\ of\ employees\ during\ the\ period\ on\ roll}$$

Average number of employees during the period is calculated as follows

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$$\frac{No.\,of\,employees\,at\,begining + No.\,of\,employees\,at\,end\,of\,the\,period}{2}$$

Equivalent Employee (Labour) Turnover rate

If in the above computations, the data given is for a period other than a year, the employee turnover rate so computed may be converted into equivalent annual employee turnover rate by using the following formula

$$\frac{Employee\ Turnover\ rate\ for\ the\ period}{Number\ of\ Days\ in\ the\ period} \times 365$$

Causes of Employee (Labour) Turnover

The reasons for employee turnover in an organisation can be classified under the following three heads

1. **Personal causes**
   All the personal reasons which induce or compel an employee to leave his job; such causes include the following
   - Change of jobs for betterment.
   - Premature retirement due to ill health or old age.
   - Domestic problems and family responsibilities.
   - Discontent over the jobs and working environment.
2. **Unavoidable Causes**
   Unavoidable causes are those under which it becomes obligatory on the part of management to ask one or more of their employees to leave the organisation; such causes are summed up as listed below
   - Seasonal nature of the business
   - Shortage of raw material, power, slack market for the product etc.;
   - Change in the plant location;
   - Disability, making a worker unfit for work;
   - Disciplinary measures;
   - Marriage (generally in the case of women).
3. **Avoidable Causes**
   Avoidable causes are those which require the attention of management on a continuous basis so as to keep employee turnover ratio as low as possible. The main causes under this case are indicated below:
   - Dissatisfaction with job, remuneration, hours of work, working conditions, etc.,
   - Strained relationship with management, supervisors or fellow workers;
   - Lack of training facilities and promotional avenues;
   - Lack of recreational and medical facilities;
   - Low wages and allowances.

Effects of Employee (Labour) Turnover

High employee turnover increases the cost of production in the following ways:

- Even flow of production is disturbed;

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- Efficiency of new workers is low; productivity of new but experienced workers is low in the beginning;
- There is increased cost of training and induction;
- New workers cause increased breakage of tools, wastage of materials, etc.
- Cost of recruitment and training increases.

1. **Cost of Employees (Labour) Turnover**
   Two types of costs which are associated with employee turnover are:
   a. **Preventive Costs**
      The cost incurred to prevent employee turnover or keep it as lowest as possible. Cost incurred for prevention of employee turnover includes the following:
      - Cost of medical benefit provided to the employees
      - Cost incurred on employees' welfare like pension etc.
      - Cost on other benefits with an objective to retain employees

   b. **Replacement Costs**
      These are the costs which arise due to employee turnover. If employees leave soon after they acquire the necessary training and experience of good work, additional costs will have to be incurred on new workers, i.e., cost of recruitment, training and induction, abnormal breakage and scrap and extra wages and overheads due to the inefficiency of new workers.

It is obvious that a company will incur very high replacement costs if the rate of employee turnover is high. Similarly, only adequate preventive costs can keep Employee turnover at a low level. Each company must, therefore, work out the optimum level of Employee turnover keeping in view its personnel policies and the behaviour of replacement cost and preventive costs at various levels of Employee turnover rates.

Illustrations

Illustration - 1

X an employee of ABC Co. gets the following emoluments and benefits:

(a)	Basic Pay	Rs.10,000 p.m.
(b)	Dearness Allowance	Rs.2,000 p.m.
(c)	Bonus	20% of salary and D.A.
(d)	Other Allowances	Rs.2,500 p.m.
(e)	Employer's Contribution to P.F.	10% of salary and D.A.

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'X' works for 2,400 hours per annum, out of which 400 hours are non-productive and treated as normal idle time. You are required to compute the effective hourly cost of employee 'X'.

Illustration - 2

In a factory working six days in a week and eight hours each day, a worker is paid at the rate of Rs.100 per day basic plus D.A @ 120% of basic. He is allowed to take 30 minutes off during his hours shift for meals-break and a 10 minutes recess for rest. During a week, his card showed that his time was chargeable to :

Job X	15 hrs
Job Y	12 hrs
Job Z	13 hrs

The time not booked was wasted while waiting for a job. In Cost Accounting, how would you allocate the wages of the workers for the week?

Illustration - 3

Calculate the earnings of A and B from the following particulars for a month and allocate the employee cost of each job X, Y and Z;

S. No	Particulars	Worker A	Worker B
(i)	Basic Wages (Rs.)	10,000	16,000
(ii)	Dearness Allowance	50%	50%
(iii)	Contribution to PF (on basic wages)	8%	8%
(iv)	Contribution to ESI (on basic wages)	2%	2%
(v)	Overtime (Hours)	10	--

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to state insurance and Provident Fund are at equal rates with employee's contributions.

The two workers were employed on jobs X, Y and Z in the following proportions:

Jobs	X	Y	Z

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Worker A	40%	30%	30%
Worker B	50%	20%	30%

Overtime was done on job Y.

Illustration - 4

It is seen from the job card for repair of the customer's equipment that a total of 154 labour hours have been put in as detailed below:

	Worker A	**Worker B**	**Worker C**
Wage per day of 8hrs	Rs.200	Rs.100	Rs.300
	No. of hours worked		
Monday	10.5	8	10.5
Tuesday	8	8	8
Wednesday	10.5	8	10.5
Thursday	9.5	8	9.5
Friday	10.5	8	10.5
Saturday	-	8	8
Total	**49**	**48**	**57**

In terms of an award in an employee conciliation, the workers are to be paid dearness allowance on the basis of cost of living index figures relating to each month which works out @ Rs.968 for the relevant month.

The dearness allowance is payable to all workers irrespective of wages rate if they are present or are on leave with wages on all working days.

Sunday is a weekly holiday and each worker has to work for 8 hours on all weekdays and 4 hours on Saturday; the workers are however paid full wages on Saturday (8 hours for 4 hours worked).

Workers are paid overtime according to the Factories Act, 1948. Excluding holidays, the total number of hours works out to 176 in the relevant month. The company's contribution to Provident Fund and Employees' State Insurance Premium are absorbed into overheads.

Work out the wages payable to each worker

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Illustration - 5

In a factory, the basic wage rate is Rs.100 per hour and overtime rates are as follows:

Before and after normal working hours	175 % of basic wage rate
Sundays and holidays	225% of basic wage rate

During the previous year, the following hours were worked
• Normal time
• Overtime
  • before and after working hours
  • Sundays & holidays
Total
	1,00,000 hours
	20,000 hours
	5,000 hours
	1,25,000 hours

The following hours have been worked on job 'Z'

• Normal time
• Overtime
  • before and after working hours
  • Sundays & holidays
Total
	1,000 hours
	100 hours
	25 hours
	1,125, hours

You are required to calculate the labour cost chargeable to job 'Z' and overhead in each of the following instances:

1. Where overtime is worked regularly throughout the year as a policy due to worker's shortage
2. Where overtime is worked irregularly to meet the requirements of production
3. Where overtime is worked at the request of the customer to expedite the job.

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Illustration - 6

Using Taylor's differential piece rate system, find the earnings of 'A' from the following particulars:

Standard time per piece	12 minutes
Normal rate per hour (in an 8 hour- day)	Rs. 20
A produced	37 units

Illustration - 7

Using Taylor's differential piece rate system, compute the earnings of the Amar, Akbar and Ali from the following particulars:

Standard time per piece	20 minutes
Normal rate per hour (in an 8 hour- day)	Rs. 90
Amar produced	23units
Akbar produced	24units
Ali produced	30 units

Illustration - 8

Calculate the earnings of workers A, B and C under Straight Piece Rate System and Merrick's Piece Rate System from the following particulars:

Standard time per unit	1 minutes
Normal rate per hour	Rs. 54
Output per day is as follows:	
Worker A	390 units
Worker B	450 units
Worker C	600 units
Working hours per day	8 hours

Illustration - 9

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In a factory,

Standard time allowed for completing a given task (50 units)	8 hours
guaranteed time wages	Rs. 20 per hour

If a task is completed in less than the standard time, the high rate of `4 per unit is payable. Calculate the wages of a worker, under the Gantt system, if he completes the task in

(i) 10 hours; (ii) 8 hours, and (iii) in 6 hours. Also ascertain the comparative rate of earnings per hour under the three situations.

Illustration - 10

From the following information you are required to calculate the bonus and earnings under Emerson Efficiency System. The relevant information is as under:

Standard working hours	8 hours a day
Standard output per hour in units	5
Daily wage rate	Rs. 500
Actual output in units:	
Worker A	25 units
Worker B	40 units
Worker C	45units

Illustration – 10(1)

Calculate the earnings of worker from the following information under Bedaux system:

Standard time for a product A-30 seconds plus relaxation allowance of 50%	
Standard time for a product B-20 second plus relaxation allowance of 50%	
During 8 hours-day for actual output of:	
Product A	500 units
Product B	300 units
Wage rate	Rs. 100 per hour

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Illustration - 11

Calculate the earnings of a worker under Halsey System. The relevant data is as below:

Time rate (per hour)	Rs. 60
Time allowed	8 hours
Time taken	6 hours
Time saved	2 hours

Illustration - 12

A skilled worker in XYZ Ltd. is paid a guaranteed wage rate of Rs. 30 per hour. The standard time per unit for a particular product is 4 hours. Mr. P, a machine man, has been paid wages under the Rowan Incentive Plan and he had earned an effective hourly rate of Rs. 37.50 on the manufacture of that particular product.

What could have been his total earnings and effective hourly rate, had he been put on Halsey Incentive Scheme (50%)?

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2.4 Overheads

Introduction

Overheads are the expenditure which cannot be conveniently traced to or identified with any particular cost unit. They may be defined as the cost of indirect materials, indirect labour and such other expenses including services which cannot conveniently be charged to a specific unit (i.e. indirect expenses). Such expenses are incurred generally for a particular work order) –

- Over various products,
- Over various departments or cost centers, and
- Over various heads of account.

Examples: wages paid to watch and ward staff, heating and lighting expenses of factory etc.

Overheads also represent expenses that have been incurred in providing certain ancillary facilities or services which facilitate or make possible the carrying out of the production process; by themselves these services are not of any use. For instance, a boiler house produces steam so that machines may run, and, without the generation of steam, production would be seriously hampered.

But if machines do not run or do not require steam, the boiler house would be useless, and the expenses incurred would be a waste. Overheads are incurred not only in the factory of production but also on administration, selling and distribution.

Objective of study of Overheads

The basic objectives of study of overheads costs are –

1. **To Link Over heads to output**
   Overheads are not directly related to the product. Hence, an indirect method of establishing a relationship or linking becomes necessary. This is done by linking overheads first to the cost centre (Department) and thereafter to the output produced.

2. **To Control Overheads**
   The total overheads incurred must be kept within reasonable control limits in order to achieve savings in cost and increase in profits.

Classification of Overheads

A. By Function

1. Factory or Manufacturing Overhead

Manufacturing overhead is the indirect cost incurred for manufacturing or production activity in a factory. It includes all expenditures incurred from the procurement of materials to the completion of finished product.

Examples: Stock keeping expenses, Repairs and maintenance of plant, Depreciation of factory building, Indirect labour, Cost of primary packing etc.

2. Office and Administrative Overhead

Office and Administrative overheads are expenditures incurred on all activities relating to general management and administration of an organisation. It includes formulating the policy, directing the organisation and controlling the operations of an undertaking which is not related directly to production, selling, distribution, research or development activity or function.
Examples: Salary paid to office staff, Repairs and maintenance of office building, Depreciation of office building, Postage and stationery etc.

3. Selling and Distribution Overheads

Selling Overheads: Expenses related to sale of products and include all indirect expenses in sales management for the organisation.
Examples: Salesman commission, Advisement costs, Sales office expenses etc.

Distribution Overheads: Cost incurred on making product available for sale in the market

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Examples: Delivery van expenses, Transit insurance, Warehouse and cold storage expenses, Secondary packing expenses etc.

B. By Nature

1. Fixed Overhead

These are the costs which are incurred for a period, and which, within certain output and turnover limits, tend to be unaffected by fluctuations in the levels of activity (output or turnover). They do not tend to increase or decrease with the changes in output.

Examples: Salary paid to permanent employees, Depreciation of buildings and plant and equipment, Interest on capital, Insurance

2. Variable Overhead

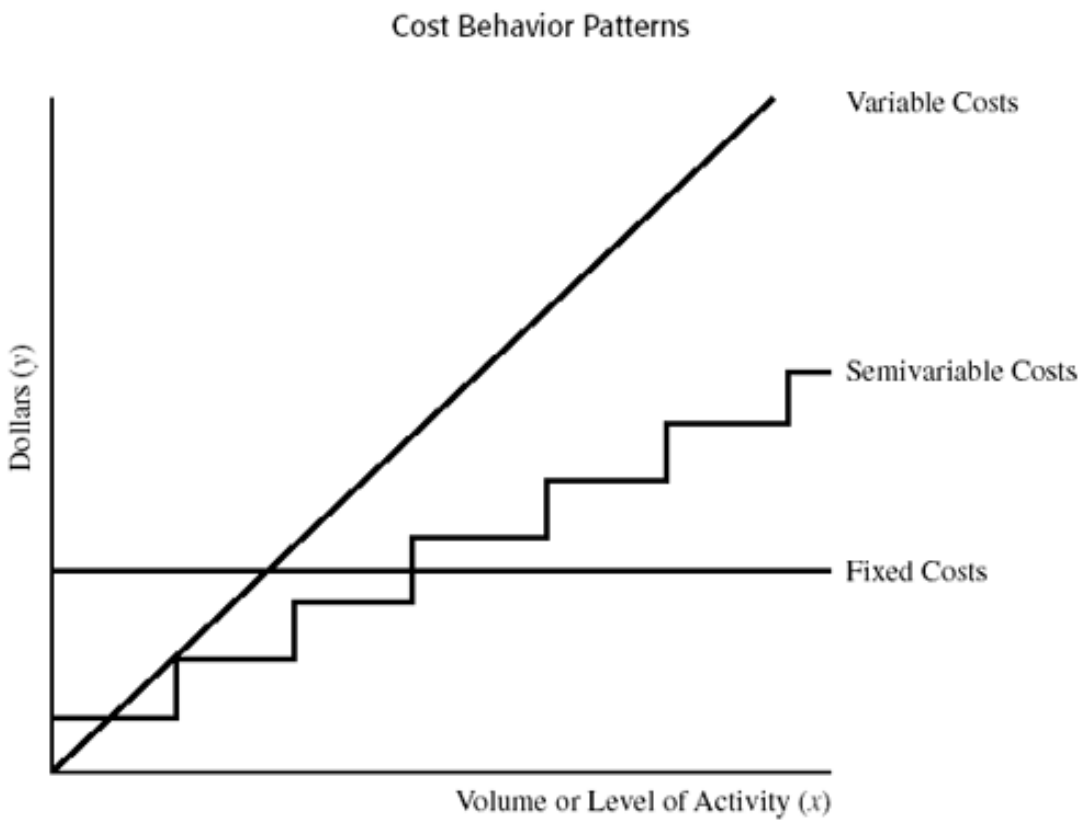
These costs tend to vary with the volume of activity. Any increase in the activity results in an increase in the variable cost and vice-versa

Examples: Indirect materials, Power and fuels, Lubricants, Tools and spares

3. Semi Variable Overheads

These costs contain both fixed and variable components and are thus partly affected by fluctuations in the level of activity.

Examples: Electricity cost, Water cost, Telephone and internet expenses etc.



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C. By Element

1. Indirect Materials

Materials which do not normally form part of the finished product (cost object) are known as indirect materials.

Examples: Stores used for maintaining machines and building (lubricants, cotton waste, bricks etc.), Stores used by service departments like powerhouse, boiler house, canteen etc.

2. Indirect Employee Cost

Employee costs which cannot be allocated but can be apportioned to or absorbed by cost units or cost centres is known as indirect employee.

Examples: Salary paid to foreman and supervisor; Salary paid to administration staff etc.

3. Indirect Expenses

Expenses other than direct expenses are known as indirect expenses, that cannot be directly, conveniently and wholly allocated to cost centres

Examples: Rates and taxes, Insurance, Depreciation, Advertisement expenses etc.

D. By Control

1. Controllable Costs

These are those costs which can be controlled by the implementation of appropriate managerial influence and proper policies

Examples: Material Costs, Wages and salary, Power and fuel etc.

2. Uncontrollable Costs

Overhead costs which cannot be controlled by the management even after the implementation of appropriate managerial influence and proper polices are known as uncontrollable costs.

Examples: Rates and taxes, Depreciation, Interest on borrowings

Advantages of Classification of Overheads into Fixed and Variable

The primary objective of segregating semi-variable expenses into fixed and variable in to ascertain marginal costs. Besides this, it has the following advantages also:

Controlling Expenses

The classification of expenses into fixed and variable components helps in controlling expenses. Fixed costs are generally policy costs, which cannot be easily reduced. They are incurred irrespective of the output and hence are more or less non controllable. Variable expenses vary with the volume of activity and the responsibility for incurring such expenditure is determined in

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relation to the output. The management can control these costs by giving proper allowances in accordance with the output achieved

Preparation of Budget Estimates

The segregation of overheads into fixed and variable part helps in the preparation of flexible budget. It enables a firm to estimate costs at different levels of activity and make comparison with the actual expenses incurred.

Decision Making

The segregation of semi variable cost between fixed and variable overhead also helps the management to take many important decisions. For example, decisions regarding the price to be charged during depression or recession or for export market. Likewise, decisions on make or buy, shut down or continue, etc., are also taken after separating fixed costs from variable costs.

Accounting and Control of Manufacturing Overheads

A. Manufacturing Overheads

Generally manufacturing overheads form a substantial portion of the total overheads. It is important, that such overheads should be properly absorbed over the cost of production. The following procedure may be adopted in this regard. The steps given below shows how factory overhead rates are estimated and overheads absorbed on that basis and the last one shows how actual are compared with the absorbed amount.

B. Estimation and collection of manufacturing overheads:

The first stage is to estimate the amount of overheads, keeping in view the past figures and adjusting them for known future changes. The sources available for the collection of factory overheads may include(a) Invoices, (b) Stores requisition, (c) Wage analysis book (d) Journal entries. etc.

C. Assignment of Manufacturing Overheads:

The guiding principle for assignment of manufacturing overheads to a cost object is the traceability of the overheads in an economically feasible manner.

Assignment of the manufacturing overhead is done on the basis of either of the following two principles:

D. Cause and Effect:

Cause is the process or operation, or activity and effect is the incurrence of cost.

E. Benefit received:

Manufacturing overheads are to be apportioned to various cost objects in proportion to the benefits received by them.

a. Cost Allocation

Cost allocation is defined as the allotment of whole items of cost to cost centers or cost units. It implies relating overheads directly to the various departments

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Examples: If a separate power meter has been installed for a department, the entire power cost ascertained from the meter is allocated to that department. The salary of the works manager cannot be directly allocated to any one department since he looks after the whole factory

b. Cost Apportionment

Cost apportionment is defined as the division of cost among two or more cost centers in proportion to the estimated benefit received. It is also known as primary distribution of overheads. Thus, apportionment implies "the allotment of proportions of items of cost to cost centres or departments".

c. Re-apportionment (Secondary Distribution of Overheads)

The total cost of the service departments is distributed proportionately to different production departments on the basis of services rendered by them to production departments. Here, total cost means direct materials direct labour plus total apportioned overheads of the service departments.

E. Absorption or Recovery

Overhead absorption or Overhead Recovery is a process by which overheads are included in the total cost of a product. It is also defined as the charging of overheads to cost units by means of rates calculated for each cost centre. Absorption of manufacturing overheads shall be as follows

a. **Variable Manufacturing Overheads:** The variable manufacturing overheads shall be absorbed on the basis of actual production
b. **Fixed Manufacturing overheads:** The fixed manufacturing overhead shall be absorbed on the basis of normal capacity.

$$\text{Overhead absorption rate} = \frac{\text{Total Overheads}}{\text{Number of units of absorption base applicable to cost center.}}$$

Distinguish between Allocation and Apportionment

Point of differentiation	Allocation	Apportionment
Meaning	***Identifying a cost centre and charging its expense in full.***	***Allotment of proportions of common cost to various cost centers.***
Nature of Expenses	***Specific and Identifiable***	***General and Common***
Number of Cost Centres (Depts.)	***One***	***Many***
Amount of Overhead	***Charged in Full***	***Charged in Proportions***

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Over and under absorption of overheads

After the year end the total amount of actual factory overheads is known. There is bound to be some difference between the actual amount of overheads and the absorbed amount of overheads due to various reasons, like price changes, volume changes etc. This difference is known as under / Over absorption of overheads.

a. **Under Absorption:** When the overheads charged (absorbed) to production are less than actual overheads incurred then it is known as under absorption of overheads.
b. **Over Absorption:** When the overheads charged (absorbed) to production are more than actual overheads incurred then it is known as over absorption of overheads.

Steps for the distribution of Overheads

The various steps for the distribution of overheads have been discussed in detail as below:

A. Collection

This involves collection and accumulation of data relating to overheads based on past information and adjusted for known current trends and projected into the future. The information is collected from (a) Invoices and Stores Requisitions (for Indirect Materials), (b) Wage Analysis Book (for Indirect Labour) and (c) Journal Entries (for Indirect Expenses)

E. Classification

Overheads are classified according to nature viz. fixed, variable and semi-variable expenses. This facilities decision-making and proper budgeting.

F. Allocation of Cost

Most of the manufacturing processes functionally are different and are performed by different departments in the factory. Where such a division of functions had been made, some of the departments should be engaged in actual production of goods, and others in providing services ancillary thereto. At this stage, the factory overheads which can be directly related to the various production or service departments are allocated in this manner i.e. whole items of overheads are allocated to production and service departments.

It may, sometime, become necessary to sub-divide a manufacturing organisation into several cost centres, so that a closer distribution of expenses and a more detailed control is practicable. It is thus obvious that the principal object of setting up cost centres is to collect data, in of similar activities more conveniently. This avoids a great deal of cost analysis.

When costs are collected by setting up cost centres, several items can be ascertained definitely, and the element of estimation is reduced considerably. For instance, the allowance of the normal idle time or the amount to be spent on consumable stores, etc. There are two main types of cost centres - machine or personal - depending on whether the process of manufacture is carried on at a centre by man or machine. For the convenience of recording of expenditure, cost centres are sometimes allotted a code number.

Advantages of Departmentalization

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- Better Estimation of Expenses
- Better Control
- Ascertainment of Cost for each department
- Suitable Method of Costing

G. Apportionment of Overheads (Primary distribution of overheads)

The overheads which cannot be directly allocated between the different departments are now apportioned on some suitable basis. For distributing these overheads over different departments, it is necessary at first to determine the proportion of benefit received by each department and then distribute the total expenditure proportionately on that basis. Some of the bases that may be adopted for the apportionment of expenses are stated below:

Overhead Cost	Basis of Apportionment
a. Rent and other building expenses b. Lighting and heating (conditioning) c. Fire precaution services d. Air - conditioning	Floor area, or volume of department
a. Perquisites b. Labour welfare expenses c. Time keeping d. Personnel office e. Supervision	Number of workers
a. Compensation to workers b. Holiday pay c. ESI and PF contribution d. Perquisites	Direct wages
General overheads	Direct labour hour, or Direct wages, or Machine hours.
a. Depreciation of plant and machinery b. Repairs and maintenance of Plant and machinery c. Insurance of stock	Capital values
a. Power/steam consumption b. Internal transport c. Managerial salaries	Technical estimates

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Lighting expenses(light)	No. of light points, or Area or Metered units
Electric power (machine operation)	Horsepower of machines, or Number of machine hour, or value of machines or units consumed.
a. Material handling b. Stores overhead	Weight of materials, or volume of materials, or value of materials or unit of materials.

H. Other basis of apportionment of Overheads

We have considered already that the benefit received by the department generally is the principal criterion on which the costs of service departments or common expenses are apportioned. But other bases of apportionments which may be used are mentioned below:

1. Analysis or Survey of existing conditions

At times it may not be possible to determine the advantage of an item of expenses without undertaking an analysis of expenditure. For example, lighting expenses can be distributed over departments only on the basis of the number of light points fixed in each department.

2. Ability to pay

It is a principle of taxation which has been applied in cost accounting as well for distributing the expenditure on the basis of income of the paying department, on a proportionate basis. For example, if a company is selling three different products in a territory, it may decide to distribute the expenses of the sales organisation to the amount of sales of different articles in these territories. This basis, though simple to apply, may be inequitable since the expenditure charged to an article may have no relation to the actual effort involved in selling it. Easy selling lines thus may have to bear the largest proportion of expenses while, on the other hand, these should bear the lowest charge.

3. Efficiency or Incentives

Under this method, the distribution of overheads is made on the basis of pre-determined levels of production or sales. When distribution of overhead cost is made on this basis and if the level of production exceeds the predetermined level of production the incidence of overhead cost gets reduced and the total cost per unit of production or of sales, lowered. The opposite is the effect if the assumed levels are not reached.

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I. Re-apportioning service department overheads over production department

The re-apportionment of the service department cost to the production department is known as secondary distribution. The suggestive bases that may be adopted for reapportionment are given below:

Cost of service departments	Basis
1. Maintenance and repair shop 2. Planning and progress 3. Tool room	Direct labour hours, Machine hours, Direct labour wages, Asset value × Hours worked.
4. Canteen and welfare 5. Hospital and dispensary 6. Personnel Department	No. of direct workers, No. of employees etc.
7. Timekeeping	No. of card punched, No. of employees
8. Computer section	Computer hours, Specific allocation to departments
9. Powerhouse (electric lighting cost)	Floor area, Cubic content, No. of electric Points, Wattage
10. Powerhouse (electric power cost)	Horsepower, kWh, Horsepower × Machine hours, kWh × Machine hours
11. Stores Department	No. of requisitions, Weight or value Of Materials issued.
12. Transport department	Crane hours, Truck hours, Truck mileage, Truck tonnage, Truck ton- hours, Tonnage handled. No. of packages of Standard size
13. Fire protection	Capital Values
14. Inspection	Inspection hours

Notes

- Repairs included in repairs shop cost, building maintenance cost included in maintenance shop cost etc. should be apportioned on the basis of capital values.
- Economy, practicability, equitability and reliability are the matters of consideration for selection of the base.

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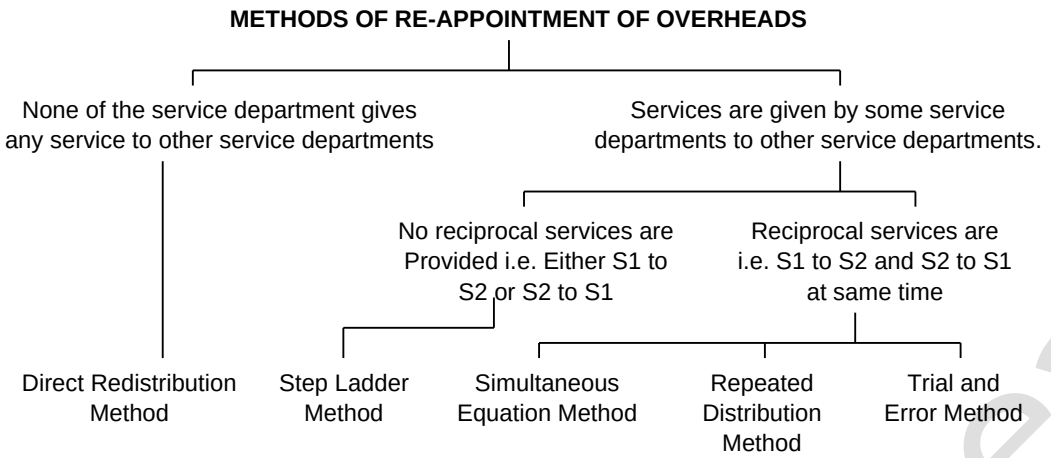
J. Methods of Re apportionment



1. Direct Redistribution

Service department costs under this method are apportioned over the production departments only, ignoring the services rendered by one service department to the other.

2. Step Ladder Method or Nonreciprocal method

This method gives cognizance to the services rendered by service department to another service department. Therefore, as compared to previous method, this method is more complicated because a sequence of apportionments has to be selected here sequence here begins with the department that renders maximum number of services to the other service department(s). In other words, the cost of the service department that serves the largest number of services to the other service department(s) and production department(s) is distributed first. After this, the cost of service department serving the next largest number of departments is apportioned. This process continues till the cost of last service department is apportioned. The cost of last service department is apportioned among production departments only.

3. Reciprocal services method

This method recognizes the fact that where there are two or more service departments, they may render services to each other and, therefore, these inter-departmental services are to be given due weight while re-distributing the expenses of the service departments. The methods available for dealing with reciprocal services are:

- Simultaneous equation method
- Trial and error method
- Repeated distribution method.

a. Simultaneous equation method

According to this method firstly, the costs of service departments are ascertained. These costs are then re-distributed to production departments on the basis of given percentages.

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b. Trial and error method

According to this method the cost of one service cost centre is apportioned to another service cost centre. The cost of another service centre plus the share received from the first cost centre is again apportioned to the first cost centre. This process is repeated till the amount to be apportioned becomes negligible, that means repeated distribution method is followed to the extent of service departments only. All apportioned amounts for each service cost centre are added to get the total apportioned cost. These total service cost centre costs are redistributed to the production departments.

c. Repeated distribution method

Under this method, service departments' costs are distributed to other service and production departments on agreed percentages and this process continues to be repeated, till the figures of service departments are either exhausted or reduced to too small a figure.

Methods of absorbing Overheads to various Products and Jobs

A. Percentage of Direct material cost

Under this method, the cost of direct material consumed is the base for calculating the amount of overhead absorbed. This overhead rate is computed by the following formula

Overhead rate = Total Production Overheads of a Department / Budgeted Direct Material cost of all Products

B. Percentage of Prime cost method

This method is based on the fact that both materials as well as labour contribute in raising factory overheads. Hence, the total of the two i.e. Prime cost should be taken as base for absorbing the factory overhead. The overhead rate in this method is computed by the following formula

Overhead rate = Total Production Overheads of a Department × 100 / Prime Cost

C. Percentage of direct labour cost

The formula to be used is

Overhead rate = Total Production Overhead of a Department × 100 / Direct Labour Cost

D. Labour Hour Rate

This method is an improvement on the percentage of direct wage basis, as it fully recognizes the significance of the element of time in the incurring and absorption of manufacturing overhead expenses. This method is admirably suited to operations which do not involve any large use of machinery

Direct Labour Hour Rate = Total Production Overheads of a Department / Direct Labour Hours

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E. Machine Hour Rate

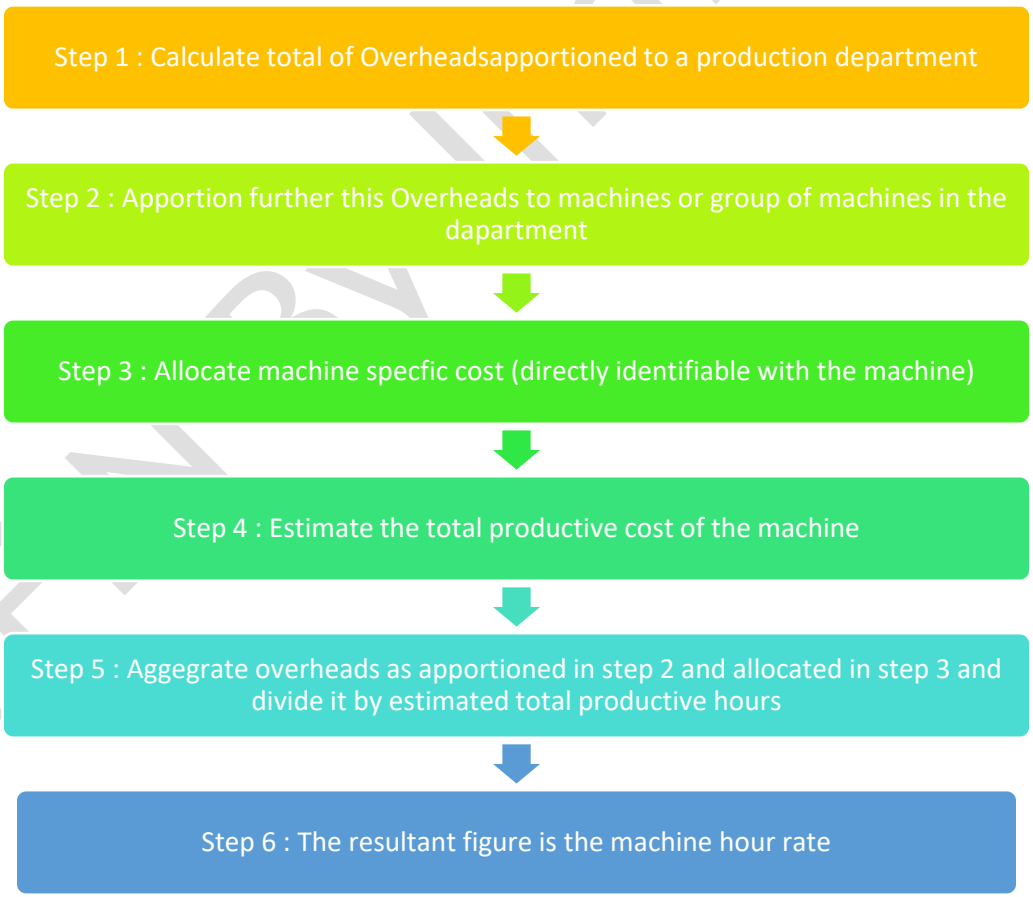
Machine hour rate implies, cost of running a machine for an hour to produce goods. There are two methods of computing machine hour rates

1. Direct Machine hour rate

According to the first method, only the expenses directly or immediately connected with the operation of the machine are taken into account e.g., power, depreciation, repairs and maintenance, insurance, etc. The rate is calculated by dividing the estimated total of these expenses for a period by the estimated number of operational hours of the machines during the period

2. Comprehensive Machine hour rate

It will be obvious, however, that in addition to the expenses stated above there may still be other manufacturing expenses such as supervision charges, shop cleaning and lighting, consumable stores and shop supplies, shop general labour, rent and rates, etc. incurred for the department as a whole and, hence, not charged to any particular machine or group of machines. In order to see that such expenses are not left out of production costs, one should include a portion of such expenses to compute the machine hour rate. Alternatively, the overheads not directly related to machines may be absorbed on the basis of Productive Labour Hour Rate Method or any other suitable method. Steps involved in using machine hour rate is as follows



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F. Rate per unit of output

This is the simplest of all the methods. In this method overhead rate is determined by the following formula

Overhead rate = Amount of Overhead / No. of Units

Types of Overhead Rates

A. Normal Rate

This rate is calculated by dividing the actual overheads by actual base. It is also known as actual rate.

Normal Overhead Rate = Actual amount of Overhead / Actual base

B. Pre-determined rate

This rate is determined in advance by estimating the amount of the overhead for the period in which it is to be used

Pre-determined rate = Budgeted amount of Overhead / Budgeted Base

C. Blanket Overhead

It refers to the computation of one single overhead rate for the whole factory. The use of blanket rate may be proper in certain factories producing only one major product in a continuous process or where the work performed in every department is fairly uniform or standardized.

Blanket Overhead Rate = Total Overheads for the factory / Total number of units of base for the factory

A blanket rate should be applied in the following cases:

- Where only one major product is being produced.
- Where several products are produced, but
  - All products pass through all departments; and
  - All products are processed for the same length of time in each department.

Where these conditions do not exist, departmental rates should be used.

D. Departmental Overhead Rate

It refers to the computation of one single overhead rate for a particular production unit or department. Where the product lines are varied or machinery is used to a varying degree in the different departments, that is, where conditions throughout the factory are not uniform, the use of departmental rates is to be preferred.

Departmental Overhead Rate = Overhead of department or cost centre / Corresponding base

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Accounting of Under and Over absorbed Overheads

There are three methods to deal with the under or over recovery / absorption of overheads¬

A. Use of Supplementary Rate

When the amount of under recovery or over recovery of overheads is sizeable (big), then the supplementary rates are used to account for the amount of under and over recovery of overheads.

B. Write off to Costing Profit and Loss Account

If the amount of under recovery or over recovery is negligible or small, then it is transferred to costing Profit and Loss Account.

c. Carry Forward of Overheads

Sometimes management carries forward the amount of under recovery or over recovery of overheads in 'Overheads Suspense A/c' or 'Overheads Reserve A/c' to be set - off against the under or over recovery of the subsequent years' overheads.

Accounting and Control of Administrative Overheads

Administrative overhead is defined as "The sum of those costs of general management and of secretarial accounting and administrative services, which cannot be directly related to the production, marketing, research or development functions of the enterprise." According to this definition, administrative overhead constitutes the expenses incurred in connection with the formulation of policy directing the organisation and controlling the operations of an undertaking. These overheads are also collected and classified in the same way as the factory overheads.

A. Methods of Accounting of Administrative Overheads

1. **Apportioning Administrative Overheads between Production and Sales Departments**
   According to this method administrative overheads are apportioned over production and sales departments. The reason for the apportionment of overhead expenses over these departments, recognizes the fact that administrative overheads are incurred for the benefit of both of these departments. Therefore, each department should be charged with the proportionate share of the same

2. **Charging to Profit and Loss Account**
   According to this method administrative
   overheads are charged to Costing Profit & Loss Account. The reason for charging to Costing Profit & Loss are firstly; the administrative overheads are concerned with the formulation of policies and thus are not directly concerned with either the production or the selling and distribution functions. Secondly, it is difficult to determine a suitable basis for apportioning administrative overheads over production and sales departments. Lastly, these overheads are the fixed costs. In view of these arguments, administrative overheads should be charged to Profit and Loss Account.

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3. Treating Administrative Overheads as a separate addition to Cost of Production/Sales

This method considers administration as a separate function like production and sales and, as such costs relating to formulating the policy, directing the organisation and controlling the operations are taken as a separate charge to the cost of the jobs or a product, sold along with the cost of other functions. The basis which are generally used for apportionment are:

- Works cost
- Sales value or quantity
- Gross profit on sales
- Quantity produced
- Conversion cost, etc.

B. Control of Administrative Overheads

Mostly administrative overheads are of fixed nature, and they arise as a result of management policies. These fixed overheads are generally non-controllable. But at the same time these overheads should not be allowed to grow disproportionately. Some degree of control has to be exercised over them. The methods usually adopted for controlling administrative overheads are as follows:

- Classification and analysis of overheads by administrative departments according to their functions, and a comparison with the accomplished results
- Control through Budgets
- Control through Standard

Accounting and Control of Selling and Distribution Overheads

These are the expenses incurred for promoting, marketing and distributing the goods to the customers. Therefore, these overheads are charged to the cost of goods sold to determine the cost of sales. It may be charged on any of the following basis: -

1. Sale Value

It is considered that the sale value is ordinarily the most logical basis, there being some connection between the amount of sales and the amount of expenses incurred to achieve them.

2. Cost of Goods Sold

Not a generally used method; this can be used as an alternative to Sales Value, only if all products have identical selling prices and gross margins.

3. Gross Profit on Sales

This method follows the “ability to pay” principle. Hence products yielding high profit margins are charged with higher share of selling overheads.

4. Number of orders or units sold

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Under this basis, expenses are classified into fixed and variable. Fixed expense per unit is ascertained by apportioning fixed costs on the basis of benefits received and dividing the same by the quantities sold. Some fixed selling expenses and the basis of apportionment based on benefits received are

Expenses	**Basis**
Salaries in the Sales Department and of the salesmen	Estimated time devoted to the sale of Various products.
Advertisement	Actual amount incurred for each product since these days it is usual to advertise each product separately; common expenses, such as in an exhibition, should be apportioned on the basis of advertisement expenditure on each product.
Show Room expenses	Average space occupied by each product.
Rent of finished goods godowns and Expenses on own delivery vans	Average quantities delivered during a period.

If a suitable basis for apportioning expenses does not exist, it may be apportioned in the proportion of sales of various products.

A. Control of Selling and Distribution Overheads

- The incidence of selling and distribution overheads depends mainly on external factors, such as distance of market, extent and nature of competition, terms of sales, etc. which are beyond the control of management.
- These overheads are dependent upon the customers, behaviour, their liking and disliking, tastes etc. Therefore, as such control over the overheads may result in loss of customers.
- These expenses being of the nature of policy costs, are not amenable to control. In spite of the above difficulties, the following methods may be used for controlling them.

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- **Comparison with past performance:** According to this method, selling and distribution overheads are compared with the figures of the previous period. Alternatively, the expenses may be expressed as a percentage of sales, and the percentages may be compared with those of the past period. This method is suitable for small concerns.
- **Budgetary Control:** A budget is set up for selling and distribution expenses. The expenses are classified into fixed and variable. If necessary, a flexible budget may be prepared indicating the expenses at different levels of sales. The actual expenses are compared with the budgeted figures and in the case of variances suitable actions are taken.
- **Standard Costing:** Under this method standards are set up in relation to the standard sales volume. Standards may be set up for salesmen, territories, products etc. Once the standards are set up, comparison is made between the actuals and standards: variances are enquired into and suitable action taken.

Concepts related to Capacity

The term "capacity" signifies volume of a business enterprise. It can be measured in the following manner:

A. Maximum theoretical capacity (Rated Capacity)

It is that capacity of a plant or department which will be achieved under 100 % operating time. It assumes round the clock operation of all plants with no allowance for machine downtime, waits and delays or holidays. It cannot be achieved in reality.

B. Practical capacity

The practical capacity of a plant is the theoretical maximum capacity less normal and unavoidable operating interruptions, such as repairs, waits, breaks, machine failure etc.

C. Normal capacity

It involves consideration of both the ability to produce and the ability to sell. For this, a sales budget is prepared which determines normal activity. This is a long-term measure that represents the practical plant capacity less the estimated idle capacity. The normal capacity concept is generally the most suitable for product cost determinations which further help in determining selling prices and valuation of inventories for purposes of financial statements.

D. Actual Capacity

It is the capacity actually achieved during a given period. It is presented as a percentage of installed capacity.

E. Idle Capacity

It is that part of the capacity of a plant, machine or equipment which cannot be effectively utilised in production.

A. Normal Idle Capacity: It is the difference between Installed capacity and Normal capacity.

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B. Abnormal idle capacity: It is the difference between Installed capacity and Normal capacity. The idle capacity may arise due to lack of product demand, non-availability of raw material, shortage of skilled labour, absenteeism, shortage of power fuel or supplies, seasonal nature of product etc.

F. Treatment of Idle Capacity Cost

Idle capacity costs can be treated in product costing, in the following ways:

- If the idle capacity cost is due to unavoidable reasons such as repairs, maintenance, changeover of job etc. a supplementary overhead rate may be used to recover the idle capacity cost. In this case, the costs are charged to the production capacity utilised.
- If the idle capacity cost is due to avoidable reasons such as faulty planning, power failure etc.; the cost should be charged to costing profit and loss account.
- If the idle capacity cost is due to seasonal factors, then, the cost should be charged to the cost of production by inflating overhead rates.

Treatment of certain items in Costing

A. Interest and financing charges

It includes any payment in nature of interest for use of non-equity funds and incidental cost that an entity incurs in arranging those funds. Example of interest and financing charges are interest on borrowings. financing charges in respect of finance leases, cash discount allowed to customers. The term interest and financing charges, finance costs and borrowing costs are used interchangeably. It does not include imputed costs. Interest and financing charges shall be presented in the cost statement as a separate item of cost of sales.

B. Depreciation

Depreciation "is the diminution in the intrinsic value of an asset due to use and/or the lapse of time." Depreciation is thus the result of two factors viz., the use, and the lapse of time. Assignment of Deprecation: It shall be traced to the cost object to the extent economically feasible. Where it is not directly traceable it should be assigned using either or two principles,

- Cause and Effect and
- Benefit received

C. Packing expenses

1. Primary Packing

Cost of primary packing necessary to protect the product or for preserving the quality of goods, should become a part of the Prime Cost.

2. Secondary Packing

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The cost of packing to facilitate the transportation & handling of the product from the factory to the customer should become a part of the Distribution cost. The cost of fancy packing necessary to attract customers is an advertising expenditure. Hence, it will be treated as a Selling Overhead.

3. Special Packing

When there is a special packing at the request of a customer, its cost should be charged to the specific work order or job.

D. Fringe Benefits

These are the additional payments or facilities provided to the workers apart from their salary and direct cost-allowances like house rent, dearness and city compensatory allowances. These benefits are given in the form of overtime, extra shift duty allowance, holiday pay, pension facilities etc

Treatment: If the amount of fringe benefits is considerably large, it may be recovered as direct charge by means of a supplementary wage or labour rate; otherwise these may be collected as part of production overheads.

E. Expenses on removal and re-erection of machines

- Expenses may sometimes be incurred on removal and re-erection of machinery in factories.
- Such expenses may be incurred due to factors like change in method of production; an addition or alternation in factory building, change in flow of production, etc.
- All such expenses are treated as production overheads.
- When amount of such expenses is large, and benefit from re-erection of machinery is expected to be received over a longer period of time, then it may be spread over a period of time.

F. Bad Debts:

There is no unanimity among different authors of cost Accounting about the treatment of bad debts.

1. Exclusion View

One view is that 'bad debts' should be excluded from cost. According to this view bad debts are financial loses and therefore, should not be included in the cost of a particular job or product. This view is more predominant and should be followed.

2. Inclusion View

According to another view it should form part of selling and distribution overheads, especially when they arise in the normal course of trading. Therefore, bad debts should be treated in cost accounting in the same way as any other selling and distribution cost.

However extraordinarily large bad debts should not be included in cost accounts.

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G. Training Expenses

Training is an essential input for industrial workers. Training expenses includes wages of workers, cost incurred in running training department, loss arising from the initial lower production, extra spoilage etc.

Treatment: Training expenses of factory workers are treated as part of the cost of production. The training expenses of office staff or salesmen should be treated as Administrative or Selling Overhead respectively. These expenses can be spread over the various departments of the concern, based on the number of workers on the roll.

Training expenses would be abnormally high in the case of high labour turnover. Such expenses should be excluded from costs and charged to the costing profit and loss account.

K. Canteen expenses

- An enterprise / factory may operate a canteen within its premises, to provide lunch and refreshments to workers, as part of its staff welfare measures.
- Sometimes, a small amount (say Rs. 2 per meal) may also be recovered from the workers.
- The loss incurred by the firm in running the canteen should be regarded as an overhead expense.
- If the canteen is meant only for factory workers, the expense should be apportioned on the basis of the number of workers employed in each department. If office Staff also takes advantage of the canteen facility, a suitable share of the expense should be treated as Administrative Overheads.

L. Carriage and Cartage Expenses

It refers to expenses incurred on the movement (inwards and outwards) and transportation of materials and goods.

1. Carriage Inward

Carriage expenses related to direct material should be included in the cost of direct material (as a part of Landed Cost) and those relating to indirect material (stores) should be treated as Factory Overheads.

2. Carriage Outward

Expenses related to the transaction of finished goods may be treated as Distribution Overhead.

M. Expenses for welfare activities

All expenses incurred on the welfare activities of employees in a company are part of general overheads. Such expenses should be apportioned between factory, office, selling and distribution overheads on the basis of number of persons involved.

N. Night shift allowance

Workers in the factories, which operate during nighttime are paid some extra amount known as 'night shift allowance'.

If this allowance is treated as part of direct wages, the jobs/production carried at night will be costlier than jobs/production performed during the day. However, if additional expenditure on night shift is incurred to meet some specific customer order, such expenditure may be charged

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directly to the order concerned. If night shifts are run due to abnormal circumstances, the additional expenditure should be charged to the costing profit and loss account.

O. Research and Development Expenses

It is incurred for searching new or improved products, production methods / techniques or plants / equipments. Research related to original investigations to gain from new scientific or technical knowledge and understanding. It may be:

1. Basic Research

that which is general, and not directed towards any specific practical aim.

2. Applied Research

that which is directed towards a specific practical aim or objective.

3. Treatment

Basic Research	Applied Research
If continuous: charged to revenue as an expense of the period or as a separate functional overhead.	For specific existing products: Directly charged / allocated to the product.
If not continuous: Spread over a number of years (like deferred revenue expenditure, if the amount is large).	For all existing products / methods: Treated as manufacturing OH and absorbed over all products.
	For new products: Charged to the product if the venture is successful. Otherwise written off to costing P&L A/c either in lump-sum or by amortization.

4. Development Expenses

It begins with the implementation of the decision to produce a new or improved product or to employ a new or improved method. The treatment of Development Expenses is the same as that of applied research.

Illustrations

Illustration - 1

A company has two products
(I) Vanilla ice-cream – 1,00,000 units
(ii) Mango ice-cream 35,000 units
The following information is given:

Particulars	Vanilla (Rs.)	Mango (Rs.)	Total (Rs.)

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Direct Material Cost	5.0	2.0	7.0
Direct Labour Cost	3.0	1.0	4.50
Prime Cost	8.0	3.5	11.5
Overheads - Electricity			5,00,000

Allocate and distribute the overheads to both the products

Illustration - 2

XL Ltd. has three production departments and four service departments. The expenses for these departments as per Primary Distribution Summary are as follows:

	(Rs.)	**(Rs.)**
Production Departments:		
A	30,00,000	
B	26,00,000	
C	24,00,000	**80,00,000**
Service Departments:		
Stores	4,00,000	
Timekeeping & Accounts	3,00,000	
Power	1,60,000	
Canteen	1,00,000	**9,60,000**

The following information is also available in respect of the production departments

	Dept. A	**Dept. B**	**Dept. C**
Horsepower of Machine	300	300	200
Number of workers	20	15	15
Value of stores requisition in (Rs.)	2,50,000	1,50,000	1,00,000

Apportion the costs of service departments over the production departments

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Illustration - 3

Suppose the expenses of two production departments A and B and two service departments X and Y are as under:

Department	Amount	Apportionment Basis		
	(Rs.)	Y	A	B
X	2,00,000	25%	40%	35%
Y	1,50,000	—	40%	60%
A	3,00,000			
B	3,20,000			

Apportion the costs of service departments.

Illustration - 4

Service department's expenses

Particulars	Amount (Rs.)
Boiler House	3,00,000
Pump Room	60,000
Total	**3,60,000**

The allocation is:

Particulars	Production Departments		Service Departments	
	A	B	Boiler House	Pump Room
Boiler House	60%	35%	•	5%
Pump Room	10%	40%	50%	•

Find out the amount of the expenditure that must be allocated to the 2 production departments.

Illustration - 5

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Sanz Ltd. is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 2018:

	Total (Rs.)	**A (Rs.)**	**B (Rs.)**	**C (Rs.)**	**X (Rs.)**	**Y (Rs.)**
Direct material		1,00,000	2,00,000	4,00,000	2,00,000	1,00,000
Direct wages		5,00,000	2,00,000	8,00,000	1,00,000	2,00,000
Factory rent	4,00,000					
Power	2,50,000					
Depreciation	1,00,000					
Other overheads	9,00,000					

Additional information:					
Area (Sq. ft.)	500	250	500	250	500
Capital value of assets (Rs. In lakhs)	20	40	20	10	10
Machine hours	1,000	2,000	4,000	1,000	1,000
Horsepower of machines	50	40	20	15	25

A technical assessment of the apportionment of expenses of service departments is as under:

	A	**B**	**C**	**X**	**Y**
Service Dept. 'X' (%)	45	15	30	•	10

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Service Dept. 'Y' (%)	60	35	•	5	•

Required:

1. A statement showing distribution of overheads to various departments.
2. A statement showing re-distribution of service departments expenses to production departments using
   a. Trial and error method.
   b. Repeated redistribution method
3. Machine hour rates of the production departments 'A', 'B' and 'C'

Illustration - 6

The ABC Company has the following account balances and distribution of direct charges on 31st March 2019.

Particulars	**Total (Rs.)**	**Production Departments**		**Service Departments**	
		Machine shop (Rs.)	**Packing (Rs.)**	**General Plant (Rs.)**	**Stores and Maintenance (Rs.)**
Allocated Overheads:					
Indirect labour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent's salary	4,000	-	-	4,000	-
Cost & payroll salary	10,000	-	-	10,000	-
Overheads to be					

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apportioned:					
Power	8,000				
Rent	12,000				
Fuel and heat	6,000				
Insurance	1,000				
Taxes	2,000				
Depreciation	1,00,000				
	1,64,420	6,200	4,700	17,170	7,350

4. The following data were compiled by means of the factory survey made in the previous year:

	Floor space	**Radiator Sections**	**No. of Employees**	**Investment (Rs.)**	**H.P hours**
Machine Shop	2,000 sq. ft.	45	20	640,000	3,500
Packing	800 sq. ft.	90	10	200,000	500
General Plant	400 sq. ft.	30	3	10,000	-
Stores & Maintenance	1,600 sq. ft.	60	5	150,000	1,000
	4,800 sq. ft.	225	38	1,000,000	5,000

5. Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:
6. Machine shop 50%; Packing 20%; General Plant 30%; General Plant overheads is distributed based on number of employees:
7. (a) Prepare an overhead distribution statement with supporting schedules to show computations and basis of distribution including distribution of the service department expenses to producing department. (b) Determine the service department distribution by the method of continued distribution. Carry through 3 cycles. Show all calculations to the nearest rupees.

Illustration - 7

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Modern Manufactures Ltd. has three Production Departments P1, P2, P3 and two Service Departments S1 and S2 details pertaining to which are as under:

	P1	P2	P3	S1	S2
Direct wages (Rs.)	3,000	2,000	3,000	1,500	195
Working hours	3,070	4,475	2,419	-	-
Value of machines (Rs.)	60,000	80,000	1,00,000	5,000	5,000
H.P. of machines	60	30	50	10	-
Light points	10	15	20	10	5
Floor space (sq. ft.)	2,000	2,500	3,000	2,000	500

8. The following figures extracted from the Accounting records are relevant:

Particulars	Amount (Rs.)
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,939
Power	1,500
Depreciation on Machines	10,000
Sundries	9,695

9. The expenses of the Service Departments are allocated as under:

	P1	P2	P3	S1	S2
S1	20%	30%	40%	-	10%
S2	40%	20%	30%	10%	-

10. Find out the total cost of product X, which is processed for manufacture in Departments P1, P2 and P3 for 4, 5 and 3 hours respectively, given that its Direct Material Cost is Rs.50 and Direct Labour Cost is Rs.30.

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Illustration -8

Deccan Manufacturing Ltd. have three departments which are regarded as production departments.

Service departments' costs are distributed to these production departments using the "Step Ladder Method" of distribution.

Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows.

Data required for distribution is also shown against each department:

Department	Factory Overheads (Rs.)	Direct Labour Hours	No. of employees	Area in Sq. mts
Production				
X	1,93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
Service				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500
R	1,05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

Illustration -9

Gemini enterprises undertakes three different jobs A, B and C.

All of them require the use of a special machine and also the use of a computer.

The computer is hired, and the hire charges work out to Rs. 4,20,000 per annum.

The expenses regarding the machine are estimated as follows:

Particulars	Amount (Rs.)
Rent for the quarter	17,500
Depreciation per annum	2,00,000

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Indirect charges per annum	1,50,000

During the first month of operation the following details were taken from the job register:

Particulars	Job		
	A	B	C
Number of hours the machine was used:			
1. Without the use of computer	600	900	-
2. With the use of computer	400	600	1000

You are required to compute the machine hour rate:

1. For the firm as a whole for the month when the computer was used and when the computer was not used.
2. For the individual jobs A, B and C.

Illustration - 10

A light engineering factory fabricates machine parts to customers. The factory commenced fabrication of 12 Nos. machine parts to customers' specifications and the expenditure incurred on the job for the week ending 21st August, 20X1 is given below:

Particulars	Amount (Rs.)	Amount (Rs.)
Direct materials (all items)		780.00
Direct labour (manual) 20 hours @Rs. 15 per hour		300.00
Machine facilities:		
Machine No. I: 4 hours @ Rs.45	180.00	
Machine No. II: 6 hours @ Rs. 65	390.00	570.00

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Total		**1,650.00**
Overheads @ Rs.8 per hour on 20 manual hours		160.00
Total cost		**1,810.00**

3. The overhead rate of Rs.8 per hour is based on 3,000-man hours per week;
4. similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours out of 45 hours per week.
5. After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week.
6. During the week ending 21st August, 20X1, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32.5 hours respectively.
7. Prepare a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.
8. Similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours out of 45 hours per week.
9. After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week.
10. During the week ending 21st August, 20X1, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32.5 hours respectively.
11. Prepare a Cost Sheet for the job for the fabrication of 12 Nos. machine parts duly levying the supplementary rates.

Illustration -11

In a manufacturing unit, factory overhead was recovered at a pre-determined rate of Rs. 25 per man-day.

The total factory overhead expenses incurred and the man- days actually worked were Rs. 41.50 lakhs and 1.5 lakh man-days respectively.

Out of the 40,000 units produced during a period, 30,000 were sold.

On analysing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase in overhead costs.

How would unabsorbed overheads be treated in Cost Accounts?

Illustration - 12

In a factory, overheads of a particular department are recovered on the basis of

Rs. 5 per machine hour.

The total expenses incurred and the actual machine hours for the department for the month of August were Rs.80,000 and 10,000 hours respectively.

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Of the amount of Rs. 80,000, Rs. 15,000 became payable due to an award of the Labour Court and Rs. 5,000 was in respect of expenses of the previous year booked in the current month (August).

Actual production was 40,000 units, of which 30,000 units were sold.

On analysing the reasons, it was found that 60% of the under-absorbed overhead was due to defective planning and the rest was attributed to normal cost increase. How would you treat the under-absorbed overhead in the cost accounts?

Illustration - 13

ABC Ltd. manufactures a single product and absorbs the production overheads at a pre-determined rate of Rs. 10 per machine hour.

At the end of financial year 20X1-X2, it has been found that actual production overheads incurred were Rs. 6,00,000.

It included Rs. 45,000 on account of 'written off' obsolete stores and Rs.30,000 being the wages paid for the strike period under an award.

The production and sales data for the year 20X1-X2 is as under:

Particulars	**Amount (Rs.)**
Production:	
Finished Goods	20,000 units
Work-in-progress (50% complete in all respects)	8,000 units
Sales:	
Finished Goods	18,000 units

The actual machine hours worked during the period were 48,000.

It has been found that one-third of the under-absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

Calculate the amount of under-absorption of production overheads during the year 20X1-X2; and

Show the accounting treatment of under-absorption of production overheads.

Illustration - 14

A factory has three production departments.

The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on

- percentage of total factory overheads to

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- total factory wages.

The relevant data for a month are given below:

Department	Direct Material	Direct Wages	Factory OH Amount (Rs.)	Direct Labour Hours Amount (Rs.)	Machine Hours Amount (Rs.)
Budget:					
Machining	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	-
Actual:					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	-

The details of one of the representative jobs produced during the month are as under:

Job No. CW 7083				
Department	Direct Materials	Direct Wages Amount (Rs.)	Direct Labour Hours	Machine Hours
Machining	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	-

The factory adds 30% on the factory cost to cover administration and selling overheads and profit.

Requirements:

1. Calculate the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.
2. Suggest any suitable alternative method(s) of absorption of the factory overheads and calculate the overhead recovery rates based on the method(s) so recommended by you.
3. Determine the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.

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4. Calculate the department-wise and total under or over recovery of overheads based on the company's current policy and the method(s) recommended by you.

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Study Note – 4 | Cost Book Keeping

4.1 Cost Accounting Records, Ledgers and Cost Statements

Meaning & Importance

A Cost Sheet is a statement which shows the break-up and build-up of costs. It is a document, which provides for the assembly of the detailed cost of a cost centre or a cost unit. n a typical cost sheet, cost information is presented on the basis of functional classification. However, other classification may also be adopted as per the requirements of users of the information.

Functional Classification of Elements of Cost

Under this classification, costs are divided according to the function for which they have been incurred. The following are the classification of costs based on functions:

- Direct Material Cost
- Direct Employee (labour) Cost
- Direct Expenses
- Production/ Manufacturing Overheads
- Administration Overheads
- Selling Overheads
- Distribution Overheads
- Research and Development costs etc.

Cost Heads in a Cost Sheet

The costs as classified on the basis of functions are grouped into the following cost heads in a cost sheet:

- Prime Cost
- Cost of Production
- Cost of Goods Sold
- Cost of Sales

A. Prime Cost

Prime cost represents the total of direct materials costs, direct employee (labour) costs and direct expenses. The total of cost for each element has to be calculated separately.

Direct Material cost	xxx
Direct Labour Cost	xxx
Direct expenses	xxx
Total: Prime Cost	xxx

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1. Direct Material Cost

It is the cost of direct material consumed. The cost of direct material consumed is calculated as follows:

Opening Cost of Material	xxx
Add: Additions/Purchases	xxx
Less: Closing Stock of Materials	xxx
Direct Materials consumed	xxx

2. Direct Employee Cost

It is the total of payment made to the employees who are engaged in the production of goods and provision of services. Employee cost is also known as labour cost; it includes the following

- Wages and salary;
- Allowances and incentives;
- Payment for overtimes;
- Employer's contribution to Provident fund and other welfare funds;
- Other benefits (leave with pay, free or subsidised food, leave travel concession etc.)

3. Direct Expenses

Expenses other than direct material cost and direct employee cost, which are incurred to manufacture a product or for provision of service and can be directly traced in an economically feasible manner to a cost object. The following costs are examples for direct expenses:

- Royalty paid/ payable for production or provision of service;
- Hire charges paid for hiring specific equipment;
- Cost for product/ service specific design or drawing;
- Cost of product/ service specific software;
- Other expenses which are directly related with the production of goods or provision of service.

B. Cost of Production

In a conventional cost sheet, this item of cost can be seen. It is the total of prime cost and factory related costs and overheads.

Prime Cost Add: Factory Overhead	Xxx xxx
Gross Works Costs	Xxx

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Add: Opening stock of Work in Progress	Xxx
Less: Closing stock of Work-in-process	(Xxx)
Factory or Works Costs	Xxx
Add: Quality Control Cost	Xxx
Add: Research & Development cost (Process related)	Xxx
Add: Administrative Overheads related with Production	xxx
Less: Credit for recoveries (miscellaneous income)	(xxx)
Add: Packing Cost (Primary packing)	xxx
Cost of Production	**xxx**

1. Factory Overheads

It is also known as works/ production/ manufacturing overheads. It includes the following indirect costs:

- Consumable stores and spares.
- Depreciation of plant and machinery, factory building etc.
- Lease rent of production assets.
- Repair and maintenance of plant and machinery, factory building etc.
- Indirect employees cost connected with production activities.
- Drawing and Designing department cost.
- Insurance of plant and machinery, factory building, stock of raw material & WIP etc.
- Amortized cost of jigs, fixtures, tooling etc.
- Service department cost such as Tool Room, Engineering & Maintenance, Pollution Control etc.

2. Stock of Work-in-process

The cost of opening and closing stock of work-in process is adjusted to arrive at factory/ works cost. The WIP stock is valued on the basis of percentage of completion in respect of each elements of cost. Students may refer the 'Chapter- Process & Operation Costing' to know the WIP valuation methods.

3. Quality Control Cost

This is the cost of resources consumed towards quality control procedures.

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4. **Research & Development cost**

It includes only those research and development related cost which with is incurred to improvement of process, system, product or services.

5. **Administrative Overheads**

It includes the cost of production administration only. The general administration overhead is not included in production cost.

6. **Credit for recoveries**

The realised or realisable value of scrap or waste is deducted.

7. **Packing Cost (primary)**

Packing material which is essential to hold and preserve the product for its use by the customer.

C. Cost of Goods Sold

It is the cost of production for goods sold. It is calculated after adjusting the values of opening and closing stocks of finished goods. It can be calculated as below:

Cost of Production	Xxx
Add: Cost of Opening stock of finished goods	Xxx
Less: Cost of Closing stock of finished goods	Xxx
Cost of Goods Sold	**xxx**

D. Cost of Sales

It is the total cost of a product incurred to make the product available to the customer or consumer. It includes Cost of goods sold, administration and marketing expenses. It is calculated as below:

Cost of Goods Sold	Xxx
Add: Administrative Overheads (General)	Xxx
Add: Selling Overheads	Xxx
Add: Packing Cost (secondary)	Xxx
Add: Distribution Overheads	Xxx

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Cost of Sales	**Xxxx**

1. **Administrative Overheads**

It is the cost related with general administration of the entity. It includes the followings:

- Depreciation and maintenance of machines, building, furniture etc. of corporate or general management.
- Salary of administrative employees, accountants, directors, secretaries etc.
- Rent, insurance, lighting, office expenses etc.

2. **Selling Overheads**

It is the cost related with sale of products or services. It includes the following costs:

- Salary and wages related with sales department and employees directly related with selling of goods.
- Rent, depreciation, maintenance and other cost related with sales department.
- Cost of advertisement, maintenance of website for online sales, market research etc.

3. **Packing cost (secondary)**

Packing material that enables to store, transport, inform the customer, promote and otherwise make the product marketable.

4. **Distribution Overheads**

It includes the cost related with making the goods available to the customers. The costs are

- Salary and wages of employees engaged in distribution of goods.
- Transportation and insurance costs related with distribution.
- Depreciation, hire charges, maintenance and other operating costs related with distribution vehicles etc.

Cost Sheet / Statement

Sl.no	Particulars	Total cost	Cost per Unit
1	Direct materials consumed - Opening Stock of Raw Material - Add: Additions/ Purchases - Less: Closing stock of Raw Material	 Xxx Xxx (xxx)	
2	Direct employee (labour) cost	Xxx	

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3	Direct expenses	Xxx	
4	**Prime Cost (1+2+3)**	**xxx**	
5	Works/ Factory Overheads	Xxx	
6	Gross Works Cost (4+5)	Xxx	
7	Add: Opening Work in Process	Xxx	
8	Less: Closing Work in Process	(xxx)	
9	**Works/ Factory Cost (6+7-8)**	**Xxx**	
10	Quality Control Cost	Xxx	
11	Research and Development Cost	Xxx	
12	Administrative Overheads (relating to production activity)	Xxx	
13	Less: Credit for Recoveries/Scrap/By-Products / misc. income	(xxx)	
14	Add: Packing cost (primary)	Xxx	
15	**Cost of Production (9+10+11+12-13+14)**	**Xxx**	
16	Add: Opening stock of finished goods	Xxx	
17	Less: Closing stock of finished goods	(xxx)	
18	**Cost of Goods Sold (15+16-17)**	**Xxx**	
19	Add: Administrative Overheads (General)	Xxx	
20	Add: Marketing Overheads - Selling Overheads - Distribution Overheads	Xxx Xxx Xxx	

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21	**Cost of Sales (18+19+20)**	**Xxx**	

Advantages of Cost Sheet

The main advantages of a Cost Sheet are as follows:

- It provides the total cost figure as well as cost per unit of production.
- It helps in cost comparison.
- It facilitates the preparation of cost estimates required for submitting tenders.
- It provides sufficient help in arriving at the figure of selling price.
- It facilitates cost control by disclosing operational efficiency.

4.3 Non-Integrated Accounting System

It is a system of accounting under which separate ledgers are maintained for cost and financial accounts by Accountants. This system is also referred to as cost ledger accounting system. Under such a system the cost accounts restrict itself to recording only those transactions which relate to the product or service being provided. Hence items of expenses which have a bearing with sales or, production or for that matter any other items which are under the factory management are the ones dealt with in such accounts. This leads to the exclusion of certain expenses like interest, bad debts and revenue/income from 'other than the sale of product or service'.

A special feature of the non-integrated system of accounts is its ability to deal with notional expenses like rent or interest on capital tied up in the stock. The accounting of notional rent facilitates comparisons amongst factories (some owned and some rented).

Non-Integrated Accounting Systems contain fewer accounts when compared with financial accounting because of the exclusion of purchases, expenses and also Balance Sheet items like fixed assets, debtors and creditors. Items of accounts which are excluded are represented by an account known as Cost ledger control account.

The important ledgers to be maintained under non-integrated accounting system in the Cost Accounting department are the following:

1. Cost Ledger

This is the principle ledger of the cost department in which impersonal accounts are recorded. This ledger is made self-balancing by maintaining therein a Control Account for each subsidiary ledger

2. Stores Ledger

It contains an account for each item of stores. The entries in each account maintained in this ledger are made from the invoice, goods received note, material requisitions, material received

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note etc. Accounts in respect of each item of stores show receipt, issue and balance in physical as well as in monetary terms.

3. Work-in-Process Ledger

This ledger is also known as job ledger, it contains accounts of unfinished jobs and processes. All material costs, wages and overheads for each job in process are posted to the respective job account in this ledger. The balance in a job account represents total balance of job/work-in-process, as shown by the job account.

4. Finished Goods Ledger

It contains an account for each item of finished product manufactured or the completed job. If the finished product is transferred to stock, a credit entry is made in the work-in-process ledger and a corresponding debit entry is made in this ledger

Principal Accounts

The main accounts which are usually prepared when a separate Cost Ledger is maintained are as follows:

1. Cost Ledger Control Account

This account is also known as **General Ledger Adjustment Account. This account is made to complete double entry.** All items of expenditure are credited to this account. Sales are debited to this account and net profit/loss from Costing Profit & Loss Account is transferred to this account. The balance in this account at the end of the particular period represents the net total of all the balances of the impersonal account

2. Stores Ledger Control Account

This account is **debited for the purchase of material and credited for issue of materials from stores**. The balance in this account indicates the total balance of all the individual stores accounts. Abnormal losses or gains if any in this account, are transferred to Costing Profit & Loss Account. Entries are made on the basis of goods received notes and stores requisitions etc.

3. Wages Control Account

This account is **debited with total wages paid (direct and indirect)**. Direct wages are further transferred to Work-in-Process Control Account and indirect wages to Production Overhead; Administration Overhead or Selling & Distribution Overhead Control Accounts, as the case may be. Wages paid for abnormal idle time are transferred to Costing Profit & Loss Account either directly or through Abnormal Loss Account.

4. Manufacturing/Production/Works/ Factory Overhead Control Account

This account is **debited with indirect costs of production** such as indirect material, indirect employee, indirect expenses (carriage inward etc.). **Overhead recovered is credited to this**

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Account. The difference between overhead incurred and overhead recovered (i.e. Under Absorption or Over Absorption of Overheads) is transferred to Overheads Adjustment Account

5. Work-in-Process Control Account

This account is debited with the total cost of production, which includes—direct materials, direct employee, direct expenses, production overhead recovered, and is credited with the amount of finished goods completed and transferred. The balance in this account represents total balances of jobs/works-in-process, as shown by several job accounts.

6. Administrative Overhead Control Account

This account is **debited with overhead incurred and credited with overhead recovered.** The overhead recovered are debited to Finished Goods Control Account, if administrative overhead is related with production activities otherwise to Cost of Sales A/c. The difference between administrative overheads incurred and recovered is transferred to Overhead Adjustment Account.

7. Finished Goods Control Accounts

This account is **debited with the value of goods transferred from Work-in-process Control Account** administration costs recovered **(if relates to production activities).** This account is credited with Cost of Sales Account. The balance of this account represents the value of goods unsold at the end of the period.

8. Selling and Distribution Overhead Control Account

This account is debited with selling and distribution overheads incurred and credited with the selling and distribution overheads recovered. The difference between overheads incurred and recovered is transferred usually to Overhead Adjustment Account

9. Cost of Sales Account

This account is **debited with the cost of finished goods transferred from Finished Goods Control Account for sale,** General Administrative overhead recovered, Selling and distribution overhead recovered. The balance of this account is ultimately transferred to Sales Account or Costing Profit & Loss Account.

10. Costing Profit & Loss Account

This account is debited with cost of goods sold, under-absorbed overheads and abnormal losses and is credited with sales value, over-absorbed overhead and abnormal gains. The net profit or loss in this account is transferred to Cost Ledger Control Account.

11. Overhead Adjustment Account

This account is to be **debited for under-recovery of overhead and credited with over-recovery of overhead amount**. The net balance in this account is transferred to Costing Profit & Loss Account.

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Note: Sometimes, Overhead Adjustment Account is dispensed with and under/over absorbed overheads is directly transferred to Costing Profit & Loss Account from the respective overhead accounts.

Scheme of Entries

The manner in which the Cost Ledger, when maintained on a double entry basis, would operate is illustrated by the following statements of various journal entries as would appear in the cost books.

1. Material

(i) Purchase – Rs.5000 (Cash or Credit)

(a)	Material Control A/c	Dr.5,000	
	To Cost Ledger Control A/c		5,000
(b)	Stores Ledger Control A/c	Dr.5,000	
	To Material Control A/c		5,000

Note: Sometimes Material Control Account is dispensed with and entries are directly made into Stores Ledger Control A/c, giving a credit to Cost Ledger Control A/c.

(ii) Purchases worth Rs 500 for special job

(a)	Work-in-Process Ledger Control A/c	Dr.500	
	To Cost Ledger Control A/c		500

(iii) Material returned to vendor— Rs 500

(a)	Cost Ledger Control A/c	Dr.500	
	To Store Ledger Control A/c		500

(iv)

(a)	Material (Direct) issued to production— Rs 1,000		
	Work-in-Process Control A/c	Dr.1,000	
	To Store Ledger Control A/c		1,000
(b)	Material (Indirect) issued to production— Rs 200		
	Production Overhead Control A/c	Dr.200	
	To Store Ledger Control A/c		200

(v)

(a)	Material worth Rs 200 returned from shop to stores		
	Stores Ledger Control A/c	Dr.200	
	To Work-in-Process Control A/c		200
(b)	Material worth Rs 100 is transferred from Job-1 to Job- 2		
	Job- 2 A/c	Dr.100	
	To Job- 1 A/c		100

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(vi) Material worth Rs 100 is issued from stores for re-pairs

(a) Production Overhead Control A/c Dr.100
To Stores Ledger Control A/c 100

2. Labour

a. Direct wages paid to workers— Rs 1,000

i. Wages Control A/c Dr.1,000
To Cost Ledger Control A/c 1,000

b. Indirect wages paid to workers in the production— Rs 700

i. Wages Control A/c Dr.700
To Cost Ledger Control A/c 700

ii. Production Overhead Control A/c Dr.700
To Wages Control A/c 700

c. Indirect wages paid to workers in administration— Rs 500

i. Wages Control A/c Dr.500
To Cost Ledger Control A/c 500

ii. Administration Overhead A/c Dr.500
To Wages Control A/c 500

d. Indirect wages paid to workers in Selling & Dist. department— Rs 300

i. Wages Control A/c Dr.300
To Cost Ledger Control A/c 300

ii. Selling & Dist. Overhead A/c Dr.300
To Wage Control A/c 300

3. Direct Expenses

a. Direct expenses incurred Rs 500 for Job No. 12

i. Job No. 12 A/c (WIP Control A/c) Dr.500
To Cost Ledger Control A/c 500

4. Overheads

a. Overhead expenses incurred Rs 500 (Production Rs 150; Administrative Rs 150; Selling and Distribution Rs 200)

i. Production Overhead Control A/c Dr.150
Administrative Overhead Control A/c Dr.150
Selling & Dist. Overhead Control A/c Dr.200
To Cost Ledger Control A/c 500

b. Carriage Inward (Direct to Factory) — Rs 100

i. Production Overhead Control A/c Dr.100
To Cost Ledger Control A/c 100

c. Production overhead recovered— Rs 1,000

i. Work-in-Process Ledger Control A/c Dr.1,000

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To Production Overhead Control A/c 1,000

d. Administrative Overhead recovered Rs 500 from finished goods
   i. Finished Goods Ledger Control A/c Dr.500
      To Administrative Overhead Control A/c 500

e. Selling and Distribution Overhead Rs 100 recovered from sales
   i. Cost of Sales A/c Dr.100
      To Selling & Dist. Overhead Control A/c 100

f. Under recovery of overheads
   i. Costing Profit & Loss A/c Dr.xxx
      To Administrative Overhead Control A/c xxx

g. Over recovery of overheads
   i. Production Overheads Control A/c Dr.xxx
      To Costing Profit & Loss A/c xxx

5. Sales

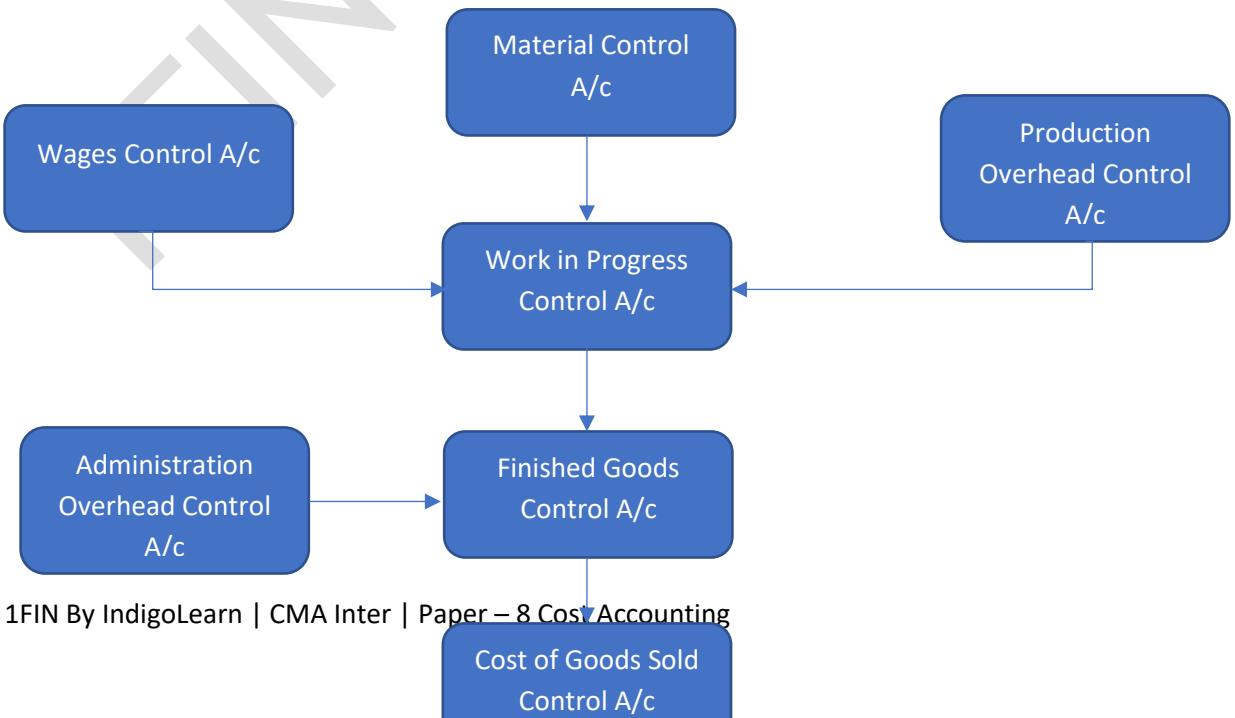
i. Cost Ledger Control A/c Dr.xxx
   To Costing Profit & Loss A/c xxx

6. Profit/ Loss

a. In case of Profit
   i. Costing Profit & Loss A/c Dr. xxx
      To Cost Ledger Control A/c xxx

b. In case of Loss
   i. Cost Ledger Control A/c Dr.xxx
      To Costing Profit & Loss A/c xxx

Non-Integrated Accounting System-flowchart



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4.4 Integrated Accounting System

Integrated Accounts is the name given to a system of accounting, whereby cost and financial accounts are kept in the same set of books. Obviously, then there will be no separate sets of books for Costing and Financial records. Integrated accounts provide or meet out fully the information requirement for Costing as well as for Financial Accounts. For Costing it provides information useful for ascertaining the cost of each product, job, process, operation of any other identifiable activity and for carrying necessary analysis. Integrated accounts provide relevant information which is necessary for preparing profit and loss account and the balance sheets as per the requirement of law and also helps in exercising effective control over the liabilities and assets of its business.

Advantages

The main advantages of Integrated Accounts are as follows:

1. **No need for Reconciliation**

The question of reconciling costing profit and financial profit does not arise, as there is only one figure of profit.

2. **Less efforts**

Due to use of one set of books, there is a significant saving in efforts made.

3. **Less time consuming**

No delay is caused in obtaining information as it is provided from books of original entry.

4. **Economical process**

It is economical also as it is based on the concept of "Centralisation of Accounting function".

Essential pre-requisites for Integrated Accounts

The essential pre-requisites for integrated accounts include the following steps:

- The management's decision about the extent of integration of the two sets of books. Some concerns find it useful to integrate up to the stage of prime cost or factory cost while other prefer full integration of the entire accounting records

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- A suitable coding system must be made available so as to serve the accounting purposes of financial and cost accounts.
- An agreed routine, with regard to the treatment of provision for accruals, prepaid expenses, other adjustment necessary for preparation of interim accounts.
- Perfect coordination should exist between the staff responsible for the financial and cost aspects of the accounts and an efficient processing of accounting documents should be ensured.

Features of Integrated Accounting System

Following are the main points of integrated accounting:

- Complete analysis of cost and sales are kept.
- Complete details of all payments in cash are kept
- Complete details of all assets and liabilities are kept and this system does not use a notional account to represent all impersonal accounts

In non-integrated system, a cost ledger control account or general ledger adjustment account is used in cost ledger. In this system, **general ledger adjustment account is eliminated** and detailed accounts for assets and liabilities are maintained. In other words, following accounts are used for "General Ledger Adjustment Account/ Cost Ledger Control Account" of non-integrated system: In non-integrated system, a cost ledger control account or general ledger adjustment account is used in cost ledger. In this system, general ledger adjustment account is eliminated and detailed accounts for assets and liabilities are maintained. In other words, following accounts are used for "General Ledger Adjustment Account/ Cost Ledger Control Account" of non-integrated system

- Bank account
- Receivables (Debtors) account
- Payables (Creditors) account
- Provision for depreciation account etc.

In integrated system, all accounts necessary for showing classification of cost will be used but the cost ledger control account of non-integrated accounting is replaced by use of following accounts:

- Bank account
- Receivables (Debtors) account
- Payables (Creditors) account
- Provision for depreciation account
- Fixed assets account
- Share capital account

4.5 Reconciliation of Cost and Financial Accounts

When the cost and financial accounts are kept separately, it is imperative that those should be reconciled, otherwise the cost accounts would not be reliable. In this connection, it is necessary to remember that a reconciliation of the two sets of accounts only can be made if both the sets

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contain sufficient details as would enable the causes of differences to be located. It is, therefore, important that in the financial accounts, the expenses should be analysed in the same way as in the cost accounts.

The reconciliation of the balances generally, is possible preparing a *Memorandum Reconciliation Account*. In this account, the items charged in one set of accounts but not in the other or those charged in excess as compared to that in the other are collected and by adding or subtracting them from the balance of the amount of profit shown by one of the accounts, shown by the other can be reached. **The procedure is similar to the one followed for reconciling the balance with a bank that shown by the cash book or the ledger.**

Causes of differences in Financial and Cost Accounts

1. Items included in Financial Accounts only
    a. Purely Financial Expenses:
        i. Interest on loans or bank mortgages
        ii. Expenses and discounts on issue of shares, debentures etc.
        iii. Other capital losses i.e., loss by fire not covered by insurance etc.
        iv. Losses on the sales of fixed assets and investments
        v. Goodwill written off
        vi. Preliminary expenses written off
        vii. Income tax, donations, subscriptions
        viii. Expenses of the company's share transfer office, if any.
    b. Purely Financial Income:
        i. Interest received on bank deposits, loans and investments
        ii. Dividends received
        iii. Profits on the sale of fixed assets and investments
        iv. Transfer fee received.
        v. Rent receivables
2. Item included in Cost Accounts only (notional expenses)
        i. Charges in lieu of rent where premises are owned
        ii. Interest on capital at notional figure though not incurred
        iii. Salary for the proprietor at notional figure though not incurred
        iv. Notional Depreciation on the assets fully depreciated for which book value is nil.
3. Items whose treatment is different in the two sets of accounts

    The objective of cost accounting is to provide information to management for decision making and control purposes while financial accounting conforms to external reporting requirements. Hence there are chances that certain items are treated differently in the two sets of accounts. Similarly cost accounting may use a different method of depreciation than what is allowed under financial accounting.

4. Varying basis of valuation

    It is another factor which sometimes is responsible for the difference. It is well known that in financial accounts stock are valued either at cost or market price, whichever is lower. But in Cost Accounts, stocks are only valued at cost.

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Procedure for reconciliation

There are 3 steps involved in the procedure for reconciliation.

- Ascertainment of profit as per financial accounts
- Ascertainment of profit as per cost accounts
- Reconciliation of both the profits (similar to the bank reconciliation statement)

Circumstances where reconciliation statement can be avoided

When the Cost and Financial Accounts are integrated - there is no need to have a separate reconciliation statement between the two sets of accounts. Integration means that the same set of accounts fulfil the requirement of both i.e., Cost and Financial Accounts.

Accounting for Management Information and Cost Control

With a view to control costs, standard cost for each element of cost is set. The standard costs so set are used to measure and compare the actual costs. This enable the management to trace cost variances from the standard cost. The variances so obtained are analysed and necessary actions are taken. This ensure that standard costs are adhered.

For cost control purpose, the management needs specific accounting system which fulfils the management objective of controlling costs. On the basis of timing of variance analysis, two main types of management accounting systems are followed:

A. Single Plan

Under this system of management accounting, the variances in costs from the set standards are reported at its happenings without waiting for books closing. Timely analysis is done so that much time is not lost in taking corrective action wherever needed. The single plan system envisages the posting of all items in the debit side of the work-in-progress account at the standard cost leaving the credit side to represent the standard cost of finished production and work-in-progress.

This system enables the ascertainment of variances as and when the transaction is posted to work-in-progress account. In other words, the analysis of variances is done from the original documents like invoices, labour sheets, etc., and this method of analysis is known as analysis at source.

Since, the single plan system contemplates the analysis of variances at source, the installation of this system requires more planning so that effective documentation at each stage is introduced for proper recording and analysis of variance.

1. Scheme of entries
   So far as materials are concerned, material price variances are recorded at the time of receipt of the material and the material quantity variances are recorded as far as possible when excess materials are used. The entries will be as illustrated below
   1. Material Control A/c ……. Dr.
   Material Price Variance A/c ……..…Dr.
   (Actual Cost > Standard Cost)
   To Creditors/ Cost Ledger Control A/c.

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To Material Price Variance A/c
(Actual Cost < Standard Cost)

This entry enables the firm to debit the material control account with the actual purchases at standard cost and credit the creditor's account at the actual cost of actual prices thereby transferring the variances to price variance account.

2. Work-in-progress Control A/c ……. Dr.
   Material Usage Variances A/c……Dr.
   (Actual usage > Standard usage)
   To Material Control A/c
   To Material Usage Variances A/c
   (Actual usage < Standard usage)

   This entry charges the work-in-progress control account with the standard cost of standard quantity and credit the material control account at the standard cost of actual issue, the variance being transferred to usage variance account.
3. Wages Control A/c ……..…… Dr.
   Labour Rate Variances A/c ……..…… Dr.
   (Actual wage rate > Standard wage rate)
   To Cash/ Cost Ledger Control A/c
   To Labour Rate Variances A/c
   (Actual wage rate < Standard wage rate)
   This entry is passed to record the wages at standard rate thereby transferring rate variances to the appropriate account.
4. Work-in-progress Control A/c ……. Dr.
   Overhead Expense Variances A/c ……..… Dr.
   (Actual OH > Standard OH)
   To Overhead Expense Control A/c.
   To Overhead Expense Variances A/c
   (Actual OH < Standard OH)

B. Partial Plan

In the partial plan, variances are analysed at the end of period. Under this method the work-in-progress account is charged at the actual cost of production for the period and is credited with the standard cost of the period's production of finished product.

The closing balance of work-in-progress is also shown at standard cost. The balance after making the credit entries represent the variance from standard for the period. The analysis of the variance is done after the end of the period. This method is simple in operation because variances are analysed after the end of period but may present difficulties if the firm makes a variety of products.

1. Recapitulation
   - Current standards are used in both the systems

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- Under the partial plan, material stocks are carried at actual cost whereas the same are carried out at standard cost under the single plan.
- The work-in-progress and finished goods are valued at standard cost under both the methods
- Computation of variances
    - In partial plan, material price variance is computed on material used in finished goods and work-in-progress whereas in single plan it is computed on the material quantity purchased

The partial plan is suitable where simple analysis of variance is sufficient at the end of the period whereas the single plan is preferred if frequent detailed analysis of variance is desired, as (a) the comparison of actual with standard cost of each operation or operator or (b) the daily reporting of standard cost of excess material used.

Illustrations

Illustration – 1

As on 31st March, 20X3, the following balances existed in a firm's Cost Ledger:

	Dr.	Cr.
	(Rs.)	(Rs.)
Stores Ledger Control A/c	3,01,435	
Work-in-Process Control A/c	1,22,365	
Finished Stock Ledger Control A/c	2,51,945	
Manufacturing Overhead Control A/c		10,525
Cost Ledger Control A/c		6,65,220
	6,75,745	6,75,745

During the next three months the following items arose:	(Rs.)
Finished product (at cost)	2,10,835
Manufacturing overhead incurred	91,510

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Raw materials purchased	1,23,000
Factory Wages	50,530
Indirect Labour	21,665
Cost of Sales	1,85,890
Material issued to production	1,27,315
Sales returned at Cost	5,380
Material returned to suppliers	2,900
Manufacturing overhead charged to production	77,200

You are required to pass the Journal Entries; write up the accounts and schedule the balances, stating what each balance represents.

Illustration - 2

From the following details show the necessary accounts in the Cost Ledger

	Materials (Rs.)	**Work-in-Process (Rs.)**		**Finished Stock (Rs.)**
Opening balance	8,000	5,000		10,000
Closing balance	11,000	9,000		12,000
Transactions during the period:			(Rs.)	
Materials purchased			25,000	
Wages paid (including 2,000 indirect)			10,000	
Overheads incurred			8,000	
Overheads absorbed			9,000	
Sales			50,000	

Illustration – 3

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On 31st March, 20X3 the following balances were extracted from the books of the Supreme Manufacturing Company:

Particulars	Debit (Rs.)	Credit (Rs.)
Stores Ledger Control A/c	35,000	
Work-in-Process Control A/c	38,000	
Finished Goods Control A/c	25,000	
Cost Ledger Control A/c		98,000
	98,000	98,000

The following transactions took place in April 20X3:

	(Rs.)
Raw Materials:	
-Purchased	95,000
-Returned to suppliers	3,000
-Issued to production	98,000
-Returned to stores	3,000
Productive wages	40,000
Indirect wages	25,000
Factory overhead expenses incurred	50,000
Selling and Administrative expenses	40,000
Cost of finished goods transferred to warehouse	2,13,000
Cost of Goods sold	2,10,000
Sales	3,00,000

Factory overheads are applied to production at 150% of direct wages, any under/over absorbed overhead being carried forward for adjustment in the subsequent months. All administrative and

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selling expenses are treated as period costs and charged off to the Profit and Loss Account of the month in which they are incurred.

Show the following Accounts:

1. Cost Ledger Control A/c
2. Stores Ledger Control A/c
3. Work-in-Process Control A/c
4. Finished Goods Stock Control A/c
5. Factory Overhead Control A/c
6. Costing Profit and Loss A/c

Trial Balance as at 30th April, 20X3.

Illustration - 4

Acme Manufacturing Co. Ltd. opens the costing records, with the balances as on 1st July, 20X2 as follows:

	(Rs.)	**(Rs.)**
Material Control A/c	1,24,000	
Work-in-Process Control A/c	62,500	
Finished Goods Control A/c	1,24,000	
Production Overhead Control A/c	8,400	
Administrative Overhead Control A/c		12,000
Selling & Distribution Overhead Control A/c	6,250	
Cost Ledger Control A/c		3,13,150
	3,25,150	3,25,150

The following are the transactions for the quarter ended 30th September 20X2:

	(Rs.)
Materials purchased	4,80,100
Materials issued to jobs	4,77,400
Materials to works maintenance	41,200
Materials to administration office	3,400
Materials to selling department	7,200

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Wages direct	1,49,300
Wages indirect	65,000
Transportation for indirect materials	8,400
Production overheads	2,42,250
Absorbed production overheads	3,59,100
Administration overheads	74,000
Administration allocation to production	52,900
Administration allocation to sales	14,800
Sales overheads	64,200
Sales overheads absorbed	82,000
Finished goods produced	9,58,400
Finished goods sold	9,77,300
Sales realization	14,43,000

Make up the various accounts as you envisage in the Cost Ledger and prepare a Trial

Balance as at 30th September, 20X2.

Illustration - 5

Bangalore Petrochemicals Co. keeps books on integrated accounting system. The following balances appear in the books as on 1st January 2018.

Particulars	**Debit (Rs.)**	**Credit (Rs.)**
Stores Ledger control A/c	18,000	
Work-in-Process Control A/c	17,000	
Finished Goods Control A/c	13,000	
Bank A/c	10,000	
Creditors A/c		8,000
Fixed assets A/c	55,000	
Debtors A/c	12,000	

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Share capital A/c		80,000
Provision for depreciation A/c		5,000
Profit and loss A/c		32000
	1,25,000	1,25,000

Transaction for the year ended 31st Dec., 20X2 were as given below:

	(Rs.)	**(Rs.)**
Wages-direct	87,000	
Wages-indirect	5000	92,000
Purchase of materials (on credit)		1,00,000
Materials issued to production		1,10,000
Materials for repairs		2,000
Goods finished during the year (at cost)		2,15,000
Sales (credit)		3,00,000
Cost of goods sold		2,20,000
Production overhead absorbed		48,000
Production overhead incurred		40,000
Administration overhead incurred (production)		12,000
Selling overhead incurred		14,000
Payments of creditors		1,01,000
Payments of debtors		2,90,000
Depreciation on machinery		1,300
Prepaid rent (included in factory overheads)		300

Write up accounts in the integrated ledger.

Illustration - 6

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In the absence of the Chief Accountant, you have been asked to prepare a month's cost accounts for a company which operates a batch costing system fully integrated with the financial accounts. The following relevant information is provided to you:

	Debit (Rs.)	**Credit (Rs.)**
Balances at the beginning of the month:		
Stores Ledger Control Account		25,000
Work-in-Process Control Account		20,000
Finished Goods Control Account		35,000
Prepaid Production Overheads brought forward from previous month		3,000
Transactions during the month:		
Materials Purchased		75,000
Materials Issued:		
To production	30,000	
To factory maintenance	4,000	34,000
Materials transferred between batches		5,000
Total wages paid:		
To direct workers	25,000	
To indirect workers	5,000	30,000
Direct wages charged to batches		20,000
Recorded non-productive time of direct workers		5,000
Selling and Distribution Overheads Incurred		6,000
Other Production Overheads Incurred		12,000
Sales		1,00,000
Cost of Finished Goods Sold		80,000
Cost of Goods completed and transferred into finished goods during the month		65,000
Physical value of work-in-Process at the end of the month		40,000

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The production overhead absorption rate is 150% of direct wages charged to work-in- Process.

Required:

Prepare the following accounts for the month:

1. Stores Ledger Control Account.
2. Work-in-Process Control Account.
3. Finished Goods Control Account.
4. Production Overhead Control Account.
5. Costing Profit and Loss Account.

Illustration – 7

The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31-3-20X3.

	Amount
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Office and administrative Overhead (production related)	2,60,000
Selling and distribution Overheads	1,80,000
Finished goods (1,230 units)	1,50,000

	Debit (Rs.)	**Credit (Rs.)**
Work-in-Process:		
Materials	30,000	
Labour	20,000	
Factory overheads	20,000	70,000
Goodwill written off		2,00,000
Interest on capital		20,000

In the Costing records, factory overhead is charged at 100% of wages, administration overhead 10% of factory cost and selling and distribution overhead at the rate of ` 10 per unit sold.

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Prepare a statement reconciling the profit as per cost records with the profit as per financial records.

Study Note – 5 |Methods of Costing

5.1 Job Costing

Meaning of Job Costing

CIMA London defines Job Costing as "the category of basic costing methods which is applicable where the work consists of separate contracts, jobs or batches, each of which is authorized by specific order or contract." According to this method costs are collected and accumulated according to jobs, contracts, products or work orders. Each job or unit of production is treated as a separate entity for the purpose of costing.

Process of Job Costing

- Prepare a separate cost sheet for each job
- Disclose cost of materials issued for the job
- Employee costs incurred (on the basis of bill of material and timecards respectively)
- When job is completed, overhead charges are added for ascertaining total expenditure

Suitability of Job Costing

- When jobs are executed for different customers according to their specifications.
- When no two orders are alike, and each order/job needs special treatment.

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- Where the work-in-progress differs from period to period on the basis of the
- number of jobs in hand.

Job Cost Card / Sheet

Job cost card is a cost sheet, where the quantity of materials issued, hours spent by different class of employees, amount of other expenses and share of overheads are recorded. This is helpful in knowing the total cost, profitability etc. of a job. The following is an illustrative format
of Job Cost card/ sheet.

Company ABC			
Job Cost Sheet			
Job Number		Order No	
Customer Name			
Date Started		Date Completed	
Job Supervisor			
Units Ordered		Units Completed	
Direct Material:			
Request No.	Units	Price	Amount
Total Direct Materials (A)			
Direct Labor:			
Employee	Hours	Wage Rate	Amount
Total Direct Labor (B)			
Manufacturing Overheads:			
Allocation Base	Base Units	Rate	Amount
Total Manufacturing Overheads (C)			
Total Job Cost (D=A+B+C)			
Total Revenue (E)			
Percentage of Cost Recovered (D/E)			

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Advantages & Disadvantages of Job Costing

Advantages	Disadvantages
1. The details of Cost of material, labour and overhead for all job is available to control.	1. Job Costing is costly and laborious method.
2. Profitability of each job can be derived.	2. As lot of clerical process is involved the chances of error are more.
3. It facilitates production planning.	3. This method is not suitable in inflationary condition.
4. Budgetary control and Standard Costing can be applied in job costing.	4. Previous records of costs will be meaningless if there is any change in market condition.
5. Spoilage and detective can be identified, and responsibilities can be fixed accordingly.	

Illustrations

Illustration - 1

In a factory following the Job Costing Method, an abstract from the work-in-progress as on 30th September was prepared as under.

Job No.	Materials (Rs.)	Direct Hrs.	Labour (Rs.)	Factory Overheads applied (Rs.)
115	1325	400 hrs.	800	640
118	810	250 hrs.	500	400
120	765	300 hrs.	475	380
	2,900		**1775**	**1420**

Materials used in October were as follows:

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Material Requisition No.	Job No.	Cost (Rs.)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
		3,535

A **summary for labour hours** deployed during October is as under:

Job no.	Number of Hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	--
124	25	10
	275	**75**

Indirect Labour

	Shop A	Shop B
Waiting for material	20	10
Machine Breakdown	10	5
Idle time	5	6
Overtime Premium	6	5
	316	**101**

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A **shop credit slip** was issued in October, that material issued under Requisition No. 54 was returned back to stores as being not suitable. A material transfer note issued in October indicated that material issued under Requisition No. 55 for Job 118 was directed to Job 124.

The hourly rate in shop A per labour hour is Rs.3 per hour while at shop B, it is Rs.2 per hour. The factory overhead is applied at the same rate as in September. Job 115, 118 and 120 were completed in October.

An abstract from the work-in-progress as on 30th September was prepared as under:

Job No.	Materials (Rs.)	Direct Hrs.	Labour (Rs.)	Factory OH applied (Rs.)	31100 Factory OH ÷ Labour
115	1325	400 hrs.	800	640	80%
118	810	250 hrs.	500	400	80%
120	765	300 hrs.	475	380	80%
	2,900		**1775**	**1420**	

Overheads is to be recovered at 80% of the direct labour costs

The hourly rate in shop A per labour hour is Rs.3 per hour while at shop B, it is Rs.2 per hour. The factory overhead is applied at the same rate as in September. Job 115, 118 and 120 were completed in October.

You are asked to compute the factory cost of the completed jobs. It is the practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the job to the customer on a total cost plus 20% basis. What would be the invoice price of these three jobs?

5.2 Contract Costing

Contract costing is a form of specific order costing where job undertaken is relatively large and normally takes period longer than a year to complete. Contract costing is usually adopted by the contractors engaged in any type of contracts like construction of building, road, bridge, erection of tower, setting up of plant etc. Contract costing have the following distinct features:

1. The major part of the work in connection with each contract is ordinarily carried
2. out at the site of the contract.
3. The bulk of the expenses incurred by the contractor are considered as direct.
4. The indirect expenses mostly consist of office expenses, stores and works.
5. A separate account is usually maintained for each contract.
6. The number of contracts undertaken by a contractor at a time is usually few.

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7. The cost unit in contract costing is the contract itself.

Meaning of Terms Used in Contract Costing

(i) Work-in-Progress:

Work-in-progress in contract costing refers to the contract which is not complete at the reporting date. 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 estimated/ notional profit.

(ii)Cost of Work Certified or Value of Work Certified:

A contract is a continuous process and to know the cost or value of the work completed as on a particular date; assessment of the completion of work is carried out by an expert (it may be any professional like surveyor, architect, engineer etc.). The expert, based on his assessment, certifies the work completion in terms of percentage of total work.

(a) Value of Work Certified = Value of Contract × Work certified (%)

(b) Cost of Work Certified = Cost of work to date – (Cost of work uncertified+ Material in hand + Plant at site)

(iii) Cost of Work Uncertified:

It represents the cost of the work which has been carried out by the contractor but has not been certified by the expert. It is always shown at cost price.

	(₹)	(₹)
Total cost to date		xxx
Less: Cost of work certified	xxx	
Material in hand	xxx	
Plant at site	xxx	xxx
Cost of work uncertified		xxx

(iv) Progress Payment:

A contract takes longer period to complete and requires large investment in working capital to progress the contract work, hence, it is desirable by the contractor to have periodic payments from the contractee against the work done to avoid working capital shortage. For this a contactor enters into an agreement with the contractee and agrees on payment some

reasonable basis, which generally, includes percentage of work completion as certified by an expert.

Progress payment = Value of work certified - Retention money - Payment to date

(v)Retention Money:

In a contract, a contractee generally keeps some amount payable to contractor with himself as security deposit. To ensure that the work carried out by the contractor is as per the plan and specifications, it is monitored periodically by the contractee. To have a cushion against any defect or undesirable work the contractee uphold some money payable to contractor. This security money upheld by the contractee is known as retention money.

In some contracts the contractor has to deposit some security money before staring of the contract as a term of contract. This is known as Earnest money. 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.

Retention Money = Value of work certified - Payment actually made/cash paid

(vi) 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

(vii) 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)

(viii) Estimated Profit:

It is the excess of the contract price over the estimated total cost of the contract.

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Cost Plus Contracts

Cost- plus contract is a contract where the value of the contract is determined by adding an agreed percentage of profit to the total cost. These types of contracts are entered into when it is not possible to estimate the contract cost with reasonable accuracy due to unstable condition of factors that affect the cost of material, employees, etc.

Cost plus contracts have the following advantages and disadvantages:

Advantages:

- The Contractor is assured of a fixed percentage of profit. There is no risk of incurring any loss on the contract.
- It is useful specially when the work to be done is not definitely fixed at the time of making the estimate.
- 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 veracity of the cost of the contract.

Disadvantages:

The contractor may not have any inducement to avoid wastages and effect economy in production to reduce cost.

Escalation Clause in a Contract:

Escalation clause in a contract empowers a contractor to revise the price of the contract in case of increase in the prices of inputs due to some macro-economic or other agreed reasons. A contract takes longer period to complete and the factors based on which price negotiation is done at the time of entering into the contract may change till the contract completes. This protect the contractor from adverse financial impacts and empowers the contractor to recover the increased prices. As per this clause, the contractor increases the contract price if the cost of materials, employees and other expenses increase beyond a certain limit. Inclusion of such a clause in a contract deed is called an "Escalation Clause".

Illustrations

Illustration - 1

From the following information compute notional profit & estimated profit

	Rs.
Total expenditure to date	22,50,000

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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

Illustration – 2

Compute the notional profit and estimated profit from the following

	Rs.
Total Expenditure to date	4,50,000
Estimated further expenditure for the project	25,000
Contract Price	6,12,000
Work Certified	5,50,800
Work Uncertified	34,000
Cash received	4,40,640

Illustration - 3

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

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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, 2019.

The value of the work completed and certified up to 30th November 2019 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 2019 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 2019 was Rs. 30,000.

You are required to compute value of work certified, cost of work not certified and notional profit on the contract till the year ended 31st December 2019.

Illustration – 4

A contractor prepares his accounts for the year ending 31st December each year. He commenced a contract on 1st April 2018.

The following information relates to the contract as on 31st December 2018:

	(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 2018.
- The contract price is Rs. 20,00,000. On 31st December 2018 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.

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Prepare Contract A/c and show how much profit or loss should be included in financial accounts to 31st December 2018.

Illustration - 5

M/s. Bansal's 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:

	2016 (Rs.)	2017 (Rs.)	2018 (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, makes the final payment on completion of the contract.

You are required to make a contract account for three years and total estimated profit or loss from the contract.

5.3 Batch Costing

Batch Costing is a type of specific order costing where articles are manufactured in predetermined lots, known as batch. Under this costing method the cost object for cost determination is a batch for production rather output as seen in unit costing method

A batch consists of certain number of units which are processed simultaneously to be for manufacturing operation. Under this method of manufacturing the inputs are accumulated in the assembly line till it reaches minimum batch size. Soon after a batch size is reached, all inputs in a batch is processed for further operation. Reasons for batch manufacturing may either technical or economical or both.

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Example: in pen manufacturing industry, it would be too costly to manufacture one pen of a particular design at a time to meet the demand of one customer. On the other hand, the production of say 10,000 pens of the same design will reduce the cost to a sizeable extent.

To initiate production process, an entity has to incur expenditures on engaging workers for production and supervision, setting-up of machine to run for production etc. These are the minimum level of expenditure which has to be incurred each time a batch is run irrespective of number of units produced.

Costing Procedure in Batch Costing

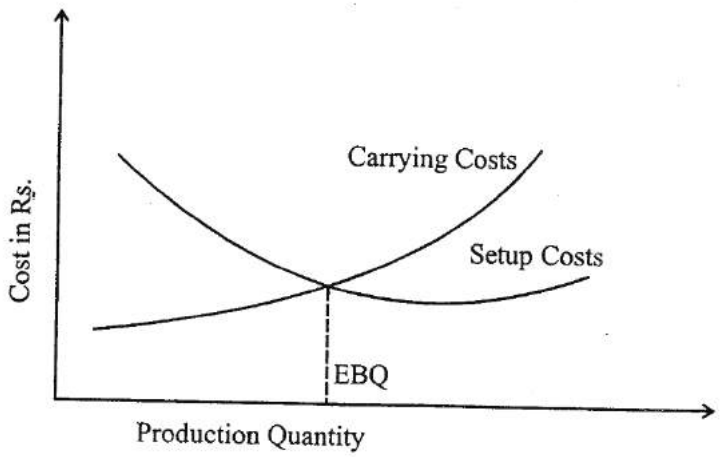
To facilitate convenient cost determination, one number is allotted for each batch. Material cost for the batch is arrived at on the basis of material requisitions for the batch and labour cost is arrived at by multiplying the time spent on the batch by direct workers as ascertained from timecards or Job Tickets. Overheads are absorbed on some suitable basis like machine hours, direct labour hours etc.

Economic Batch Quantity

As the product is produced in batches or lots, the lot size chosen will be critical in achieving least cost operation. Primarily the total production cost under Batch production comprises two main costs namely

- Machine Set Up Cost and
- Inventory holding cost

If the size is higher, the set-up cost may decline due to lesser set ups required but units in inventory will go up leading to higher holding costs. If the lot size is lower, lower inventory holding costs are accomplished but only with higher set up costs. Economic Batch quantity is the size of a batch where total cost of set-up and holding costs are at minimum.



As can be seen in the above diagram, Costs are shown on the Y axis and Batch size or Batch Quantity is shown on the X Axis. With the higher batch size, holding cost shows a tendency to increase whereas Set-up costs show a declining trend. The point where both the cost lines intersect each other represents the lowest cost combination.

The economic batch size or Economic Batch Quantity may be determined by calculating the total cost for a series of possible batch sizes and checking which batch size that gives the minimum cost. Alternatively, a formula can be derived which is similar to determination of Economic Order Quantity (EOQ). The objective here being to determine the production lot (Batch size) that optimizes on both set up and inventory holding cots formula. The mathematical formula usually used for its determination is as follows:

$$EBQ = \frac{\sqrt{2DS}}{\sqrt{C}}$$

Where,

D = Annual demand for the product

S = Setting up cost per batch

C = Carrying cost per unit of production

Difference between Batch & Job Costing

Sl. No	Job Costing	Batch Costing
1.	Method of costing used for nonstandard and non-repetitive products produced as per customer specifications and against specific orders	Homogeneous products produced in a continuous production flow in lots.
2.	Cost determined for each Job	Cost determined in aggregate of the entire Batch and then arrived at on per unit basis.
3.	Jobs are different from each other and independent of each other. Each Job is unique.	Products produced in a batch are homogeneous and lack of individuality

Illustrations

Illustration - 1

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Arnav Confectioners (AC) owns a bakery which is used to make bakery items like pastries, cakes and muffins. AC use to bake at least 50 units of any item at a time.

A customer has given an order for 600 muffins. To process a batch of 50 muffins, the following cost would be incurred:

Particulars	**Amount (Rs.)**
Direct materials	500
Direct wages	50
Oven set- up cost	150

AC absorbs production overheads at a rate of 20% of direct wages cost.

10% is added to the total production cost of each batch to allow for selling, distribution and administration overheads.AC requires a profit margin of 25% of sales value.

Determine the selling price for 600 muffins.

Illustration - 2

A jobbing factory has undertaken to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which materials and labour hours are booked at actual.

Overheads are levied at a rate per labour hour. The selling price contracted for is Rs. 8 per piece. From the following data present the cost and profit per piece of each batch order and overall position of the order for 1,200 pieces.

Month	**Batch Output**	**Material cost**	**Direct wages**	**Direct labour**
		(Rs.)	(Rs.)	(hours)
January	210	650	120	240
February	200	640	140	280
March	220	680	150	280
April	180	630	140	270
May	200	700	150	300
June	220	720	160	320

The other details are:

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Month	Chargeable expenses	Direct labour
	(Rs.)	(hours)
January	12,000	4,800
February	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

Illustration - 3

Particulars	Amount (Rs.)
Monthly demand for a product	500 units
Setting-up cost per batch	60
Cost of manufacturing per unit	20
Rate of interest	10% p.a.

Determine Economic Batch Quantity.

Illustration - 4

M/s. KBC Bearings Ltd. is committed to supply 48,000 bearings per annum to M/s. KMR Fans on a steady daily basis. It is estimated that it costs Rs.1 as inventory holding cost per bearing per month and that the set-up cost per run of bearing manufacture is Rs. 3,200

1. What would be the optimum run size of bearing manufacture?
2. What would be the interval between two consecutive optimum runs?
3. Find out the minimum inventory cost?

5.4 Process Costing - Joint and By Products

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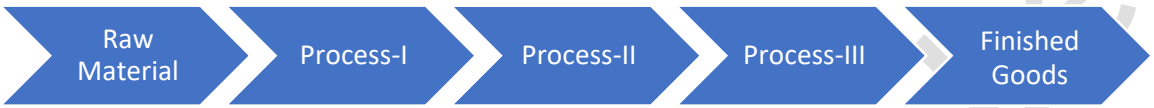
Meaning of Process Costing

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, soaps, 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.

This can be understood with the help of the following diagram:



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 center's 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 simultaneously.
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 vice versa.
6. Production of a product may give rise to Joint and/or By-Products.

Meaning of Normal Loss / Gain & Abnormal Loss / 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.

A. Loss

There are two types of material losses viz. (i) Normal loss and (ii) Abnormal loss.

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(i) **Normal Process Loss:**

It is also known as normal wastage. 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 also known as abnormal wastage. It is defined as the loss in excess of the predetermined 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 arises. 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 profit and loss account.

B. Abnormal Process Gain/Yield:

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 or actual and expected production is known as abnormal gain or yield. So abnormal gain may be defined as an unexpected gain in production under the normal conditions. This arises due to over- estimation of process loss, improvements in work efficiency of workers, use od better technology in production etc.

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.

Valuation of Work in Progress

Equivalent Units:

This concept is used 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.

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$$\text{Equivalent completed units} = \begin{pmatrix}\text{Actual number of units in}\\ \text{the process of manufacture}\end{pmatrix} \times \begin{pmatrix}\text{Percentage of}\\ \text{work completed}\end{pmatrix}$$

Steps in Process Costing

Step-1: Analyse the Physical Flow of Production Units

Step-2: Calculate Equivalent Units for each Cost Elements

Step-3: Determine Total Cost for each Cost Element

Step-4: Compute Cost Per Equivalent Unit for each Cost Element

Step-5: Assign Total Costs to Units Completed and Ending WIP

Process Costing Methods

Mainly two methods for valuation of work-in-process are followed:

(i) First-in-First Out (FIFO) method.

(ii) Weighted Average (Average)method

(i) First-in-First Out (FIFO) Method:

Under this method the units completed and transferred include completed units of work-in-process and subsequently introduced units. Proportionate cost to complete the opening work-in-process and that to process the completely processed units during the period are derived separately. The cost of opening work-in-process 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 process is valued at current cost.

(ii) Weighted Average (Average) Method:

Under this method, the cost of opening work-in-process 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 workload already contained in opening work-in-process and workload of current period.

FIFO v/s Weighted Average Method:

The main difference between FIFO method and average method is that units of opening work in process and their cost are taken in full under average method while under FIFO method only the remaining work done now is considered.

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.

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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.

Illustrations

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.

Particulars	Process I(Rs.)	Process II(Rs.)	Process III(Rs.)
Materials	1,50,000	50,000	20,000
Labour	80,000	2,00,000	60,000
Other expenses	26,000	72,000	25,000

Indirect expenses amounting to Rs.85,000 may be apportioned on the basis of wages. There was no opening or closing stock.

Illustration – 2

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated was 5% of input. 4,750 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has no realisable value.

You are required to show –

- Process- I account,
- Value of normal loss and
- Units transferred to Process-II.

Illustration – 3

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated

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was 5% of input. 4,750 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has realisable value of Rs.2 per unit.

You are required to show –

- Process- I account,
- Value of normal loss and
- Units transferred to Process-II.

Illustration - 4

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated was 5% of input. 4,550 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has realisable value of Rs. 2 per unit.

You are required to show

- Process- I account
- value of normal loss
- abnormal loss and
- units transferred to Process-II.

Illustration – 5 & 6

A product passes from Process- I and Process- II. Materials issued to Process- I amounted to Rs. 40,000, Wages Rs. 30,000 and manufacturing overheads were Rs. 27,000. Normal loss anticipated was 5% of input. 4,850 units of output were produced and transferred-out from Process-I. There were no opening stocks. Input raw material issued to Process I was 5,000 units. Scrap has realisable value of Rs. 2 per unit.

You are required to show

- Process- I account,
- value of normal loss,
- abnormal loss/ gain and
- units transferred to Process-II.

Illustration – 7

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 20X1-X2, prepare Process- I, Process- II and Finished Stock A/c:

Particulars	**Process- I**	**Process- II**
Raw materials used	7,500 units	--

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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-process.

Illustration – 8

A company produces a component, which passes through two processes.
During the month of April, 20X5, materials for 40,000 components were put into Process I of which 30,000 were completed and transferred to Process II.
Those not transferred to Process II were

1. 100% complete as to materials cost and
2. 50% complete as to labour and overheads cost.

The Process I cost incurred were as follows:
Direct material Rs.15,000
Direct wages Rs. 18,000
Factory overheads Rs.12,000
Of those transferred to Process II, 28,000 units were completed and transferred to finished goods stores.
There was a normal loss with no salvage value of 200 units in Process II.
There were 1,800 units, remained unfinished in the process with

1. 100% complete as to materials and
2. 25% complete as regard to wages and overheads.

No further process material costs occur after introduction at the first process until the end of the second process, when protective packing is applied to the completed components.
The process and packing costs incurred at the end of the Process II were:

1. Packing materials Rs.4,000
2. Direct wages Rs.3,500
3. Factory overheads Rs.4,500

Required:

1. Prepare Statement of Equivalent Production, Cost per unit and Process I A/c.
2. Prepare Statement of Equivalent Production, Cost per unit and Process II A/c.

Illustration – 9

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Opening work-in-process
1. 1,000 units (60% complete);
2. Cost Rs. 1,10,000.

Units introduced during the period 10,000 units;
1. Cost Rs.19,30,000.
2. Transferred to next process - 9,000 units.

Closing work-in-process – 800 units (75% complete).
Normal loss is estimated at 10% of total input including units in process at the beginning.
Scraps realise Rs.10 per unit. Scraps are 100% complete.
Using FIFO method, compute equivalent production and cost per equivalent unit. Also evaluate the output.

Illustration – 10

Following information is available regarding Process-I for the month of February, 20X5:
Production Record

Particulars	% Completion	Quantity
Units in process as on 1.2.20X5	All materials used, 25% complete for labour and overhead	4,000
New units introduced	100% Complete	16,000
Units completed	100 % Complete	14,000
Units in process as on 28.2.20X5	All materials used, 33-1/3% complete for labour and overhead	6,000

Cost Records

Work-in-process as on 1.2.20X5	**Rs.**
Materials	6,000
Labour	1,000
Overhead	1,000
	8,000
Cost during the month	**Rs.**
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-I

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Illustration – 11

Following details are related to the work done in Process-I by XYZ Company during the month of March, 20X5:

Opening work in progress (2,000 units)	
Materials	Rs. 80,000
Labour	Rs. 15,000
Overheads	Rs. 45,000

Material introduced in Process – I (38,000 units)	
Material	Rs.14,80,000
Direct labour	Rs.3,59,000
Overheads	Rs.10,77,000

	Degree of completion
Units scrapped (3,000 units)	
Materials	100%
Labour and overheads	80%
Closing work-in process: 2,000 units	
Materials	100%
Labour and overheads	80%

Units finished and transferred to Process-II: 35,000 units

Normal Loss

5% of total input including opening work-in-process.

Scrapped units fetch Rs.20 per piece.

You are required to prepare:

1. Statement of equivalent production
2. Statement of cost
3. Statement of distribution cost, and
4. Process-I Account, Normal Loss Account and Abnormal Loss Account

Illustration – 12

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 20X8:

	Process-I (Rs.)	Process- II (Rs.)	Finished Stock (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	4,500	11,250
Inter-process profit included in opening stock	--	1,500	8,250

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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.

Joint Products and By Products

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.

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.

By – Products

These are defined as "products recovered from material discarded in a main process, or from the production of some major product.

Thus, byproducts 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 benzol obtained on carbonization of coal and glycerin 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.

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Apportionment of Joint Costs

Joint product costs occur in many industries such as petroleum, oil refinery, textiles, dairy, food processing and many other process industries.

The management of business concerns require accurate and reliable cost information related with the joint products to make managerial decisions such as to process further or to sell at split-off stage. To arrive at either decision, it is necessary to know the share of joint costs to be apportioned to the different joint products.

Joint costs are the expenditures incurred up to the point of separation i.e. split-off point. The main problem faced in the case of joint products/ by-products is the apportionment of this joint costs to 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.

Methods of Apportionment of Joint Cost to Joint 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 Units Method
ii. Net Realisable Value at split-off point
iii. Using Technical Estimates
iv. Market value at the point of separation
v. Market value after further processing
vi. Average unit cost method
vii. Contribution margin method

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, numbers 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.

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.

Net Realisable Value at Split-off Point Method:

In this method of joint cost apportionment, the followings are deducted from the sales value of joint products at final stage i.e. After processing:

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.

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Using Technical Estimate:

This method uses technical estimates to apportion the joint costs over the joint products.

Market value at the point of separation:

This method is used for the apportionment of joint costs to joint products up to the split off point on the basis of market value at split off point. It is difficult to apply this method if the market value of the products at the point of separation is not available. It is a useful method where further processing cost are incurred disproportionately.

Market value after further processing:

Under this method joint cost are apportioned on the basis of market value of products after further processing.

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 above overcomes the shortcoming of this method.

Average unit cost method:

Under this method, total process cost (up to the point of separation) is divided by total units of joint products produced. On division average cost per unit of production is obtained.

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.

The fixed costs are then apportioned over the joint products on the basis of the contribution ratios.

Methods of apportioning Joint Cost over Joint 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 Units Method
(ii) Net Realisable Value at split-off point
(iii) Using Technical Estimates

Some other methods, which managers may also use for making decisions are:

(i) Market value at the point of separation
(ii) Market value after further processing
(iii) Average unit cost method
(iv) Contribution margin method

Methods of apportioning Joint Cost over by-products:

Net Realisable Value Method- The realisation on the disposal of the byproduct may be deducted from the total cost of production so as to arrive at the cost of the main product.

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Standard cost in technical estimates- 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.

Comparative price- Value of the by-product is ascertained with reference to the price of a similar or an alternative material.

Re-use basis- The value put on the by-product should be same as that of the materials introduced into the process.

Treatment of By-Product Cost in Cost-Accounting

(i) When they are of small total value:

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.

(ii) When the by-products are of considerable total value:

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).

If total sales value of by-products at split-off point is small, it may be treated as per the provisions discussed above under (i).

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 (ii).

Illustrations

Illustration - 1

A coke manufacturing company produces the following products by using 5,000 tons of coal @ 1,100/- per ton into a common process.

Coke	3,500 tons
Tar	1,200 tons
Sulphate of ammonia	52 tons
Benzol	48 tons

Apportion the joint cost amongst the products on the basis of the physical unit method.

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Illustration – 2,3,4

An entity incurs a joint cost of 64,500/- in producing two products A (200 units), B (200 units) and earns a sales revenue of 86,000/- by selling product A @ 170/- per unit and product B @ 260/- per unit. Further processing costs for products A and B are 4,000/- and 32,000/- respectively the Joint cost can be apportioned to products A and B on the basis of Net realisable value method.

Illustration -5

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 - 60,000/-
b. Production data:

Products	**Units produced**
A	500
B	200
C	300
Total	1000

Illustration - 6

Find out the cost of joint products A and B using contribution margin method from the following data:

Sales: A: 100 kg @ 60/- per kg.

B: 120 kg @ 30/- per kg.

Joint costs: Marginal cost 4,400/-

Fixed cost 3,900/-

Illustration - 7

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 40,000/-. Conversion of 60,000/- were 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 are as follows:

	Production (in ton)	**Sales Quantity (in ton)**	**Selling price per ton (`)**

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Caustic Soda	1,200	1,200	50
Chlorine	800	—	—
PVC	500	500	200

All 800 tons of Chlorine were further processed, at an incremental cost of 20,000/- to yield 500 tons 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 75/- per ton.

Required:

1. To calculate how joint cost of 1,00,000/- would be apportioned between Caustic Soda and Chlorine under each of following methods:
a. sales value at split- off point;
b. physical unit method, and
c. estimated net realisable value.
2. Lifetime Swimming Pool Products offers to purchase 800 tons of Chlorine in August at `75 per ton. 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?

Illustration - 8

Sun-moon Ltd. produces and sells the following products:

Products	Units	Selling price at split-off point (Rs.)	Selling price after further processing (Rs.)
A	2,00,000	17	25
B	30,000	13	17
C	25,000	08	12
D	20,000	10	-
E	75,000	14	20

Raw material costs 35,90,000/- and other manufacturing expenses cost 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

12,50,000/-; 1,50,000/-; 50,000/- and 1,50,000/- respectively. Fixed costs are 4,73,000/-.

You are required to prepare the following in respect of the coming year:

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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.

5.5 Operating Costing or Service Costing

Introduction

Service Costing - It is application of cost concepts in ascertainment of cost or providing services. It is also known as operating costing as relates to operating of a service.

Service Costing versus Product Costing:

Service costing differs from product costing (such as job or process costing) in the following ways due to some basic and peculiar nature.

- Unlike products, services are intangible and cannot be stored, hence, there is no inventory for the services.
  (ii) Use of Composite cost units for cost measurement and to express the volume of outputs.
- Unlike a product manufacturing, employee (labour) cost constitutes a major cost element than material cost.
- Indirect costs like administration overheads are generally have a significant proportion in total cost of a service as unlike manufacturing sector, service sector heavily depends on support services and traceability of costs to a service may not economically feasible.

Service Cost Unit

To compute the Service cost, it is necessary to understand the unit for which the cost is to be computed. All the costs incurred during a period are collected and analysed and then expressed in terms of a cost per unit of service.

One specific issue with service costing is the difficulty in defining a realistic cost unit that represents a suitable measure of the service provided. The cost unit to be applied needs to be defined carefully and frequently, a composite cost unit may be deemed more appropriate.

For example, Hotels may use the 'Occupied Room Days' as an appropriate unit for cost ascertainment and control.

Other typical cost unit that may be used include:

Service industry	Unit of cost (examples)
Transport Services	Passenger- km., (In public transportation) Quintal- km., or Ton- km. (In goods carriage)

Electricity Supply service	Kilowatt- hour (kWh)
Hospital	Patient per day, room per day or per bed, per operation etc.
Canteen	Per item, per meal etc.
Cinema	Per ticket.
Hotels	Guest Days or Room Days
Bank or Financial Institutions	Per transaction, per services (e.g. per letter of credit, per application, per project etc.)
Educational Institutes	Per course, per student, per batch, per lecture etc.
IT & ITES	Cost per project, per module etc.
Insurance	Per policy, Per claim, Per TPA etc.

Methods for ascertaining Service Cost Unit:

Composite Cost Unit:

Sometime two measurement units are combined together to know the cost of service or operation. These are called composite cost units. For example, a public transportation undertaking would measure the operating cost per passenger per kilometer.

Examples of Composite units are Ton- km., Quintal- km, Passenger-km., Patient-day etc. Composite unit may be computed in two ways.

(i) Absolute (Weighted Average) basis:

$$\Sigma \text{ (Weight Carried} \times \text{Distance)}_1 + \text{(Weight Carried} \times \text{Distance)}_2 + \ldots + \text{(Weight Carried} \times \text{Distance)}_n$$

(ii) Commercial (Simple Average) basis.

$$\Sigma \text{ (Distance}_1 + \text{Distance}_2 + \ldots\ldots\ldots\ldots + \text{Distance}_n) \times \frac{(W_1+W_2+\ldots+W_n)}{N}$$

Equivalent Cost Unit/ Equivalent service Unit:

To calculate cost or pricing of two more different grade of services which uses common resources, each grade of service is assigned a weight and converted into equivalent units. Converting services into equivalent units make different grade of services equivalent and comparable.

Statement of Costs for Service Sectors

The cost statement for services may be prepared either on the basis of functional classification as done for product costing or on the basis of variability. Cost sheet on the basis of variability is prepared classifying all the costs into three different heads:

- Fixed costs or Standing charges
- Variable costs or Operating expenses
- Semi-variable costs or Maintenance expenses

Note: In the absence of information about semi-variable costs, the costs would be shown under fixed and variable heads only.

Costing of Trading Services

Transport organisations can be divided into two categories viz. Goods transport and Passenger transport.

The cost unit for Goods transport organisation is Ton- Kilometer – that means cost of carrying one Ton of goods over a distance of one kilometer.

Cost unit for Passenger transport organisation is Passenger- Kilometer – that means cost of carrying one Passenger over a distance of one kilometer.

The costs are shown under the following heads:

(i) **Standing Charges or Fixed costs**: These are the fixed costs that remain constant irrespective of the distance travelled. These costs include the following:

o Insurance

o License fees

o Salary to Driver, Conductor, Cleaners, etc. if paid on monthly basis

o Garage costs, including garage rent

o Taxes

o Administration expenses, etc.

(ii) **Variable costs or Running costs**: These costs are generally associated with the distance travelled. These costs include the following:

o Petrol and Diesel

o Lubricant oils,

o Wages to Driver, Conductor, Cleaners, etc. if it is related to operations

o Any other variable costs identified.

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(iii) **Semi-variable costs or Maintenance costs**: These costs include the following:

- o Repairs and maintenance
- o Tires
- o Spares, etc.

Costing for Hotels & Lodges

Service costing is an effective tool in respect if hotel industry. Hotels are run on commercial basis. Hence it is necessary to compute the cost - to fix the price of various services provided by the hotel and to find out the profit or loss at the end of a particular period.

In this case, the costs associated with different services offered should be identified and cost per unit should be worked out. The cost unit may be Guest-day or Room day. For calculation of cost per Guest day or Room day, estimated occupancy rate– at different point of time, for example – Peak season or lien season, are taken into account.

Costing for Hospitals

A Hospital is providing various types of medical services to the patients. Hospital costing is applied to decide the cost of these services.

A hospital may have different departments catering to varied services to the patients – such as

- Outpatient
- In Patient
- Medical services like X-Ray, Scanning, etc.
- General services like Catering, Laundry, Powerhouse, etc.
- Miscellaneous services like Transport, Dispensary, etc.

Unit of Cost:

Common unit of costs of various departments are as follows:

- Outpatient – Per Outpatient
- In Patient – Per Room Day
- Scanning – Per Case
- Laundry – Per 100 items laundered

Cost segregation:

The cost of hospital can be divided in to fixed costs and variable costs Fixed costs are based on timelines and irrespective of services provided. For example, Staff salaries, Depreciation on Building and Equipment, etc. Variable costs vary with the level of services rendered. For example, Laundry charges, Cost of food supplied to patients, Power, etc.

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Costing for IT & ITES

Information Technology (IT) and Information Technology Enabled Services (ITES) organisations provide their customers with services or intangible products. These organisations are highly labour intensive.

In this sector employee (labour) cost constitutes a significant portion of the total operating costs. The direct employee cost is traceable to services rendered.

In addition to employee cost, significant overhead costs for offering the services are incurred and are classified as service overhead.

Concept of Project:

In general – IT & ITES industries, the jobs undertaken are considered as Project. Each project is unique in nature and varies in size, functionality requirements, duration and staffing requirements.

Parameters in computation of Total cost:

A. **Software and software costs involved**
   - If they are identifiable with a project, then they are directly allocated to the project
   - If they are not directly identifiable with a project or not fully allocable to a project, then they are treated as service overhead

B. **Travel and training costs**
   - If they are incurred for a project, then they are directly allocated to the project.

- If they are not directly identifiable with a project or allocable over a number of projects, then they are treated as service overhead. For example, Java (software language) training provided to the software engineers, may useful in multiple Java based projects. Hence treated as overhead costs.

C. **Effort costs**
   - Effort costs are basically identified with a project. They can be classified as direct cost, unless otherwise specified.
   - Effort costs are not just the salaries of the software engineers or programmers who are involved in the project. Organisations compute effort costs in terms of overhead costs where they take the total cost of running the organisation and divide this by the number of productive staff.

Costing for Toll Roads

Cost Involved:

The project cost consists of following two main components:

- **Capital Costs:**
  - The capital cost consists of cost incurred during the construction period.

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- The total cost includes the cost of construction of road and other structures and consultancy charges. In addition to this cost, it also includes the cost of construction of tollbooths.

- **Operating and Maintenance Cost:**
  - Routine maintenance cost would be incurred once the Toll road is operational.
  - Operating and Maintenance expenses can be broadly classified as follows:
    - Toll collection expenses
    - Administrative expenses for day-to-day operation.
    - Maintenance expenses, which include routing and periodic maintenance.
    - Interest expenses incurred for servicing term loans.

Build – Operate – Transfer (BOT) Approach:

BOT is an option for the Government to outsource public projects to the private sector. With BOT, the private sector designs, finances, constructs and operate the facility and eventually, after specified concession period, the ownership is transferred to the Government.

Toll Rate:

The toll rate should have a direct relation with the benefits that the road users would gain from its improvements. The benefits to road users are likely to be in terms of fuel savings, improvement in travel time and Good riding quality. To compute the toll rate following formula with rounding off to nearest multiple of five has been adopted:

User Fee = Total Distance × Toll Rate per km.

Other Services – Costing for Power Houses

Power houses are engaged either in electricity generation or steam generation. It uses the concepts of service costing i.e. 'Powerhouse Costing.' Service cost statement can be prepared by identifying the costs associated with the power generation or steam generation.

Cost unit is different for electricity generation and steam generation.

The cost unit for electricity generation organisation is cost per kilowatt-hour (kWh) – that means cost of generating one kilowatt of power per hour. Please note that kWh is commonly known as a "Unit".

The costs are shown under the following heads:

(i) **Standing Charges or Fixed costs**: These are the fixed costs that remain constant irrespective of the power or stream generated. These costs include the following:

- o Rent, Rates & Taxes
- o Insurance
- o Depreciation
- o Salaries, if paid on Time (Monthly) basis
- o Administration expenses, etc.

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(ii) **Variable costs or Running costs**: These costs are generally associated with the power or stream generated. These costs include the following:

- o Fuel Charges
- o Water Charges
- o Wages / Labour charges, if paid on the basis of production
- o Any other variable costs identified.

(iii) **Semi-variable costs or Maintenance costs**: These costs include the following:

- o Meters
- o Furnaces
- o Service materials
- o Tools, etc.

Illustrations

Illustration - 1

1. A Lorry starts with a load of 20 MT of goods from Station "A".
2. It unloads 8 MT in Station "B" and balance goods in Station "C".
3. On return trip, it reaches from Station "A" with a load of 16 MT, loaded at Station "C".

The distance between A to B, B to C and C to A are 80kms, 120 kms and 160 kms, respectively.

Compute

i. "Absolute MT-kilometre" and
"Commercial MT-kilometre

Illustration – 2

A hotel has three types of suites for its customers, viz.,

1. Standard,
2. Deluxe
3. Luxurious

Following information is given

Type	No.of rooms	Room Tariff
Standard	100	--
Deluxe	50	2.5 times of the Standard
Luxurious	30	Twice the Deluxe

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Compute the Room Tariff

Assumed that there are 360 days a year.

Illustration – 3

AXA Passenger Transport Company is running 5 buses between two towns, which are 40 kms apart. Seating capacity of each bus is 40 passengers.

Following details are available from their books, for the month of April 20X8:

	Rs.
Salary of Drivers, Cleaners and Conductors	24,000
Salary to Supervisor	10,000
Diesel and Other Oil	40,000
Repairs and Maintenance	8,000
Taxation and Insurance	16,000
Depreciation	26,000
Interest	20,000
	1,44,000

Actual passengers carried were 75% of the seating capacity. All the four buses run on all days of the month. Each bus made one round trip per day.

Calculate cost per passenger-kilometre.

Illustration – 4,5

A Transport company has been given a 40 k.m. long route to run a bus.

1. The bus costs the company a sum of Rs. 10,00,000
2. It has been insured @ 3% per annum.
3. Annual taxes will amount to Rs. 20,000.
4. Garage Rent is Rs. 2,000 p.m.
5. Annual Repairs will be Rs. 20,000
6. The bus will be used for 5 years.
7. The driver's salary will be Rs. 3,000 p.m. and the conductor's salary will be Rs. 2,000 p.m. in addition to 10% of taking as commission (to be shared by the driver and conductor equally)
8. Cost of stationary will be Rs.1,000 per month,

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9. Manager cum accountant's salary is Rs. 7,000 per month.
10. Petrol and oil will be Rs.500 per 100 kilometres
11. The bus will make 3 up and down trips carrying on an average 40 passengers on each trip
12. The bus will run on an average 25 days in a month.

Assuming 15% profits on takings, calculate the bus fare to be charged from each passenger.

Illustration – 6

SMC is a public school having five buses each plying in different directions for the transport of its school students.

In view of a large number of students availing of the bus service, the bus works two shifts daily both in the morning and in the afternoon.

The buses are garaged in the school. The workload of the students has been so arranged that in the morning, the first trip picks up the senior students and the second trip plying an hour later picks up the junior students. Similarly, in the afternoon, the first trip drops the junior students and an hour later the second trip takes the senior student's home.

The distance travelled by each bus one way in 8 kms. The schoolworks 25 days in a month and remains closed for vacation in May, June and December. Bus fee, however, is payable by the students for all the 12 months of the year.

The details of expenses for a year are as under:

Driver's Salary	Rs. 4,500 per month per driver
Cleaner's salary (Salary Payable for all 12 month) (One cleaner is employed for all the five buses	Rs. 3,500 per month
License fee, taxes etc.	Rs.8,600 per bus per annum
Insurance	Rs.10,000 per bus per annum
Repairs and maintenance	Rs. 35,000 per bus per annum
Purchase price of bus (Life of each bus - 12 years)	Rs.15,00,000 each
Scrap value	Rs.3,00,000

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Diesel cost	Rs.45 per litre

Each bus gives an average mileage of 4kms per litre of diesel.

Seating capacity of each bus is 50 students. The seating capacity is fully occupied during the whole year.

Students picked up and dropped within a range up to 4 kms. of distance from the school are charged half fare and 50% of the students travelling in each trip are in this category. Ignore interest.

Since the charges are to be based on average cost; you are required to:

a. Prepare a statement showing the expenses of operating a single bus and the fleet of five buses for a year.
b. Work out the average cost per student per month in respect of:
i. Students coming from a distance of up to 4 kms. from the school and
ii. Students coming from a distance beyond 4 kms. from the school.

Illustration – 7

Global Transport Ltd. charges Rs. 90 per ton for its 6 tons truck lorry load city 'A' to city 'B'. The charges for the return journey are Rs. 84 per ton.
No concession or reduction in these rates is made for any delivery of goods at intermediate station 'C'.
In January 2019 the truck made 12 outward journeys for city 'B' with full load out of which 2 tons were unloaded twice in the way at city 'C'. The truck carried a load of 8 tons in its return journey for 5 times but once caught by police and Rs. 1,200 was paid as fine. For the remaining trips the truck carried full load out of which all the goods on load were unloaded once at city 'C'.
The distance from city A' to city 'C' and city 'B' are 140 kms and 300 kms respectively.
Annual fixed costs and maintenance charges are Rs. 60,000 and Rs. 12,000 respectively. Running charges spent during January, 20X9 are Rs. 2,944.
You are required to find out the cost per absolute ton-kilometer and the profit for January 20X9

Illustration – 8

Mr. X owns a bus which runs according to the following schedule:

(i) Delhi to Chandigarh and back, the same day.
Distance covered: 250 kms. one way.
Number of days run each month: 8
Seating capacity occupied 90%.

(ii) Delhi to Agra and back, the same day.
Distance covered: 210 kms. one way.
Number of days run each month: 10
Seating capacity occupied 85%

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(iii) Delhi to Jaipur and back, the same day.
Distance covered: 270 kms. one way.
Number of days run each month: 6
Seating capacity occupied 100%

Illustration – 9

A company runs a holiday home. For this purpose, it has hired a building at a rent of Rs.10,000 per month along with 5% of total taking. It has three types of suites for its customers, viz., single room, double rooms and triple rooms.
Following information is given:

Type of Suite	Number	Occupancy (%)
Single Rooms	100	100
Double Rooms	50	80
Triple Rooms	30	6

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple rooms suite as twice of the double rooms suite.
The other expenses for the year 2013 are as follows:

	Rs.
Staff salaries	14,25,000
Room attendants' wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

Provide profit @ 20% on total taking and assume 360 days in a year. You are required to calculate the rent to be charged for each type of suite.

Illustration – 10

A lodging home is being run in a small hill station with 100 single rooms. The home offers concessional rates during six off- season months in a year. During this period, half of the full room rent is charged.
The management's profit margin is targeted at 20% of the room rent.
The following are the cost estimates and other details for the year ending on 31st March 20X9.
[Assume a month to be of 30 days].

1. Occupancy during the season is 80% while in the off- season it is 40% only.
2. Total investment in the home is Rs.200 lakhs of which 80% relate to buildings and balance of furniture and equipment
3. Expenses:
   Staff salary [Excluding room attendants] Rs.5,50,000
   Repairs to building Rs.2,61,000
   Laundry and linen Rs.80,000

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Interior and tapestry	Rs.1,75,000
Sundry expenses	Rs.1,90,800

4. Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight-line basis.
5. Room attendants are paid Rs. 10 per room day on the basis of occupancy of the rooms in a month.
6. Monthly lighting charges are Rs.120 per room, except in four months in winter when it is Rs.30 per room and this cost is on the basis of full occupancy for a month.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Illustration – 11

ABC Hospital runs a Critical Care Unit (CCU) in a hired building. CCU consists f 35 beds and 5 more beds can be added, if required.

Rent	Rs.75,000 per month
Supervisors – 2 persons	Rs.25,000 per month each
Nurses – 4 persons	Rs.20,000 per month each
Ward boys – 4 persons	Rs.5,000 per month each

Doctors paid Rs. 2,50,000 per month – paid on the basis of number of patients attended and the time spent by them.
Other expenses for the year are as follows:

Repairs (Fixed)	Rs.81,000
Food to Patients (Variable)	Rs.8,80,000
Other Services to patients (Variable)	Rs.3,00,000
Laundry Charges (Variable)	Rs.6,00,000
Medicines (Variable)	Rs.7,50,000
Other Fixed Expenses	Rs.10,80,000
Administrative expenses allocated	Rs.10,00,000

It was estimated that for 150 days in a year 35 beds are occupied and for 80 days only 25 beds are occupied.
The hospital hired 750 beds at a charge of Rs.100 per bed per day, to accommodate the flow of patients. However, this does not exceed more than 5 extra beds over and above the normal capacity of 35 beds on any day.

You are required to –
(a) Calculate profit per Patient day, if the hospital recovers on an average Rs.2,000 per day from each patient
(b) Find out Breakeven point for the hospital.

Illustration – 12

Following are the data pertaining to Infotech Pvt. Ltd, for the year 20X8-X9

	Amount (Rs.)
Salary to Software Engineers (5 persons)	15,00,000

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Salary to Project Leaders (2 persons)	9,00,000
Salary to Project Manager	6,00,000
Repairs & maintenance	3,00,000
Administration overheads	12,00,000

The company executes a Project XYZ, the details of the same as are as follows:

1. Project duration – 6 months
2. One Project Leader and three Software Engineers were involved for the entire duration of the project, whereas Project Manager spends 2 months' efforts, during the execution of the project.
3. Travel expenses incurred for the project – Rs.1,87,500
4. Two Laptops were purchased at a cost of Rs. 50,000 each, for use in the project and the life of the same is estimated to be 2 years.

Prepare Project cost sheet.

Illustration – 13

BHG Toll Plaza Ltd built a 60 km. long highway and now operates a toll plaza to collect tolls from passing vehicles using the same.

The company has invested Rs.600 crore to build the road and has estimated that a total of 60 crore vehicles will be using the highway during the 10 years toll collection tenure.

Toll Operating and Maintenance cost for the month of April 2019 are as follows:

Salary to–

i. Collection Personnel (3 Shifts and 4 persons per shift) – Rs.150 per day per person
ii. Supervisor (2 Shifts and 1 person per shift) – Rs.250 per day per person
iii. Security Personnel (3 Shifts and 2 persons per shift) – Rs.150 per day per person
iv. Toll Booth Manager (2 Shifts and 1 person per shift) – Rs.400 per day per person

Other Expenses -

Electricity – Rs. 80,000
Telephone – Rs.40,000
Maintenance cost – Rs.30 lakhs

The company needs 25% profit over total cost to cover interest and other costs.

Required:

a. Calculate cost per kilometer.
b. Calculate the toll rate per vehicle (assume there is only one type of vehicle).

Illustration – 14

The loan department of a bank performs several functions in addition to home loan application processing task. It is estimated that 25% of the overhead costs of loan department are applicable to the processing of home-loan application.

The following information is given concerning the processing of a loan application:

	Rs.
Direct professional labour: Loan processor monthly salary: (4 employees @ Rs.20,000 each)	80,000
Loan department overhead costs (monthly)	5,000
Chief loan officer's salary	750
Telephone expenses	2,800

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Depreciation Building	2,400
Legal advice	400
Advertising	650
Miscellaneous	**12,000**
Total overhead costs	

You are required to compute the cost of processing home loan application on the assumption that one hundred home loan applications are processed each month.

Illustration – 15

From the following data pertaining to the year 20X8-X9 prepare a cost statement showing the cost of electricity generated per kwh by Chambal Thermal Power Station.

Total units generated 10,00,000 kWh

Expenses:

	Rs.
Operating labour	15,00,000
Repairs & maintenance	5,00,000
Lubricants, spares and stores	4,00,000
Plant supervision	3,00,000
Administration overheads	20,00,000

5 kWh. of electricity generated per kg. of coal consumed @ Rs.4.25 per kg.

Depreciation charges @ 5% on capital cost of Rs.2,00,00,000.

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Study Note – 6 | Cost Accounting Techniques

6.1 Marginal Costing

Introduction

The cost and management accounting system, by provision of information, enables management to take various decisions. Marginal Costing is a technique of cost and management accounting which is used to analyses relationship between cost, volume and profit.

Marginal Cost:

It is the incremental cost of production which arises due to one-unit increase in the production quantity. Variable cost varies with output Fixed cost remains fixed. Hence, marginal cost is measured by the total variable cost attributable to one unit. For example, the total cost of producing 10 units and 11 units of a product is ₹10,000 and ₹10,500 respectively. The marginal cost for 11th unit i.e. 1 unit extra from 10 units is ₹500.

Marginal cost can precisely be the sum of prime cost and variable overhead.

Marginal Costing:

It is a costing system where products or services and inventories are valued at variable costs only. It does not take consideration of fixed costs. Costs are classified on the basis of behavior of cost (i.e. fixed and variable) rather functions as done in absorption costing method.

Direct Costing:

Direct costing and Marginal Costing are used synonymously at various places and it is so also. But the relation of costs with respect to activity level must be understood. Some costs are variable at batch level but fixed for unit level and likewise variable at production line level but fixed for batches and units.

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Differential and Incremental Cost:

Differential cost is difference between the costs of two different production levels. It is relative representation of costs for two different levels either increase or decrease in cost. Incremental cost, on the other hand, is the increase in the costs due change in the volume or process of production activities.

Incremental Cost v/s Marginal cost:

Marginal cost is the change in the total cost due to production of one extra unit while incremental cost can be both for increase in one unit and in total volume.

Characteristics of Marginal Costing

The technique of marginal costing is based on the distinction between product costs and period costs. Only the variables costs are regarded as the costs of the products while the fixed costs are treated as period costs which will be incurred during the period regardless of the volume of output. The main characteristics of marginal costing are as follows:

1. All elements of cost are classified into fixed and variable components. Semi-variable costs are also analysed into fixed and variable elements.
2. The marginal or variable costs (as direct material, direct labour and variable factory overheads) are treated as the cost of product.
3. Under marginal costing, the value of finished goods and work-in-progress is also comprised only of marginal costs. Variable selling and distribution are excluded for valuing these inventories. Fixed costs are not considered for valuation of closing stock of finished goods and closing WIP.
4. Fixed costs are treated as period costs and are charged to profit and loss account for the period for which they are incurred.
5. Prices are determined with reference to marginal costs and contribution margin.
6. Profitability of departments and products is determined with reference to their contribution margin.

3. Facts about Marginal Costing

Not a distinct method:

Marginal costing is not a distinct method of costing like job costing, process costing, operating costing, etc., but a special technique used for managerial decision making. It can, therefore, be used in conjunction with the different methods of costing such as job costing, process costing, etc., or even with other techniques such as standard costing or budgetary control.

Cost Ascertainment:

In marginal costing, cost ascertainment is made on the basis of the nature of cost.

Decision Making:

In the orthodox or total cost method, other things being equal, the total cost per unit will remain constant only when the level of output or mixture is the same from period to period. Since these

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factors are continually fluctuating, the actual total cost will vary from one period to another. Thus, it is possible for the costing department to say one day that an item costs ₹ 20 and the next day it costs ₹ 18. Such fluctuating manufacturing activity, and consequently the variations in the total cost from period to period or even from day to day, poses a serious problem to the management in taking sound decisions. Hence, the application of marginal costing has been given wide recognition in the field of decision making.

Determination of cost and profit under Marginal Cost

For the determination of cost of a product or service under marginal costing, costs are classified into variable and fixed. All the variable costs are part of product and services while fixed costs are charged against contribution margin.

Cost and Profit Statement under Marginal Costing:

	Amount (₹)	Amount (₹)
Revenue (A)		xxx
Product Cost:	Xxx	
- Direct Materials	xxx	
- Direct employee (labour)	xxx	
- Direct expenses	xxx	
- Variable manufacturing overheads	xxx	xxx
Product (Inventoriable) Costs (B)	xxx	xxx
Product Contribution Margin {A-B}		xxx
- Variable Administration overheads	xxx	xxx
- Variable Selling & Distribution overheads	xxx	
Contribution Margin (C)		xxx
Period Cost: (D)		
Fixed Manufacturing expenses	xxx	
Fixed non-manufacturing expenses	xxx	xxx
Profit/ (loss) {C – D}		xxx

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Product (Inventorial) Costs:

These are the costs which are associated with the purchase and sale of goods (in the case of merchandise inventory). In the production scenario, such costs are associated with the acquisition and conversion of materials and all other manufacturing inputs into finished product for sale. Hence, under marginal costing, variable manufacturing costs constitute inventoriable or product costs. Finished goods are measured at product cost. Work-in-process (WIP) inventories are also measured at product cost on the basis of percentage of completion (Please refer Process & Operation costing chapter).

(i) Contribution:

Contribution or contribution margin is the difference between sales revenue and total variable costs irrespective of manufacturing or non-manufacturing

Contribution (C) = Sales Revenue (S) – Total Variable Cost (V)

It can also be defined as excess of sales revenue over the variable costs. The contribution forms a fund for fixed expenses and profit as illustrated below:

Example:
Variable Cost = ₹ 50,000, Fixed Cost = ₹ 20,000, Selling Price = ₹ 80,000
Contribution = Selling Price – Variable Cost
= ₹ 80,000 – ₹ 50,000 = ₹ 30,000
Profit = Contribution – Fixed Cost
= ₹ 30,000 – ₹ 20,000 = ₹ 10,000

Since, contribution exceeds fixed cost; the profit is of the magnitude of ₹ 10,000. Suppose the fixed cost is ₹40,000 then the position shall be:

Contribution – Fixed cost = Profit or,
= ₹30,000 – ₹ 40,000 = - ₹ 10,000

The amount of ₹10,000 represents extent of loss since the fixed costs are more than the contribution. At the level of fixed cost of ₹ 30,000, there shall be no profit and no loss.

(ii) Period Cost:

These are the costs, which are not assigned to the products but are charged as expenses against the revenue of the period in which they are incurred. All fixed costs either manufacturing or non-manufacturing are recognised as period costs in marginal costing.

Distinction between Marginal and Absorption Costing

The distinctions in these two techniques are illustrated by the following diagrams:

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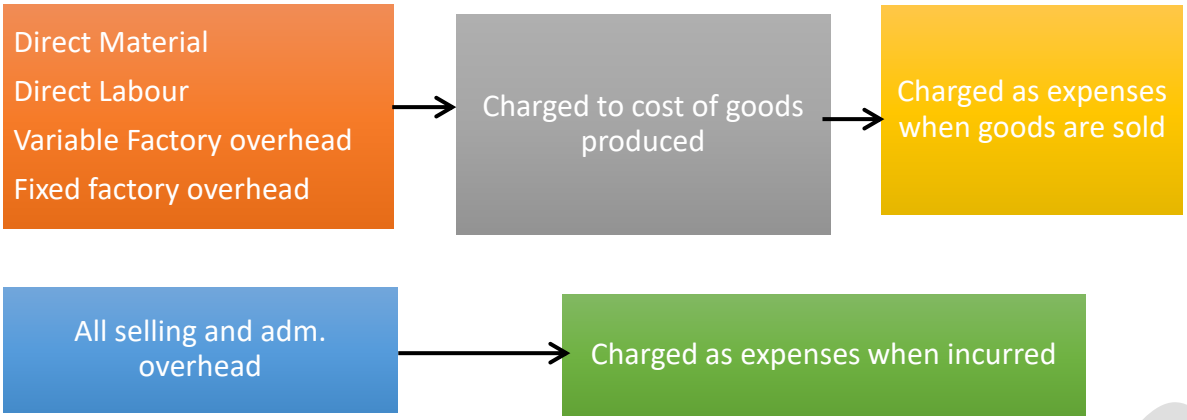
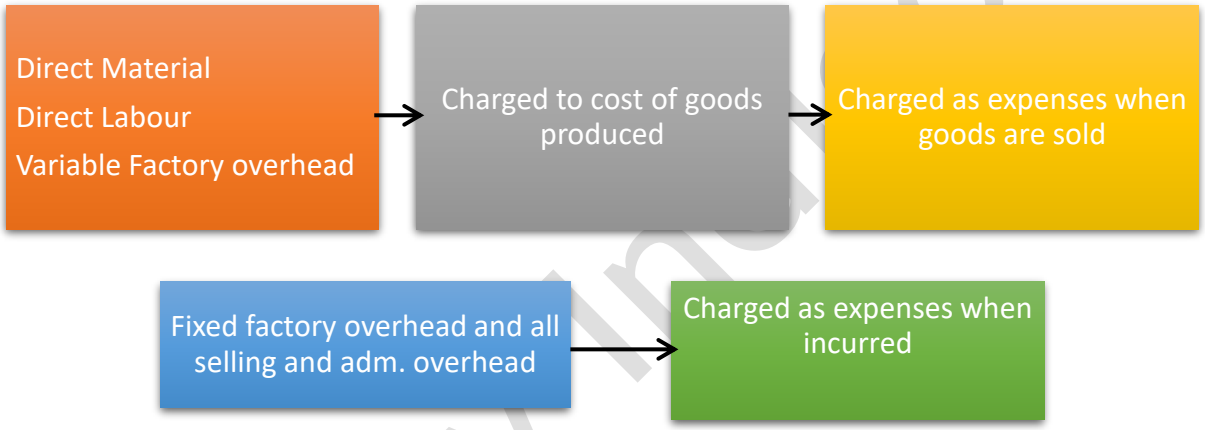


Absorption Costing Approach



Marginal Costing Approach

The main points of distinction between marginal costing and abnormal costing are as below:

	Marginal Costing	Absorption Costing
1.	Only variable costs are considered for product costing and inventory valuation	Both fixed and variable costs are considered for product costing and inventory valuation.
2.	Fixed costs are regarded as period costs. The Profitability of different products is judged by their P/V ratio.	Fixed costs are charged to the cost of production. Each product bears a reasonable share of fixed cost and thus the profitability of a product is

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		influenced by the apportionment of fixed costs.
3.	Cost data presented highlight the total contribution of each product.	Cost data are presented in conventional pattern. Net profit of each product is determined after subtracting fixed cost along with their variable costs.
4.	The difference in the magnitude of opening stock and closing stock does not affect the unit cost of production.	The difference in the magnitude of opening stock and closing stock affects the unit cost of production due to the impact of related fixed cost.
5.	In case of marginal costing the cost per unit remains the same, irrespective of the production as it is valued at variable cost	In case of absorption costing the cost per unit reduces, as the production increases as it is fixed cost which reduces, whereas, the variable cost remains the same per unit.

Difference in profit under Marginal Costing

The above two approaches will compute the different profit because of the difference in the stock valuation. This difference is explained as follows in different circumstances.

1. **No opening and closing stock:** In this case, profit / loss under absorption and marginal costing will be equal.
2. **When opening stock is equal to closing stock:** In this case, profit / loss under two approaches will be equal provided the fixed cost element in both the stocks is same amount.
3. **When closing stock is more than opening stock:** In other words, when production during a period is more than sales, then profit as per absorption approach will be more than that by marginal approach. The reason behind this difference is that a part of fixed overhead included in closing stock value is carried forward to next accounting period.
4. **When opening stock is more than the closing stock:** In other words, when production is less than the sales, profit shown by marginal costing will be more than that shown by absorption costing. This is because a part of fixed cost from the preceding period is added to the current year's cost of goods sold in the form of opening stock.

Income Statement (Absorption costing)

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Sales	XXXXX
Production Costs: Direct material consumed Direct labour cost Variable manufacturing overhead Fixed manufacturing overhead Cost of Production	 XXXXX XXXXX XXXXX XXXXX
Add: Opening stock of finished goods (Value at cost of previous period's production) Less: Closing stock of finished goods (Value at production cost of current period).	XXXXX XXXXX
Cost of Goods Sold Add: (or less) Under (or over) absorption of fixed	XXXXX XXXXX
Manufacturing overhead Add: Administration costs Selling and distribution costs	XXXXX XXXXX XXXXX
Total Cost	XXXXX
Profit (Sales – Total cost)	XXX

Income Statement (Marginal costing)

Sales	XXXXX

Variable manufacturing Costs: Direct material consumed Direct labour cost Variable manufacturing overhead Cost of Production	 XXXXX XXXXX XXXXX
Add: Opening stock of finished goods (Value at cost of previous period) Less: Closing stock of finished goods (Value at of current variable cost).	XXXXX XXXXX
Cost of Goods Sold Add: Variable administration, selling and dist. overhead	XXXXX XXXXX
Total Variable Cost Add: Selling and distribution costs	XXXXX XXXXX
Contribution (Sales – Total variable costs)	XXXXX
Less: Fixed costs (Production, admin., selling and dist.)	XXXXX
Net Profit	XXX

Advantages and Limitations of Marginal Costing

Advantages:

1. **Simplified Pricing Policy:** Since marginal cost per unit is constant from period to period within a short span of time, firm decisions on pricing policy can be taken.
2. **Proper recovery of Overheads:** Overheads are recovered in costing on the basis of pre-determined rates. If fixed overheads are included on the basis of predetermined rates, creates the problem of treatment of such under or over-recovery of overheads. Marginal costing avoids such under or over recovery of overheads.
3. **Shows Realistic Profit:** Under the marginal costing technique, the stock of finished goods and work-in-progress are carried on marginal cost basis and the fixed expenses are written off to profit and loss account as period cost. This shows the true profit of the period.

4. **How much to produce:** Marginal costing helps in the preparation of break-even analysis which shows the effect of increasing or decreasing production activity on the profitability of the company.
5. **More control over expenditure:** Segregation of expenses as fixed and variable helps the management to exercise control over expenditure.
6. **Helps in Decision Making:** Marginal costing helps the management in taking a number of business decisions like make or buy, discontinuance of a particular product, replacement of machines, etc.
7. **Short term profit planning:** It helps in short term profit planning by B.E.P charts.

Disadvantages:

1. **Difficulty in classifying fixed and variable elements:** It is difficult to classify exactly the expenses into fixed and variable category. Most of the expenses are neither totally variable nor wholly fixed. For example, various amenities provided to workers may have no relation either to volume of production or time factor.
2. **Scope for Low Profitability:** Sales staff may mistake marginal cost for total cost and sell at a price; which will result in loss or low profits. Hence, sales staff should be cautioned while giving marginal cost.
3. **Faulty valuation:** Overheads of fixed nature cannot altogether be excluded particularly in large contracts, while valuing the work-in- progress. In order to show the correct position fixed overheads, have to be included in work-in-progress.
4. **Unpredictable nature of Cost:** Marginal costing assumes that fixed cost always remains constant and so will the variable cost p.u. These costs may also change in realistic scenario.
5. **Marginal costing ignores time factor and investment:** The marginal cost of two jobs may be the same but the time taken for their completion and the cost of machines used may differ. The true cost of a job which takes longer time and uses costlier machine would be higher. This fact is not disclosed by marginal costing.
6. **Understating of W-I-P:** Under marginal costing stocks and work in progress are understated.

Cost – Volume – Profit (CVP) Analysis

Meaning:

It is a managerial tool showing the relationship between various ingredients of profit planning viz., cost, selling price and volume of activity. As the name suggests, cost volume profit (CVP) analysis is the analysis of three variables cost, volume and profit. Such an analysis explores the relationship between costs, revenue, activity levels and the resulting profit. It aims at measuring variations in cost and volume.

Assumptions:

1. Changes in the levels of revenues and costs arise only because of changes in the number of product (or service) units produced and sold. The number of output units is the only revenue driver and the only cost driver. Just as a cost driver is any factor that affects costs, a revenue driver is a variable, such as volume, that causally affects revenues.
2. Total costs can be separated into two components; a fixed component that does not vary with output level and a variable component that changes with respect to output level.

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3. Selling price, variable cost per unit, and total fixed costs (within a relevant range and time period) are known and constant.
4. The analysis either covers a single product or assumes that the proportion of different products when multiple products are sold will remain constant as the level of total units sold changes.
5. All revenues and costs can be added, subtracted, and compared without taking into account the time value of money.

Importance:

1. It provides the information about the following matters:
2. The behavior of cost in relation to volume.
3. Volume of production or sales, where the business will break-even.
4. Sensitivity of profits due to variation in output.
5. Amount of profit for a projected sales volume.
6. Quantity of production and sales for a target profit level.

Marginal Cost Equation:

Marginal Cost Equation = Sales – Variable Cost = Contribution = Fixed Cost ± Profit

Where,

S = Selling price per unit,

V = Variable cost per unit,

C = Contribution,

F = Fixed Cost,

P = Profit/Loss

Marginal Cost Statement:

Particulars	(₹)
Sales	xxxx
Less: Variable Cost	xxxx
Contribution	xxxx
Less: Fixed Cost	xxxx
Profit	xxxx

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Contribution to Sales Ratio (Profit Volume Ratio or P/V Ratio)

This ratio shows the proportion of sales available to cover fixed costs and profit. Contribution represent the sales revenue after deducting variable costs. This ratio is usually expressed in percentage.

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 \text{ or P/V Ratio} = \frac{\text{Change in contribution/ Profit}}{\text{Change in sales}} \times 100$$

A higher contribution to sales ratio implies that the rate of growth of contribution is faster than that of sales. This is because, once the breakeven point is reached, profits shall grow at a faster rate when compared to a product with a lesser contribution to sales ratio.

By transposition, we have derived the following equations:

(i) $C = S \times P/V \text{ ratio}$

(ii) $S = \frac{C}{P/V \text{ Ratio.}}$

Methods of Break - Even Analysis

Breakeven Point:

This is the point where neither profits nor losses have been made is known as a break-even point. This implies that in order to break even the amount of contribution generated should be exactly equal to the fixed costs incurred.

$$\text{Break - even point in units} = \frac{\text{Fixed costs}}{\text{Contribution per unit}}$$

Cash Break - even point:

When break- even point is calculated only with those fixed costs which are payable in cash, such a break-even point is known as cash break-even point. This means that depreciation and other non -cash fixed costs are excluded from the fixed costs in computing cash break-even point. Its formula is -

$$\text{Cash break - even point} = \frac{\text{Cash fixed costs}}{\text{Contribution per unit}}$$

Multi - Product Break - even Analysis:

In a multi-product environment, where more than one product is manufactured by using a common fixed cost, the break-even point formula needs some adjustments. The contribution is

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calculated by taking weights for the products. The weights may be of sales mix quantity or sales mix values.

Graphical presentation of Break-Even Chart

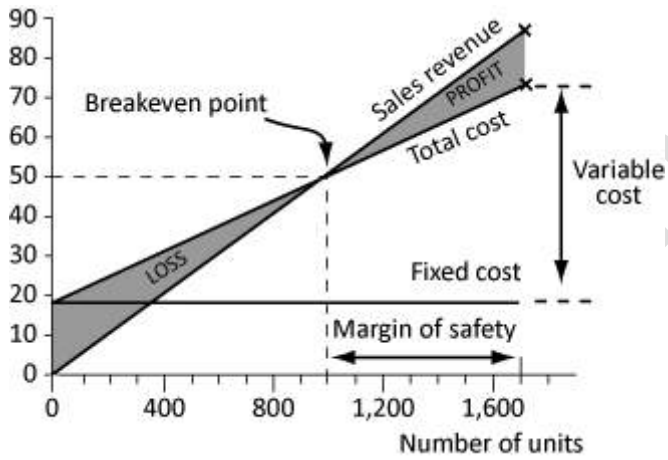
Break – even Chart:

A breakeven chart records costs and revenues on the vertical axis and the level of activity on the horizontal axis.

Steps to prepare Break – even chart.

1. Select appropriate axis.
2. Draw Fixed cost line.
3. Draw Total cost line.
4. Draw Revenue line.

The breakeven point is that point where the sales revenue line intersects the total cost line.



Angle of Incidence:

This angle is formed by the intersection of sales line and total cost line at the break-even point. This angle shows the rate at which profit is earned once the break-even point is reached. The wider the angle the greater is the rate of earning profits. A large angle of incidence with a high margin of safety indicates extremely favorable position.

Contribution Breakeven chart:

The making of a contribution breakeven chart which is based on the same principles as a conventional breakeven chart except for that it shows the variable cost line instead of the fixed cost line. Lines for Total cost and Sales revenue remain the same. The breakeven point and profit can be read off in the same way as with a conventional chart. However, it is also possible to read the contribution for any level of activity.

The contribution can be read as the difference between the sales revenue line and the variable cost line.

Profit - volume chart:

This is also very similar to a breakeven chart. In this chart the vertical axis represents profits and losses and the horizontal axis is drawn at zero profit or loss.

In this chart each level of activity is taken into account and profits marked accordingly. The breakeven point is where this line interacts the horizontal axis.

Advantages of the profit-volume chart

1. The biggest advantage of the profit-volume chart is its capability of depicting clearly the effect on profit and breakeven point of any changes in the variables.

Example:
A manufacturing company incurs fixed costs of ₹3,00,000 per annum. It is a single product company with annual sales budgeted to be 70,000 units at a sales price of ₹300 per unit. Variable costs are ₹285 per unit.

Margin of Safety:

It represents a buffer sale in excess of Break-even sale. The margin of safety can be defined as the difference between the expected level of sale and the breakeven sales. The larger the margin of safety, the higher is the chances of making profits.

Margin of Safety = Projected sales – Breakeven sales
=1,700 units – 1,000 units
=700 units or 41 % of sales.

It also can be calculated as:

$$\text{Margin of Safety} = \frac{\text{Profit}}{\text{P/V Ratio}}$$

Variations of Basic Marginal cost equation and other formulae:

1. Sales – Variable cost = Fixed cost ± Profit/ Loss By multiplying and dividing L.H.S. by S
2. $\frac{S\,(S-V)}{V} = F + P$
3. $S \times P/V\ Ratio = F + P$ or Contribution $(P/V\ Ratio = \frac{S-V}{S})$
4. BES × P/V Ratio = F (at BEP profit is zero).
5. $BES = \frac{\text{Fixed Cost}}{P/V\ Ratio}$
6. $P/V\ Ratio = \frac{\text{Fixed cost}}{BES}$
7. S × P/V Ratio = Contribution (Refer to iii)
8. P/V Ratio = Contribution / Sales
9. (BES + MS) × P/V Ratio = Contribution (Total sales = BES + MS)
10. (BES × P/V Ratio) + (MS × P/V Ratio) = F + P: By deducting (BES × P/V Ratio) from L.H.S. and F from R.H.S. in (x) above, we get:

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11. M.S. × P/V Ratio = P
12. P/V Ratio = $\frac{\text{Change in profit}}{\text{Change in sales}}$
13. P/V Ratio = $\frac{\text{Change in contribution}}{\text{Change in sales}}$
14. Profitability = $\frac{\text{Contribution}}{\text{Key factor}}$
15. Margin of Safety = $\frac{\text{Total Sales – BES or Profit}}{\text{P/V ratio}}$
16. BES = Total Sales – MS
17. Margin of Safety Ratio = $\frac{\text{Total sales - BES}}{\text{Total sales}}$

Illustrations

Illustration - 1

Arnav Limited produces 10,000 units of product Z by incurring the total cost of Rs. 3,50,000. The break-up of costs are as follows:

1. Direct Material @ Rs.10 per unit, Rs.1,00,000
2. Direct employee (labour) Cost @ Rs.8 per unit, Rs.80,000
3. Variable overheads @ Rs.2 per unit, Rs.20,000
4. Fixed Overheads Rs.1,50,000 (up to a volume of 50,000 units)

Compute the marginal cost of producing one extra unit from the current production.

Illustration - 2

Arnav Ltd. produces 10,000 units of product Z by incurring a total cost of Rs.4,80,000. Break-up costs are as follows:

1. Direct Material @ Rs.10 per unit, Rs.1,00,000
2. Direct employee (labour cost) @ Rs.8 per unit, Rs.80,000
3. Variable Overheads @ Rs.2 per unit, Rs.20,000
4. Machine set up cost @ Rs.1,200 for a production run (100 units can be manufactured in a run)
5. Depreciation of a machine specifically used for production of Z Rs.10,000
6. Apportioned fixed overheads Rs.1,50,000

Illustration – 3

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WONDER LTD. manufactures a single product, ZEST. The following figures relate to ZEST for a one-year period:

Activity Level	50%	100%
Sales and production (units)	400	800
Other Details	Amount (Rs.)	Amount (Rs.)
Sales	8,00,000	16,00,000
Production costs:		
- Variable	3,20,000	6,40,000
- Fixed	1,60,000	1,60,000
Selling and distribution costs:		
- Variable	1,60,000	3,20,000
- Fixed	2,40,000	2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of ZEST at the beginning of the year.

In the first quarter, 220 units were produced, and 160 units were sold.

Required:

(a) What would be the fixed production costs absorbed by ZEST if absorption costing is used?

(b) What would be the under/over-recovery of overheads during the period?

(c) What would be the profit using absorption costing?

(d) What would be the profit using marginal costing?

Illustration – 4

XYZ Ltd. has a production capacity of 2,00,000 units per year. Normal capacity utilisation is reckoned as 90%. Standard variable production costs are Rs.11 per unit. The fixed costs are Rs.3,60,000 per year. Variable selling costs are Rs.3 per unit and fixed selling costs are Rs.2,70,000 per year. The unit selling price is Rs.20.

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In the year just ended on 30th June 2014, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30th June was 20,000 units. The actual variable production costs for the year were Rs. 35,000 higher than the standard.

1. Calculate the profit for the year
    a. by absorption costing method and
    b. by marginal costing method.
2. Explain the difference in the profits.

Illustration - 5

ABC Ltd. manufacturing a single product, incurring variable costs of Rs. 300 per unit and fixed costs of Rs. 2,00,000 per month. If the product sells for Rs. 500 per unit.

What is the breakeven point in units and break-even point in rupee value of sales?

Illustration -6,7,8

MNP Ltd sells goods at Rs. 37.50 per unit. Variable costs are Rs. 17.50 per unit (manufacturing costs of Rs. 14 and selling cost Rs. 3.50 per unit). Fixed costs are incurred uniformly throughout the year and amount to Rs. 35,00,000 (including depreciation of 15,00,000). There is no beginning or ending inventories.

Required:

(i) Estimate breakeven sales level quantity and cash breakeven sales level quantity.

Illustration - 11

If P/V ratio is 60% and the Marginal cost of the product is Rs. 20. What will be the selling price?

Illustration - 12

The ratio of variable cost to sales is 70%. The break-even point occurs at 60% of the capacity sales. Find the capacity sales when fixed costs are Rs. 90,000. Also compute profit at 75% of the capacity sales.

Illustration - 13

1. Ascertain Profit when

Sales Rs.2,00,000

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Fixed Cost	Rs.40,000
BEP	Rs.1,60,000

2. Ascertain Sales, when

Fixed Cost	Rs.20,000
Profit	Rs.10,000
BEP	Rs.40,000

Illustration - 14

An Indian soft drink company is planning to establish a subsidiary company in Bhutan to produce mineral water. Based on the estimated annual sales of 40,000 bottles of the mineral water, cost studies produced the following estimates for the Bhutanese subsidiary:

	Total Annual Costs	Variable %
Material	2,10,000	100%
Labour	1,50,000	80%
Factory Overheads	92,000	60%
Administration Expenses	40,000	35%

The Bhutanese production will be sold by manufacturer's representatives who will receive a commission of 8% of the sale price. No portion of the Indian office expenses is to be allocated to the Bhutanese subsidiary. You are required to

1. Compute the sale price per bottle to enable the management to realise an estimated 10% profit on sale proceeds in Bhutan.
2. Calculate the break-even point in terms of sales as also in number of bottles for the Bhutanese subsidiary on the assumption that the sale price is Rs.14 per bottle

Illustration - 15

Mr. X has Rs. 2,00,000 investments in his business firm. He wants a 15% return on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60 % of sales, his fixed costs are Rs. 80,000 per year.

Show computations to answer the following questions:

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1. What sales volume must be obtained to break even?
2. What sales volume must be obtained to get 15% return on investment?

Mr. X estimates that even if he closed the doors of his business, he would incur Rs. 25,000 as expenses per year. At what sales would he be better off by locking his business up?

Illustration – 16

An automobile manufacturing company produces different models of Cars. The budget in respect of model 007 for the month of March, 20X8 is as under:

Budgeted Output 40,000 Units

	Rs. In lakhs	**Rs. In lakhs**
Net Realization		**700.00**
Variable Costs		
Materials	264.00	
Labour	52.00	
Direct Expenses	124.00	**440.00**
Fixed Costs	90.00	
Specific Fixed Expenses	112.50	**202.50**
Allocated Fixed Costs		
Total Costs		642.60
Profits		**57.50**

Calculate:

(i)Profit with 10% increase in selling price with a 10% reduction in sales volume.

(ii)Volume to be achieved to maintain the original profit after a 10% rise in material costs, at the originally budgeted selling price per unit

Illustration - 17

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A single product company sells its product at Rs. 60 per unit. In 20X8, the company operated at a margin of safety of 40%. The fixed costs amounted to Rs. 3,60,000 and the variable cost ratio to sales was 80%.

In 20X9, it is estimated that the variable cost will go up by 10% and the fixed cost will increase by 5%.

(i) Find the selling price required to be fixed in 20X9 to earn the same P/V ratio as in 20X3.

(ii) Assuming the same selling price of Rs. 60 per unit in 20X9, find the number of units required to be produced and sold to earn the same profit as in 20X8.

Illustration - 18

A company has made a profit of Rs.50,000 during the year 20X8-X9.

If the selling price and marginal cost of the product are Rs.15 and Rs.12 per unit respectively.

Find out the amount of margin of safety.

Illustration - 19

(a) If margin of safety is Rs.2,40,000 (40% of sales) and P/V ratio is 30% of AB Ltd

Calculate its

(1) Break even sales, and

(2) Amount of profit on sales of Rs.9,00,000.

(b) X Ltd. has earned a contribution of Rs.2,00,000 and net profit of Rs.1,50,000 on sales of Rs.8,00,000. What is its margin of safety?

Illustration - 20

The following information is given by Star Ltd.

- Margin of Safety Rs.1,87,500
- Total Cost Rs.1,93,750
- Margin of Safety 3,750 units
- Break-even Sales 1,250 units

Required: Calculate

1. Profit,
2. P/V Ratio,
3. BEP Sales (in Rs.) and

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4. Fixed Cost

Illustration - 21

A company had incurred fixed expenses of Rs. 4,50,000, with sales of Rs.15,00,000 and earned a profit of Rs. 3,00,000 during the first half year. In the second half, it suffered a loss of Rs. 1,50,000.

Calculate:

(i) The profit-volume ratio, break-even point and margin of safety for the first half year

(ii) Expected sales volume for the second half year assuming that selling price and fixed expenses remained unchanged during the second half year.

(iii) The break-even point and margin of safety for the whole year

Illustration - 22

PQR Ltd. has furnished the following data for the two years:

	20X8	**20X9**
Sales	Rs.8,00,000	?
Profit/Volume Ratio (P/V ratio)	50%	37.5%
Margin of Safety sales as a % of total sales	40%	21.875%

There has been substantial savings in the fixed cost in the year 20X9 due to the restructuring process. The company could maintain its sales quantity level of 20X8 in 20X9 by reducing selling price.

You are required to calculate the following:

(i) Sales for 20X9 in Value,

(ii) Fixed cost for 20X9,

(iii) Break-even sales for 20X9 in Value.

Illustration - 23

A Ltd. Maintains margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to Rs. 5 lakhs.

Calculate the following:

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i. Break-even sales

ii. Sales

iii. Total variable cost

iv. Current profit

v. New 'margin of safety' if the sales volume is increased by 7 ½ %

Illustration - 24

You are given the following data:

Year	Sales	Profit
20X8	Rs.1,20,000	Rs.8,000
20X9	Rs.1,40,000	R.13,000

Find out –

1. P/V Ratio
2. Breakeven point
3. Profit when sales are Rs.1,80,000
4. Sales required earn a profit of Rs.12,000
5. Margin of Safety in year 20X9

Illustration - 25

A company sells its product at Rs. 15 per unit.

1. In a period, if it produces and sells 8,000 units, it incurs a loss of Rs. 5 per unit.
2. If the volume is raised to 20,000 units, it earns a profit of Rs. 4 per unit.

Calculate break-even point both in terms of Value as well as in units.

Illustration - 26

A company has three factories situated in north, east and south with its Head Office in Mumbai. The management has received the following summary report on the operations of each factory for a period:

(Rs. in '000)

	Sales		Profit	

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	Actual	Over/(Under) Budget	Actual	Over/(Under) Budget
North	1,100	(400)	135	(180)
East	1,450	150	210	90
South	1,200	(200)	330	(110)

Calculate for each factory and for the company as a whole for the period:

1. Fixed costs.
2. Break-even sales

Illustration - 27

Arnav Ltd. sells two products, J and K.

1. The sales mix is 4 units of J and 3 units of K.
2. The contribution margins per unit are Rs. 40 for J and Rs. 20 for K.
3. Fixed costs are Rs. 6,16,000 per month.

Compute Composite BEP

Illustration - 28

The product mix of a Gama Ltd. is as under:

	Product M	Product N
Units	54,000	18,000
Selling Price	Rs.7.50	Rs.15.00
Variable Cost	Rs.6.00	Rs.4.50

Find the break-even points in units, if the company discontinues product 'M' and replace with product 'O'.

The quantity of product 'O' is 9,000 units and its selling price and variable costs respectively are Rs. 18 and Rs. 9.

Fixed Cost is Rs. 15,000.

Illustration - 29

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A manufacturing company incurs fixed costs of Rs.3,00,000 per annum. It is a single product company with annual sales budgeted to be 70,000 units at a sales price of Rs.300 per unit. Variable costs are Rs.285 per unit.

(i) Draw a profit volume graph and use it to determine the break-even point.

The Company is deliberating upon an increase in the selling price of the product to Rs.350 per unit. This shall be required in order to improve the quality of the product. It is anticipated that despite increase in the selling price the sales volume shall remain unaffected, however, the fixed costs shall increase to Rs.4,50,000 per annum and the variable costs to Rs.330 per uni.

(ii) Draw on the same graph as for part (i) a second profit volume graph and give your comments.

Illustration - 30

(a) You are given the following data for the coming year for a factory:

Budgeted output	8,00,000 units
Fixed expenses	Rs.40,00,000
Variable expenses per unit	Rs.100
Selling price per unit	Rs.200

Draw a break-even chart showing the break-even point.

(b) If the price is reduced Rs.180, what will be the new break-even point? Indicate this on the graph.

Illustration - 31

M.K. Ltd. manufactures and sells a single product X whose selling price is Rs.40 per unit and the variable cost is Rs.16 per unit.

1. If the Fixed Costs for this year are Rs. 4,80,000 and the annual sales are at 60% margin of safety, calculate the rate of net return on sales, assuming an income tax level of 40%
2. For the next year, it is proposed to add another product line Y whose selling price would be Rs.50 per unit and the variable cost Rs.10 per unit. The total fixed costs are estimated at Rs.6,66,600. The sales mix of X: Y would be 7: 3. At what level of sales next year, would M.K. Ltd. break even? Give separately for both X and Y the break- even sales in rupee and quantities.

Illustration - 32

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X Ltd. supplies spare parts to an aircraft company Y Ltd. The production capacity of X Ltd. facilitates production of any one spare part for a particular period of time. The following are the cost and other information for the production of the two different spare parts A and B:

Per unit	Part A	Part B
Alloy usage	1.6 kgs.	1.6 kgs.
Machine Time: Machine A	0.6 hrs.	0.25 hrs.
Machine Time: Machine B	0.5 hrs.	0.55 hrs.
Target Price (Rs.)	145	115

1. Total hours available:
    - Machine A 4,000 hours
    - Machine B 4,500 hours
2. Alloy available is 13,000 kgs. @ Rs.12.50 per kg.
3. Variable overheads per machine hours:

- Machine A: Rs. 80
- Machine B: Rs. 100

Required

(1) Identify the spare part which will optimize contribution at the offered price.

(2) If Y Ltd. reduces target price by 10% and offers Rs. 60 per hour of unutilized machine hour, what will be the total contribution from the spare part identified above?

Illustration - 33

The profit for the year of R.J. Ltd. works out to 12.5% of the capital employed and the relevant figures are as under:

Sales… Rs. 5,00,000

Direct Materials… Rs. 2,50,000

Direct Labour… Rs. 1,00,000

Variable Overheads… Rs. 40,000

Capital Employed… Rs. 4,00,000

The new Sales Manager who has joined the company recently estimates for next year a profit of about 23% on capital employed, provided

- the volume of sales is increased by 10% and
- simultaneously there is an increase in Selling Price of 4% and
- an overall cost reduction in all the elements of cost by 2%.

Required

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Find out by computing in detail the cost and profit for next year, whether the proposal of Sales Manager can be adopted.

Illustration - 34

The following are cost data for three alternative ways of processing the clerical work for cases brought before the LC Court System:

	A Manual (Rs.)	B Semi- Automatic (Rs.)	C Fully- Automatic (Rs.)
Monthly fixed costs:			
Occupancy	15,000	15,000	15,000
Maintenance contract	---	5,000	10,000
Equipment lease	---	25,000	1,00,000
Unit variable costs (as per report):			
Supplies	40	80	20
Labour	Rs.200 (5 hrs.× Rs.40)	Rs.60 (1 hr. × Rs.60)	Rs.20 (0.25 hr. × Rs.80)

Required

1. Calculate cost indifference points. Interpret your results.
2. If the present case load is 600 cases and it is expected to go up to 850 cases in near future, which method is most appropriate on cost considerations?

6.2 Standard Costing & Variance Analysis

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Introduction

Cost control is one of the objectives of cost management. Management of an organisation setups predetermined cost to compare the actual cost with the predetermined cost. Predetermined costs are standard costs used for cost control and performance evaluation. Standard costing is a method of cost and management accounting which starts with setting of standards to reporting of variances to management for taking corrective actions. The Official Terminology of CIMA, London defines standard costing as "Control technique that reports variances by comparing actual costs to pre-set standards so facilitating action through management by exception."

Standard Costing

Standard cost is defined in the CIMA Official Terminology as "'the planned unit cost of the product, component or service produced in a period. The standard cost may be determined on a number of bases. The main use of standard costs is in performance measurement, control, stock valuation and in the establishment of selling prices." From the above definition Standard costs can be said as

- Planned cost
- Determined on a base or number of bases

Need of Standard Costing

Standards or Standard costs are established to evaluate performance of a responsibility centre. Apart from performance evaluation and cost control, standard costs are also used to value inventory where actual figures are not reliably available and to determine selling prices particularly while preparing quotations.

The standard costing is preferred for the following reasons

1. Prediction of future cost for decision making

Standard costs are set after taking all present conditions and future possibilities into consideration. Hence, standard cost is future cost for the purpose of cost estimation and profitability from a proposed project/ order/ activity

2. Provide target to be achieved

Standard costs are the target cost which should not be crossed by the responsibility centers. Performance of a responsibility center is continuously monitored and measured against the set standards. Any variance from the standard is noted and reported for appropriate action

3. Used in budgeting and performance evaluation

Standard costs are used to set budgets and based on these budgets managerial performance is evaluated.

4. Interim profit measurement and inventory valuation

Actual profit can only be known after the closure of the accounts. But an organisation may need to prepare profitability statement for interim periods for managerial reporting and decision making. To arrive at profit figure, standard costs are deducted from the revenue

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Types of Standards

A. Ideal Standards

These represent **the level of performance attainable when prices for material and labour are most favourable**, when the highest output is achieved with the best equipment and layout and when the maximum efficiency in utilisation of resources results in maximum output with minimum cost

These types of standards are criticised on three grounds

- Since such standards would be unattainable, no one would take these Seriously
- The variances disclosed would be variances from the ideal standards. These would not, therefore, indicate the extent to which they could have been reasonably and practically avoided.
- There would be no logical method of disposing of these variances

B. Normal Standards

These are **standards that may be achieved under normal operating conditions**. The normal activity has been defined as "the number of standard hours which will produce at normal efficiency sufficient good to meet the average sales demand over a term of years".

These standards are, however, difficult to set because they require a degree of forecasting. The variances thrown out under this system are deviations from normal efficiency, normal sales volume, or normal production volume

If the actual performance is found to be abnormal, large variances may result and necessitate revision of standards.

A. Basic or Bogey Standards

These standards are used only when they are likely to remain constant or unaltered over a long period. According to this standard, a base year is chosen for comparison purposes in the same way as statisticians use price indices. Since basic standards do not represent what should be attained in the present period, current standards should also be prepared if basic standards are used.

Basic standards are, however, well suited to businesses having a small range of products and long production runs. Basic standards are set, on a long-term basis and are seldom revised. When basic standards are in use, variances are not calculated. Instead, the actual cost is expressed as a percentage of basic cost.

B. Current Standards

These standards reflect the management's anticipation of what actual costs will be for the current period. These are the costs which the business will incur if the anticipated prices are paid for the goods and services and the usage corresponds to that believed to be necessary to produce the planned output.

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The variances arising from expected standards represent the degree of efficiency in usage of the factors of production, variation in prices paid for materials and services and difference in the volume of production.

Process of Standard Costing

The process of standard cost is as below

A. Setting of Standards

The first step is to set standards which are to be achieved

B. Ascertainment of actual costs

Actual cost for each component of cost is ascertained. Actual costs are ascertained from books of account, material invoices, wage sheet, charge slip etc.

C. Comparison of actual cost with standard cost

Actual costs are compared with the standards costs and variances are determined.

D. Investigate the reasons for variances

Variances arises are investigated for further action. Based on this, performance is evaluated, and appropriate actions are taken.

E. Disposition of variances

Variances arise are disposed-off by transferring it the relevant accounts (costing profit and loss account) as per the accounting method (plan) adopted.

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Setting up of Standards

Standard cost is set on the basis of management's estimation. Cost is estimated on the basis of technical specification provided by the engineering department or other expert such as production engineer. Generally, while setting standards, consideration is given to historical data, current production plan and expected conditions of future. For the sake of detailed analysis and control standard cost is set for each element of cost i.e. material, labour, variable overheads and fixed overheads. Standard are also set for the sales quantity and sales value; this is generally known as budgeted sales

Standards are set in both quantity (units or hours) and in cost (price or rate). It is thus measure in quantities, hours and value of the factors of production.

Standard costs are divided into three main cost components, such as

- Direct Material Cost
- Direct Employee (Labour) Cost and
- Overheads

Standards are set in both physical and monetary terms for each cost components. Details are as follows:

A. Physical Standards

Physical standards refer to expression of standards in units or hours. At this stage standard quantity and standard hours are determined for a particular product or service. The purpose of setting standards is to secure economies in scale of production and to set selling price for quotation purpose

In manufacturing organisations, the task of setting physical standards is assigned to the industrial engineering department. While setting standards consideration is given to the

- Company's operating plan i.e. budgets
- Final output to be produced
- Material specification, in both quantity and quality provided by the engineering department
- Proportion of material to be used in case of multiple inputs
- Method of production i.e. fully automated, semi-automated or manual
- Skill set of workers and availability of workers
- Working conditions and internal factors
- External factors (such as Labour Law, Factories Act, Govt. policy etc.)

B. Procedure of setting Material Quantity Standards

The following procedure is usually followed for setting material quantity standards

1. Standardisation of products

At this phase, products to be produced are decided based on production plan and customer's order. Generally following questions are answered at this stage: (i) What to be produced? (ii) Which type to be produced and (iii) How much to be produced?

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2. Product study

Product to be produced is analysed and studied for developments and production. Product study is carried out by the engineering department or product consultants. At this phase answers to the following questions are satisfied: (i) How can it be produced? (ii) What are the pre-requisites? (iii) Which type of materials to be used? (iv) How products can be accepted in the market? etc.

3. Preparation of specification list

After the product study a list of material is prepared. It specifies types (quality) and quantity of materials to be used, substitute of the materials, quantity and proportion of materials to be used, process to be followed, pre-requisites and condition required etc. While preparing specification list consideration to expected amount of wastage is given. It must be customised to adopt changes in the product.

4. Test runs

Sample or test runs under specified conditions are carried out and sample products are tested for the desired quality and quantity. Any deviation from the specification is noted down and specification list is updated

C. Procedure of setting Labour Time Standards

The following are the steps involved in setting labour standards

1. Standardisation of product and product study is carried out as explained above.
2. **Labour specification**

Types of labour and labour time is specified. Labour time specification is based on past records and it takes into account normal wastage of time.

3. Standardisation of methods

Selection of proper machines to use proper sequence and method of operations

4. Manufacturing layout

A plan of operation for each product listing the operations to be performed is prepared

5. Time and motion study

It is conducted for selecting the best way of completing the job or motions to be performed by workers and the standard time which an average worker will take for each job. This also takes into account the learning efficiency and learning effect.

6. Training and trial

Workers are trained to do the work and time spent at the time of trial run is noted down

D. Procedure of setting Overhead Time / Quantity Standards

Variable overhead time/ quantity is estimated based on specification made by the engineering departments. Variable overheads may either be based on direct material quantity or labour hour. Generally, it is based on labour time worked.

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Fixed overhead time is based on budgeted production volume

E. Problems faced while setting Physical Standards

- A situation may arise where the company is introducing the manufacture of a new line of product. In such case, it may be necessary to employ workers who have no experience in the job. This creates a problem of setting standard time because it is necessary to make adjustment for the inexperience of workers.
- Changes in technology may necessitate installation of sophisticated machines. When such machines are installed, the precise estimation of output and standard of efficiency achievable will pose a problem until after a long time when the working conditions are settled. Thus, setting standards for these machines and estimating the standard costs will need considerable amount of work.
- Often manufacturers prefer to product diversification to improve profitability. One of the most important problems that arise with the proposed change in product is re-setting of production facilities. For example, when an old copper part is to be changed into one made of bronze to suit the new product, special care has to be taken to order new tools which in turn, pose the problem of setting up of standard time in respect of the new tools.
- Standards of material specifications are established and if the materials are not available as per specifications, the standards may not be achievable.
- Very often the cost accountant is confronted with the problem of choosing the type of standards to be adopted.

F. Price or Rate Standards

Broadly, the price or rate standards can be set on either of the following bases

- Actual average or mean price expected to prevail during the coming period, say one year; or
- Normal prices expected to prevail during a cycle of seasons which may be of a number of years.

G. Procedure of setting Material Price Standards

Material prices are not altogether within the control of the manufacturer; but the purchasing department, on being apprised of production quantities required, should be able, from its knowledge of current market conditions and trends, to state with reasonable accuracy price for the constituent items. The standards for prices of materials should be based on the following factors, if price fluctuations are small and are not serious.

- Stock of materials on hand and the prices at which they are held;
- The prices at which orders for future deliveries of materials (agreement entered into) have already been placed
- Minimum support price fixed by the appropriate authority and
- Anticipated fluctuation in price levels

In case there are unsystematic fluctuations in the market price, it may be difficult to determine standard costs of materials; fluctuations in the market price may be of different sorts; prices may be different from month to month, from one season to another or from one year to another. There may be a secular trend which, on the whole, is pushing price upwards or downwards. The nature

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of difficulties encountered in fixing standard costs of materials will naturally be different in each case. In addition, the purchasing policy of the company and the objective to be achieved (from cost accounting) will make a difference.

H. Procedure of setting Wage Rate Standard

The type of labour required for performing a specific job would be the most important factor for deciding the rate of wage to be paid to workers. Standard wage rate for skilled and unskilled workers are set based on the following basis:

- Time taken by the workers to complete a unit of production.
- Time or piece rate prevailing in the industry. It can be known from the peers.
- Wage agreement entered into between the management and workers' union.
- Law prevailing in the area of operation, law like Payment of minimum wages Act, Payment of bonus Act etc.

I. Procedure of setting Overhead Expense Standard

In computing the overhead expense standards, consideration should be given to the level of output and the budgeted expenses. A budgeted output is fixed considering practical manufacturing capacity and anticipated sales demand. Expenditures can be budgeted under different heads for the level of output chosen. These expenditures are classified as fixed and variable. Thus, the overhead expense standards are set by computing the optimum level of output for a production department followed by budgets for fixed and variable overheads. If production is seasonal or it fluctuates during the year, a flexible budget may be prepared to facilitate comparison between the set target and actual expenditure for the period.

Types of Variances

A. Controllable and un-controllable variances

For effective cost control it is necessary to investigate into the reasons for cost variances and to take corrective actions. For this purpose, variances are classified as controllable and uncontrollable variances. Controllable variances are those which can be controlled under the normal operating conditions if a responsibility centre takes preventive measures and acts prudently.

Uncontrollable variances are those which occurs due to conditions which are beyond the control of a responsibility centre and cannot be controlled even though all preventive measures are in place. Responsibility centres are answerable for all adverse variances which could have been controlled. Controllability is a subjective matter and varies from situation to situation. If the uncontrollable variances are of significant nature and are persistent, the standard may need revision.

B. Favourable and Adverse variance

Favourable variances are those which are profitable for the company and adverse variances are those which causes loss to the company. While computing cost variances favourable variance means actual cost is less than standard cost. On the other hand, adverse variance means actual

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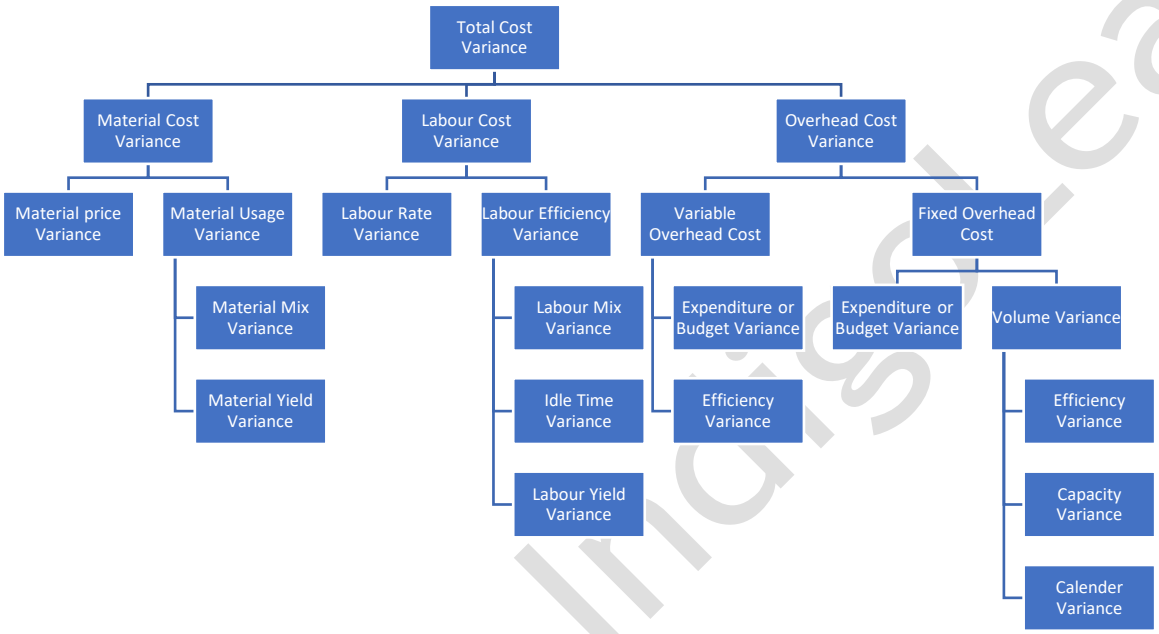
cost is exceeding standard cost. The situation will be reversed for sales variance. Favourable variances mean actual is more than budgeted and adverse when actual is less than budgeted. Favourable variance in short denoted by capital 'F' and adverse variances by capital 'A'.

Classification of Variances

Variances are broadly classified into two parts namely Revenue variance and Cost variance. At Revenue side variances is calculated by comparing actual sales from budgeted (standard) sales. On the other hand, Cost side reflects variances in cost components.



Computation of Variances

Material Cost Variance

Material cost variance is the difference between standard cost of materials used and the actual cost of materials. Mathematically it is written as.

$$Material\ Cost\ Variance = Standard\ Cost - Actual\ Cost$$

$$Or$$

$$(Std.\ Quantity \times Std.\ Price) - (Actual\ Quantity \times Actual\ Price)$$

(The difference between the Standard Material Cost of the actual production volume and the Actual Cost of Material)

Reason for Variance: Material cost variance arises mainly because of either difference in material price from the standard price or difference in material consumption from standard consumption

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or both the reasons. Analysis of material cost variance is done dividing it into two parts namely Material Price variance and Material Usage variance.

1. Material Price Variance

It measures variance arises in the material cost due to difference in actual material purchase price from standard material price. Mathematically it is

$$Material\ Price\ Variance = Standard\ Cost\ of\ Actual\ Quantity - Actual\ Cost$$

$$Or$$

$$Actual\ Quantity\ (AQ) \times (Std.Price\ (SP) - Actual\ Price\ (AP))$$

$$Or$$

$$(SP \times AQ) - (AP \times\ AQ)$$

(The difference between the Standard Price and Actual Price for the Actual Quantity Purchased)

Here actual quantity means actual quantity of material purchased. If in the question material purchase is not given, it is taken as equal to material consumed.

Responsibility for Material Price Variance: Generally, purchase department purchases materials from the market. Purchase department is expected to perform its function very prudently so that company never suffers loss due to its inefficiency. Purchase department is held responsible for adverse price variance arises due to the factors controllable by the department.

2. Material Usage Variance

It measures variance in material cost due to usage/ consumption of materials. It is computed as below:

$$Material\ Usage\ Variance$$
$$= Standard\ Cost\ of\ Standard\ Quantity\ for\ Actual\ Production$$
$$- Standard\ Cost\ of\ Actual\ Quantity$$

$$Or$$

$$Std.Price\ (SP) \times \{\ Std.Quantity\ (SQ)\ -\ Actual\ Quantity\ (AQ)\ \}$$

$$Or$$

$$[(SQ\ \times\ SP) - (AQ\ \times\ SP)]$$

The difference between the Standard Quantity specified for actual production and the Actual Quantity used, at Standard Price

Responsibility for material usage variance: Material usage is the responsibility of production department and it is held responsible for adverse usage variance

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Reasons for variance: Actual material consumption may differ from the standard quantity either due to difference in proportion used from standard proportion or due to difference in actual yield from standard yield.

Material usage variance is divided into two parts (a) Material usage mix variance and (b) Material yield variance

a. Material Mix Variance

Variance in material consumption may arise due to difference in proportion actually used from the standard mix/ proportion. It only arises when two or more inputs are used to produce a product. Mathematically,

$$Material\ Mix\ Variance = [Standard\ Cost\ of\ Actual\ Quantity\ in\ Standard\ Proportion - Standard\ Cost\ of\ Actual\ Quantity]$$

$$Or$$

$$Std.Price\ (SP) \times \{Revised\ Std.Quantity\ (RSQ) - Actual\ Quantity\ (AQ)\}$$

$$Or$$

$$[(RSQ \times SP) - (AQ \times SP)]$$

The difference between the Actual Quantity in standard proportion and Actual Quantity in actual proportion, at Standard Price

b. Material Yield Variance (Material Sub-usage Variance)

Variance in material consumption which arises due to yield or productivity of the inputs. It may arise due to use of sub- standard quality of materials, inefficiency of workers or due to wrong processing.

$$Material\ Yield\ Variance = [Standard\ Cost\ of\ Standard\ Quantity\ for\ Actual\ Proportion - Standard\ Cost\ of\ Actual\ Quantity]$$

$$Or$$

$$Std.Price\ (SP) \times \{Std.Quantity\ (SQ) - Revised\ Standard\ Quantity\ (RSQ)\}$$

$$Or$$

$$[(SQ \times SP) - (RSQ \times SP)]$$

The difference between the Standard Quantity specified for actual production and Actual Quantity in standard proportion, at Standard Purchase Price

Meaning of the terms used in the formulae:

Term	Meaning

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Standard Quantity (SQ)	Quantity of inputs to be used to produce actual output
Actual Quantity (AQ)	Quantity of inputs actually used to produce actual output.
Revised Standard Quantity (RSQ)	If Actual total quantity of inputs were used in standard proportion.

Labour Cost Variance

Amount paid to employees for their labour is generally known as employee or labour cost. In this chapter labour cost is used to denote employees cost. Labour (employee) cost variance is the difference between actual labour cost and standard cost. Mathematically it can be written as:

$$Labour\ Cost\ Variance\ =\ [Standard\ Cost - Actual\ Cost]$$

$$Or$$

$$[(SH\ \times\ SR) - (AH\ \times\ AR)]$$

The difference between the Standard Labour Cost and the Actual Labour Cost incurred for the production achieveds

Reasons for variance: Difference in labour cost arises either due to difference in the actual labour rate from the standard rate or difference in numbers of hours worked from standard hours. Labour cost variance can be divided into three parts namely (i) Labour Rate Variance (ii) Labour Efficiency Variance and (iii) Labour Idle time Variance

1. Labour Rate Variance

Labour rate variance arises due to difference in actual rate paid from standard rate. It is very similar to material price variance. It is calculated as below:

$$Labour\ Rate\ Variance\ =\ [Standard\ Cost\ of\ Actual\ Time - Actual\ Cost]$$

$$Or$$

$$Actual\ Hours\ (AH)\ \times\ \{Std.Rate\ (SR) - Actual\ Rate\ (AR)\}$$

$$Or$$

$$[(SR\ \times\ AH) - (AR\ \times\ AH)]$$

The difference between the Standard Rate per hour and Actual Rate per hour for the Actual Hours paid

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Responsibility for labour rate variance: Generally, labour rates are influenced by the external factors which are beyond the control of the organisation. However, personnel manager is responsible for labour rate negotiation

2. Labour Efficiency Variance

Labour efficiency variance arises due to deviation in the working hours from the standard working hours

$$Labour\ Efficiency\ Variance\ =$$

$$[Standard\ Cost\ of\ Standard\ Time\ for\ Actual\ Production - Standard\ Cost\ of\ Actual\ Time]$$

$$Or$$

$$Std.Rate\ (SR)\ \times \{Std.Hours\ (SH) - Actual\ Hours\ (AH)\}$$

$$Or$$

$$[(SH\ \times\ SR) - (AH\ \times\ SR)]$$

The difference between the Standard Hours specified for actual production and Actual Hours worked at Standard Rate

Responsibility for labour efficiency variance: Efficiency variance may arise due to ability of the workers, inappropriate team of workers, inefficiency of production manager or foreman etc. However, production manager or foreman can be held responsible for the adverse variance which otherwise can be controlled.

Labour efficiency variance is further divided into the following variances:

- Labour Mix Variance or Gang variance
- Labour Yield Variance (or Labour Revised-efficiency Variance)

a. Labour Mix Variance

Labour efficiency variance which arises due to change in the mix or combination of different skill set i.e. number of skilled workers, semi-skilled workers and un-skilled workers. Mathematically,

$$Labour\ Mix\ Variance\ Or\ Gang\ Variance\ =$$

$$[Standard\ Cost\ of\ Actual\ Time\ Worked\ in\ Standard\ Proportion - Standard\ Cost\ of\ Actual\ Time\ Worked]$$

$$Or$$

$$Std.Rate\ (SR) \times \{Revised\ Std.Hours\ (RSH) - Actual\ HoursWorked(AH)\}$$

$$Or$$

$$[(RSH\ \times\ SR) - (AH\ \times\ SR)]$$

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The difference between the Actual Hours worked in standard proportion and Actual Hours worked in actual proportion, at Standard Rate

b. Labour Yield Variance

Labour efficiency variance which arises due to productivity of workers.

$$Labour\ Yield\ Variance\ Or\ Sub - Efficiency\ Variance$$
$$= [Standard\ Cost\ of\ Standard\ Time\ for\ Actual\ Production - Standard\ Cost\ of\ Actual\ Time\ Worked\ in\ Standard\ Proportion]$$
$$Or$$
$$Std.Rate\ (SR) \times \{Std.Hours\ (SH) - Revised\ Std.Hours\ (RSH)\}$$
$$Or$$
$$[(SH \times SR) - (RSH \times SR)]$$

The difference between the Standard Hours specified for actual production and Actual Hours worked in standard proportion, at Standard Rate

c. Idle Time Variance

It is calculated for the idle hours. It is difference between paid and worked hours. It is calculated as below:

$$Labour\ Idle\ Time\ Variance = [Standard\ Rate\ per\ Hour \times Actual\ Idle\ Hours]$$
$$Or$$
$$Std.Rate\ (SR)\{Actual\ HoursPaid - Actual\ HoursWorked\}$$
$$Or$$
$$[(AH \times SR) - (AH \times SR)]$$

The difference between the Actual Hours paid and Actual Hours worked at Standard Rate

Variable Overheads Cost Variance

Variable overheads consist of expenses other than direct material and direct labour which vary with the level of production. If variable overhead consists of indirect materials, then in this case it varies with the direct material used. On the other hand, if variable overhead is depending on number of hours worked then in this case it will vary with labour hour or machine hours. If nothing is mentioned specifically then we take labour hour as basis.

$$Variable\ Overhead\ Cost\ Variance$$
$$= (Standard\ Variable\ Overheads\ for\ Production - Actual\ Variable\ Overheads$$

Variable overhead cost variance calculation is similar to labour cost variance. Variable overhead cost variance is divided into two parts (i) Variable Overhead Expenditure Variance and (ii) Variable Overhead Efficiency Variance.

1. Variable Overhead Expenditure (Spending) Variance

$$(Standard\ Variable\ Overheads\ for\ Actual\ Hours) - (Actual\ Variable\ Overheads)$$

$$Or$$

$$[(SR - AR) \times AH]$$

$$Or$$

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$$[(SR \times AH) - (AR \times AH)]$$

2. Variable Overhead Efficiency Variance

$$(Standard\ Variable\ Overheads\ for\ Production) - (Standard\ Variable\ Overheads\ for\ Actual\ Hours)$$

$$Or$$

$$[(SH - AH) \times SR]$$

$$Or$$

$$[(SH \times SR) - (AH \times SR)]$$

Meaning of the terms used in the formulae

Term	Meaning
Standard Hours (SH)	Hours required producing actual output
Actual Hours (AH)	Actual Hours taken to produce actual output
Revised Standard Hours (RSH)	If actual labour hours worked were worked by standard mix (combination) of labour.
Actual Yield (AY)	Actual Hours worked
Standard Yield (SY)	Actual hours if labour worked in standard ratio
Standard Labour Cost (SLC)	Standard labour cost for actual output

Fixed Overhead Cost Variance

The recovery of the fixed components of the estimated overheads depends upon capacity utilization.

In case a company produces less than the projected utilization it shall not be able to recover all the budgeted fixed overheads. This unrecovered portion is known as production volume variance.

The other variance is because of variations in actual spending when compared with both estimated fixed and estimated variable overheads. Such a variance is known as Overhead expenses variance.

A. Production Volume Variance

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The term fixed overheads imply that the element of cost does not vary directly in proportion to the output. In other words, fixed overheads do not change within a given range of activity.

However, the unit cost changes even though the fixed overheads are constant in total within the given range of output. So, higher the level of activity, the lower will be the unit cost or vice versa

The management is, therefore, faced with a costing difficulty because it requires a representative rate for charging fixed overheads irrespective of changes in volume of output.

B. Overhead Expenses Variance

the Production Volume Variance analyses the unrecovered fixed overheads. Apart from this, there can be variations in the actual spending of both fixed and variable overheads when compared to what was established as a standard. Such variations can be accounted for by analyzing an overhead expenses variance

The analysis of overhead variances is different from that of material and labour variances. As overhead is the aggregate of indirect materials, indirect labour and indirect expenses, this variance is considered to be a difficult part of variance analysis. It is important to understand that overhead variance is nothing but under or over-absorption of overhead.

Fixed Overhead Cost Variance: Fixed overhead cost variance is the **difference between actual fixed overhead and absorbed fixed overhead**. Fixed overhead variance is divided into two parts (A) Fixed Overhead Expenditure Variance and (B) Fixed Overhead Volume Variance

1. Fixed Overhead Expenditure Variance

This is the difference between the actual fixed overhead incurred and budgeted fixed overhead

$$(Budgeted\ Fixed\ Overheads) - (Actual\ Fixed\ Overheads)$$

$$Or$$

$$(BH\ \times\ SR) - (AH\ \times\ AR)$$

2. Fixed Overhead Volume Variance

Variance in fixed overhead which arise due to the volume of production is called fixed overhead volume variance.

$$(Absorbed\ Fixed\ Overheads) - (Budgeted\ Fixed\ Overheads)$$

$$Or$$

$$(SH\ \times\ SR) - (BH\ \times\ SR)$$

Fixed overhead volume variance is further divided into the three variances

- **Efficiency Variance**

  This is the difference between fixed overhead absorbed and standard fixed overhead

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$$SR\ (SH - AH)$$

$$Or$$

$$(SH \times SR) - (AH \times SR)$$

- **Capacity Variance and**

  This is the difference between standard fixed overhead and budgeted overhead.

$$SR\ (AH - BH)$$

$$Or$$

$$(AH \times SR) - (BH \times SR)$$

- **Calendar Variance**

  This variance arises due to difference in number of actual working days and the standard working days.

$$Std.Fixed\ Overhead\ rate\ per\ day\ (Actual\ no.of\ Working\ days - Budgeted\ Working\ days)$$

Note: When calendar variance is computed, there will be a modification in the capacity variance. In that case revised capacity variance will be calculated and the formula is:

Revised Capacity Variance = (Actual hours – Revised budgeted hours) × Std. fixed rate per hour

Basic terms used in the computation of overhead variance

$$Standard\ overhead\ rate\ (per\ hour) = \frac{Budgeted\ Overhead}{Budgeted\ hours}$$

$$Or$$

$$Standard\ overhead\ rate\ (per\ unit) = \frac{Budgeted\ Overhead}{Budgeted\ Output\ in\ Units}$$

Note: Separate overhead rates will be computed for fixed and variable overheads.

Basic calculations before the computation of overhead variances:

The following basic calculation should be made before computing variances.

1. When overhead rate per hour is used
   a. Standard hours for actual output (SHAO)

$$SHAO = \frac{Budgeted\ Hours}{Budgeted\ Output} \times Actual\ Output$$

   b. $Absorbed\ (or\ Recovered) overhead = Std.hours\ for\ actual\ output \times Std.overhead\ rate\ per\ hour$

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c. $Standard\ overhead\ =\ Actual\ hours\ \times\ Std.overhead\ rate\ per\ hour$
d. $Budgeted\ overhead\ =\ Budgeted\ hours\ \times\ Std.overhead\ rate\ per\ hour$
e. $Actual\ overhead\ =\ Actual\ hours\ \times\ Actual\ overhead\ rate\ per\ hour$

2. When overhead rate per unit is used
   a. Standard output for actual hours (SOAH)

$$SOAH = \frac{Budgeted\ Output}{Budgeted\ Hours} \times Actual\ Hours$$

   b. $Absorbed\ overhead\ =\ Actual\ output\ \times\ Std.overhead\ rate\ per\ unit$
   c. $Standard\ overhead\ =\ Std.output\ for\ actual\ time\ \times\ Std.overhead\ rate\ per\ unit$
   d. $Budgeted\ overhead\ =\ Budgeted\ output\ \times\ Std.overhead\ rate\ per\ unit$
   e. $Actual\ overhead\ =\ Actual\ output\ \times\ Actual\ overhead\ rate\ per\ unit$
   f. $Overhead\ cost\ variance\ =\ Absorbed\ overhead\ -\ Actual\ overhead$
   g. $OCV\ =\ (Std.hours\ for\ actual\ output\ \times\ Std.overhead\ rate) -\ Actual\ overhead$

Advantages & Criticism of Standard Costing

A. Advantages of Standard Costing

- It serves as a basis for measuring operating performance and cost control.
- It aids price fixing. Standard costing can be used to predict costs. Although actual cost may vary from day to day, standard costs will remain stable over a period of time and, where demand for a product is elastic, this information can be used as a basis for fixing the selling price.
- Introduction of standard costing facilitates evaluation of jobs and introduction of incentives
- Standard costing facilitates the estimation of the cost of new products with greater accuracy.
- It serves as a basis for inventory valuation.
- Standard costing is also used for the measurement of profit.
- Standard costing is used in planning, budgeting and decision making. Standard costs being the pre-determined costs, are particularly useful in planning and budgeting
- Standard costing is used in standardisation of products, operations and processes, it improves the overall production efficiency and reduces costs.
- It provides objectives and targets to be achieved by each level of management and defines the responsibilities of departmental managers.
- Standard costing sets a uniform basis for comparison of all elements of costs. Since care is taken in setting standards, the standards become unchanging units of comparison. The standard hour may be used as a basic unit to compare dissimilar products or processes
- The maximum use of working capital, plant facilities and current assets is assured because wastage of materials and loss due to idle time are closely controlled

B. Criticism of Standard Costing

The following are some of the criticism which may be leveled against the standard costing system.

- Variation in price
- Varying levels of output

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- Changing standard of technology
- Attitude of technical people
- Mix of product
- Level of Performance
- Standard costs cannot possibly reflect the true value in exchange
- Fixation of standards may be costly

Illustrations

Illustration - 1

The standard and actual figures of product 'Z' are as under:

Particulars	Standard	Actual
Material quantity	50 units	45 units
Material price per unit	Rs.1.00	Rs.0.80

Calculate material cost variance.

Illustration – 2

NXE Manufacturing Concern furnishes the following information:

Standard	Material for 70 kg finished products	100 kg
	Price of material	Rs.1 per kg
Actual	Output	2,10,000 kg
	Material used	2,80,000 kg
	Cost of Materials	Rs.2,52,000

Calculate:

(a) Material usage variance,

(b) Material price variance,

(c) Material cost variance.

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Illustration – 3

The standard cost of a chemical mixture is as follows:

- 40% material A at Rs.20 per kg.
- 60% material B at Rs.30 per kg.
- A standard loss of 10% of input is expected in production.

The cost records for a period showed the following usage:

- 90 kg material A at a cost of Rs.18 per kg.
- 110 kg material B at a cost of Rs.34 per kg.
- The quantity produced was 182 kg. of good product.

Calculate all material variances.

Illustration – 4

For making 10 kg of CEMCO, the standard material required is:

Material	Quantity	Rate per kg. (Rs.)
A	8	6.00
B	4	4.00

During April 1,000 kg of CEMCO were produced. The actual consumption of materials is as under:

Material	Quantity	Rate per kg. (Rs.)
A	750	7.00
B	500	5.00

Calculate

1. Material Cost Variance;
2. Material Price Variance;
3. Material Usage Variance.

Illustration – 5

The standard mix to produce one unit of product is as follows:

Material X	60 units @ Rs.15 per unit	Rs. 900
Material Y	80 units @ Rs.20 per unit	Rs. 1,600
Material Z	100 units @ Rs.25 per unit	Rs. 2,500
	240 units	**Rs. 5,000**

During the month of April, 10 units were actually produced, and consumption was as follows:

Material X	640 units @ Rs.17.50 per unit	Rs. 11,200
Material Y	950 units @ Rs.18.00 per unit	Rs. 17,100
Material Z	870 units @ Rs.27.50 per unit	Rs. 23,925
	2460 units	**Rs. 52,225**

Calculate all material variances

Illustration - 6

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J.K. Ltd. manufacturers NXE by mixing three raw materials. For every batch of 100 kg of NXE, 125 kg of raw materials are used. In April, 20X2 60 batches were prepared to produce an output of 5,600 kgs of NXE.

The standard and actual particulars of April, 20X2, are as follows:

Raw materials	**Standard**		**Actual**		**Qty of raw material purchased**
	Mix	**Price per kg**	**Mix**	**Price per kg**	
	(%)	**Rs.**	**(%)**	**Rs.**	**(Kg.)**
A	50	20	60	21	5,000
B	30	10	20	8	2,000
C	20	5	20	6	1,200

Calculate all variances.

Illustration - 8

The standard and actual figures of a firm are as under:

Standard time for the job	1,000 hours
Standard rate per hour	Rs.0.50
Actual time taken	900 hours
Actual wages paid	Rs.360

Compute the variances.

Illustration - 9

The standard labour employment and the actual labour engaged in a week for a job are as under:

	Skilled workers	Semi-skilled workers	Unskilled workers
Standard no. of workers in the gang	32	12	6
Actual no. of workers employed	28	18	4
Standard wage per hour	Rs. 3	Rs. 2	Rs. 1
Actual wage rate per hour	Rs. 4	Rs. 3	Rs. 2

During the 40-hour working week, the gang produced 1,800 standard hours of work. Calculate:

1. Labour Cost Variance	(d) Labour Mix Variance
2. Labour Rate Variance	(e) Labour Yield Variance
3. Labour Efficiency Variance	

Illustration - 10

The following standards have been set to manufacture a product:

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Particulars	Amount (Rs.)
Direct Material:	
2 units of A @ Rs. 4 per unit	8.00
3 units of B @ Rs. 3 per unit	9.00
15 units of C @ Rs. 1 per unit	15.00
	32.00
Direct Labour:	
3 hours @ Rs. 8 per hour	24.00
Total standard prime cost	**56.00**

The company manufactured and sold 6,000 units of the product during the year.

Direct material costs were as follows:

Particulars	Rate per unit
12,500 units of A	Rs. 4.4
18,000 units of B	Rs. 2.8
88,500 units of C	Rs. 1.2

The company worked 17,500 direct labour hours during the year. For 2,500 of these hours, the company paid at Rs. 12 per hour while for the remaining, the wages were paid at standard rate.

Calculate materials price variance and usage variance and labour rate and efficiency variances.

Illustration - 11

Following information is available from the records of a factory:

Particulars	Budget	Actual
Fixed overhead for June, 20X2	Rs.10,000	Rs. 12,000
Production in June, 20X2 (units)	2,000	2,100
Standard time per unit (hours)	10	-
Actual hours worked in June	-	21,000

Compute:

1. Fixed overhead cost variance

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2. Expenditure variance
3. Volume variance

Illustration – 12

XYZ Ltd. has furnished you the following information for the month of August, 20X2:

	Budget	Actual	
Output (units)	30,000	32,500	
Hours	30,000	33,000	
Fixed overhead	Rs. 45,000	Rs. 50,000	
Variable overhead	Rs. 60,000	Rs. 68,000	
Working days	25	26	

Calculate all Fixed Overhead Variances:

- FOH cost variance
- FOH expenditure variance
- FOH volume variance
- FOH Capacity, Calendar and Efficiency variances

Illustration - 13

XYZ Company has established the following standards for factory overheads.

Particulars	**Value**
Variable overhead per unit	Rs. 10/-
Fixed overheads per month	Rs. 1,00,000
Capacity of the plant	20,000 units per month
The actual data for the month is as follows:	
Actual overheads incurred	Rs. 3,00,000
Actual output (units)	15,000 units

Required:

Calculate overhead variances viz:

1. Production volume variance
2. Overhead expense variance

Illustration - 14

The overhead expense budget for a factory producing to a capacity of 200 units per month is as follows:

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Description of overhead	Fixed cost per unit in (Rs.)	Variable cost per unit in (Rs.)	Total cost per unit in (Rs.)
Power and fuel	1,000	500	1,500
Repair and maintenance	500	250	750
Printing and stationary	500	250	750
Other overheads	1,000	500	1,500
Total	**3,000**	**1,500**	**4,500**

The factory has actually produced only 100 units in a particular month. Details of over- heads actually incurred have been provided by the accounts department and are as follows:

Description of overhead	Actual cost (Rs.)
Power and fuel	4,00,000
Repair and maintenance	2,00,000
Printing and stationary	1,75,000
Other overheads	3,75,000

You are required to compute

1. Production volume variance
2. Overhead expenses variance.

6.3 Budget and Budgetary Control

Introduction

Budgetary control and standard costing systems are two essential tools frequently used by business executives for the purpose of planning and control. In the case of budgetary control, the entire exercise starts with the setting up of budgets or targets and ends with the taking of an action, in case the actual figures differ with the budgetary ones.

Meaning of Budget and Budgeting

1. Budget

CIMA Official Terminology has defined the terms 'budget' as "Quantitative expression of a plan for a defined period of time. It may include planned sales volumes and revenues; resource quantities, costs and expenses; assets, liabilities and cash flows."

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2. **Budgeting**

Itis a means of coordinating the combined intelligence of an entire organisation into a plan of action based on past performance and governed by rational judgment of factors that will influence the course of business in the future. It is a pre-determined detailed plan of actions developed and distributed as a guide to current operation and as a partial basis for subsequent evaluation of performance. The budget system is both a 'Plan' as well as 'Control' and therefore it also includes within its broad scope 'Budgetary Control'.

Budgetary Control system includes –

- Preparation of budgets
- Co-ordination between the departments and establishing the responsibilities
- Comparison of actual performance with that of budget and acting upon results to achieve maximum profitability.

A budget is therefore a formal expression of policies, plans, objectives and goals laid down in advance by top management for the undertaking as whole and for every sub-division thereof.

Characteristics of Budget

The main characteristics of budget are

- A budget is concerned for a definite future period.
- A budget is a written document.
- A budget is a detailed plan of all the economic activities of a business.
- All the departments of a business unit co-operate for the preparation of a business budget.
- Budget is a mean to achieve business and it is not an end in itself.
- Budget needs to be updated, corrected and controlled every time when circumstances change. Therefore, it is a continuous process.
- Budget helps in planning, coordination and control.
- Different types of budgets are prepared by industries according to business requirements.
- A budget acts a business barometer.
- Budget is usually prepared in the light of past experiences.
- Budget is a constant endeavor of the Management

Objectives of Budgeting

1. **Planning**

The process of budgeting begins with the establishment of specific targets of performance and is followed by executing plans to achieve such desired goals and from time to time comparing actual results with the target goals. These targets include both the overall business targets as well as the specific targets for the individual units within the business. Establishing specific targets for future operations is part of the planning function of management, while executing actions to meet the goals is the directing function of management.

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- Budget plans are made in synchronization with the overall objectives of the organisation, keeping mission and corporate strategy into account. Individual plans at unit level should be in consonance with organisational plan.
- Budgets reflect plans and that planning should have taken place before budgets are prepared.
- Budgets plans are quantified, and responsibility is assigned to the persons who are responsible for execution of plan.
- Using the budget to communicate these expectations throughout the organisation has helped many a company to reduce expenses during a severe business recession.
- Planning not only motivates employees to attain goals but also improves overall decision making.

2. **Directing and Coordinating**
    - Once the budget plans are in place, they can be used to direct and coordinate operations in order to achieve the stated targets
    - A business, however, is much more complex and requires more formal direction and coordination
    - The budget is one way to direct and coordinate business activities and units to achieve stated targets of performance.
    - The budgetary units of an organisation are called responsibility centers. Each responsibility center is led by a manager who has the authority over and responsibility for the unit's performance.
    - Objectives and degree of performance expected from a responsibility centres are communicated rapidly.
3. **Controlling**
    - As time passes, the actual performance of an operation can be compared against the planned targets. This provides prompt feedback to employees about their performance. If necessary, employees can use such feedback to adjust their activities in the future.
    - Feedback received in the form of budget report from the responsibility centre. This report is helpful to know the performance of the concerned unit.
    - Any unexpected changes into the conditions which were prevailing at the time of preparing budget are taken into account and budgets are revised to show true performance yardstick.
    - Comparing actual results to the plan also helps prevent unplanned expenditures. The budget encourages employees to establish their spending priorities.

Advantages

- To smoothen seasonal variations in production and sales.
- To co-ordinate the activities of various divisions/ departments as per company policies.
- To establish divisional and departmental responsibilities.
- To forecast operating activities and financial position.
- To provide a method of measurement of operational efficiency.
- To aid for better use of infrastructural facilities.
- To centralise control and decentralise operational responsibilities.
- To reveal variations of actual performance from budgetary performance through a process of "Management by exception".

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Disadvantages

- Budgets may or may not be true, as they are based on estimates.
- Budgets are considered as rigid documents.
- Budgets cannot be executed automatically.
- Staff co-operation is usually not available during budgetary control exercise.
- Its implementation is quite expensive.

Meaning of Budgetary Control

CIMA has defined the terms 'budgetary control' as "Budgetary control is the establishment of budgets relating to the responsibilities of executives of a policy and the continuous comparison of the actual with the budgeted results, either to secure by individual action the objective of the policy or to provide a basis for its revision. "It is the system of management control and accounting in which all the operations are forecasted and planned in advance to the extent possible and the actual results compared with the forecasted and planned ones.

Budgetary Control involves

- Establishment of budgets
- Continuous comparison of actual with budgets for achievement of targets
- Revision of budgets after considering changed circumstances
- Placing the responsibility for failure to achieve the budget targets.

Objectives of Budgetary Control System

- Portraying with precision the overall aims of the business and determining targets of performance for each section or department of the business
- Laying down the responsibilities of each of the executives and other personnel so that everyone knows what is expected of him and how he will be judged. Budgetary control is one of the few ways in which an objective assessment of executives or department is possible.
- Providing a basis for the comparison of actual performance with the predetermined targets and investigation of deviation, if any, of actual performance and expenses from the budgeted figures. This naturally helps in adopting corrective measures
- Ensuring the best use of all available resources to maximise profit or production, subject to the limiting factors. Since budgets cannot be properly drawn up without considering all aspects usually there is good co-ordination when a system of budgetary control operates
- Co-ordinating the various activities of the business, and centralising control and yet enabling management to decentralise responsibility and delegate authority in the overall interest of the business.
- Engendering a spirit of careful forethought, assessment of what is possible and an attempt at it. It leads to dynamism without recklessness. Of course, much depends on the objectives of the firm and the vigor of its management.
- Providing a basis for revision of current and future policies.
- Drawing up long range plans with a fair measure of accuracy.
- Providing a yardstick against which actual results can be compared.

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Working of Budgetary Control System

The responsibility for successfully introducing and implementing a Budgetary Control System rests with the Budget Committee acting through the Budget Officer. The Budget Committee would be composed of all functional heads and a member from the Board to preside over and guide the deliberations.

The main responsibilities of the Budget Officer are

- to assist in the preparation of the various budgets by coordinating the work of the accounts department which is normally responsible to compile the budgets—with the relevant functional departments like Sales, Production, Plant maintenance etc.;
- to forward the budget to the individuals who are responsible to adhere to them, and to guide them in overcoming any practical difficulties in its working; to prepare the periodical budget reports for circulation to the individuals concerned;
- to follow-up action to be taken on the budget reports;
- to prepare an overall budget working report for discussion at the Budget Committee meetings and to ensure follow-up on the lines of action suggested by the Committee;
- To prepare periodical reports for the Board meeting. Comparing the budgeted Profit and Loss Account and the Balance Sheet with the actual results attained. It is necessary that every budget should be thoroughly discussed with the functional head before it is finalized. It is the duty of the Budget Officer to see that the periodical budget reports are supplied to the recipients at frequent intervals as far as possible.

Advantages of Budgetary Control

Points	Description
Efficiency	The use of budgetary control system enables the management of a business concern to conduct its business activities in the efficient manner.
Control on expenditure	It is a powerful instrument used by business houses for the control of their expenditure. It in fact provide1`s a yardstick for measuring and evaluating the performance of individuals and their departments.
Finding deviations	It reveals the deviations to management, from the budgeted

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	figures after making a comparison with actual figures.
Effective utilization of resources	Effective utilization of various resources like—men, material, machinery and money—is made possible, as the production is planned after taking them into account
Revision of plans	It helps in the review of current trends and framing of future policies.
Implementation of Standard Costing system	It creates suitable conditions for the implementation of standard costing system in a business organisation.
Cost Consciousness	Budgets are studied by outside fund providers also such as banking and financial institutions, realizing that management encourages cost consciousness and maximum utilization of available resources.
Credit Rating	Management which have developed a well-ordered budget plans and which operate accordingly, receive greater favor from credit agencies

Limitations of Budgetary Control

Points	Description
Based on Estimates	Budgets are based on series of estimates which are based on the conditions prevailed or expected at the time budget is established. It requires revision in plan if conditions change

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Time factor	Budgets cannot be executed automatically. Some preliminary steps are required to be accomplished before budgets are implemented. It requires proper attention and time of management. Management must not expect too much during the development period.
Co-operation Required	Staff co-operation is usually not available during budgetary control exercise. In a decentralized organisation each unit has its own objective and these units enjoy some degree of discretion. The success of the budgetary control depends upon willing co-operation and teamwork,
Expensive	Its implementation is quite expensive. For successful implementation of the budgetary control proper organisation structure with responsibility is prerequisite.
Not a substitute for management	Budget is only a managerial tool and must be applied correctly for management to get benefited. Budgets are not a substitute for management.
Rigid document	Budgets are considered as rigid document. But in reality, an organisation is exposed to various uncertain internal and external factors. Budget should be flexible enough to incorporate ongoing developments in the internal and external factors

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Components of Budgetary Control

The policy of a business for a defined period is represented by the master budget the details of which are given in a number of individual budgets called functional budgets. These functional budgets are broadly grouped under the following heads:

1. Physical budgets

Those budgets which contain information in terms of physical units about sales, production etc. for example, quantity of sales, quantity of production, inventories, and manpower budgets are physical budgets.

2. Cost budgets

Budgets which provides cost information in respect of manufacturing, selling, administration etc. for example, manufacturing costs, selling costs, administration cost, and research and development cost budgets are cost budgets.

3. Profit budgets

A budget which enables in the ascertainment of profit, for example, sales budget, profit and loss budget, etc.

4. Financial budgets

A budget which facilitates in ascertaining the financial position of a concern, for example, cash budgets, capital expenditure budget, budgeted balance sheet etc.

Preparation of Budget

Definition of objectives

A budget being a plan for the achievement of certain operational objectives, it is desirable that the same are defined precisely. The objectives should be written out; the areas of control demarcated; and items of revenue and expenditure to be covered by the budget stated. This will give a clear understanding of the plan and its scope to all those who must cooperate to make it a success

Location of the key (or budget) factor

There is usually one factor (sometimes there may be more than one) which sets a limit to the total activity. For instance, in India today sometimes non-availability of power does not allow production to increase inspite of heavy demand. Similarly, lack of demand may limit production. Such a factor is known as key factor. For proper budgeting, it must be located and estimated properly.

Appointment of controller

Formulation of a budget usually required whole time services of a senior executive; he must be assisted in this work by a Budget Committee, consisting of all the heads of department along with the Managing Director as the Chairman. The Controller is responsible for coordinating and development of budget programmes and preparing the manual of instruction, known as Budget manual.

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Budget Manual

Effective budgetary planning relies on the provision of adequate information to the individuals involved in the planning process. Many of these information needs are contained in the budget manual. A budget manual is a collection of documents that contains key information for those involved in the planning process.

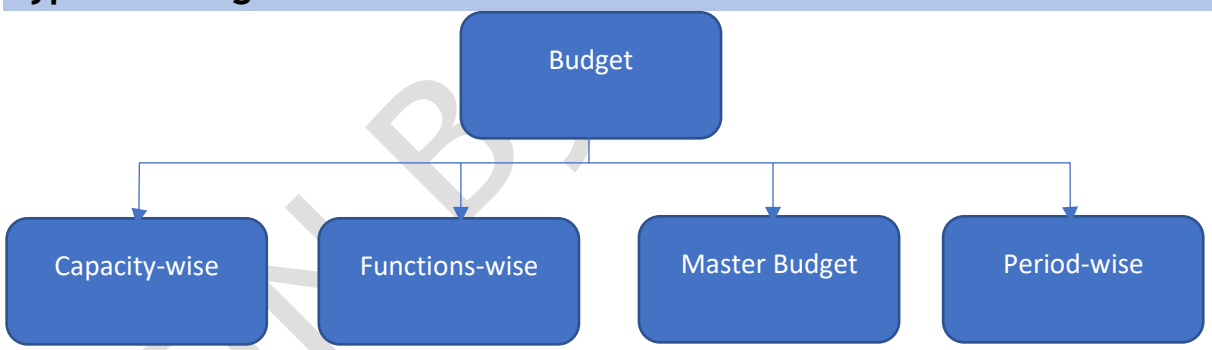
Budget period

The period covered by a budget is known as budget period. There is no general rule governing the selection of the budget period. In practice the Budget Committee determines the length of the budget period suitable for the business. Normally, a calendar year or a period co-terminus with the financial year is adopted.

Standard of activity or output

For preparing budgets for the future, past statistics cannot be completely relied upon, for the past usually represents a combination of good and bad factors. Therefore, though results of the past should be studied but these should only be applied when there is a likelihood of similar conditions repeating in the future. Also, while setting the targets for the future, it must be remembered that in a progressive business, the achievement of a year must exceed those of earlier years. Therefore, what was good in the past is only fair for the current year.

Types of Budget



Capacity-wise

1. **Fixed Budget**

According to CIMA, "a fixed budget, is a budget designed to remain unchanged irrespective of the level of activity actually attained". A fixed budget shows the expected results of a responsibility center for only one activity level.

Once the budget has been determined, it is not changed, even if the activity changes. Fixed budgeting is used by many service companies and for some administrative functions of

manufacturing companies, such as purchasing, engineering, and accounting. Fixed Budget is used as an effective tool of cost control.

In case, the level of activity attained is different from the level of activity for budgeting purposes, the fixed budget becomes ineffective. Such a budget is quite suitable for fixed expenses. It is also known as a static budget.

Merits

- Very simple to understand
- Less time consuming

Demerits

- It is misleading. A poor performance may remain undetected and a good performance may go unrealised
- It is not suitable for long period
- It is also found unsuitable particularly when the business conditions are changing constantly
- Accurate estimates are not possible
-

2. **Flexible Budget**

According to CIMA, "a flexible budget is defined as a budget, which, by recognizing the difference between fixed, semi-variable and variable costs is designed to change in relation to the level of activity attained." Unlike static(fixed) budgets, flexible budgets show the expected results of a responsibility center for different activity levels. In case if some costs are of semi-variable in nature, then it is properly segregated into variable and fixed elements. This makes Comparison more meaningful.

Merits

- With the help of flexible budget, the sales, costs and profit may be calculated easily by the business at various levels of production capacity
- In flexible budget, adjustment is very simple according to change in business conditions
- It also helps in determination of production level as it shows budgeted costs with classification at various levels of activity along with sales. Hence the management can easily select the level of production which shows the profit predetermined by the owners of the business
- It also shows the quantity of product to be produced to earn determined profit.

Demerits

- The formulation of flexible budget is possible only when there is proper accounting system maintained, perfect knowledge about the factors of production and various business circumstances is available.
- Flexible Budget also requires the system of standard costing in business
- It is very expensive and labour oriented

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Difference between Fixed and Flexible Budgets

Sl. No	Fixed Budget	Flexible Budget
1.	It does not change with actual volume of activity achieved. Thus, it is known as rigid or inflexible budget	It can be re-casted on the basis of activity level to be achieved. Thus, it is not rigid
2.	It operates on one level of activity and under one set of conditions. It assumes that there will be no change in the prevailing conditions, which is unrealistic	It consists of various budgets for different levels of activity
3.	Here as all costs like - fixed, variable and semi-variable are related to only one level of activity so variance analysis does not give useful information.	Here analysis of variance provides useful information as each cost is analysed according to its behaviour
4.	If the budgeted and actual activity levels differ significantly, then the aspects like cost ascertainment and price fixation do not give a correct picture.	Flexible budgeting at different levels of activity facilitates the ascertainment of cost, fixation of selling price and tendering of Quotations.
5.	Comparison of actual performance with budgeted targets will be meaningless specially when there is a difference between the two activity levels	It provides a meaningful basis of comparison of the actual performance with the budgeted targets

Function-wise

1. Sales Budgets

Sales forecast is the commencement of budgeting and hence sales budget assumes primary importance. The quantity which can be sold may be the principal budget factor in many business undertakings. In any case in order to chalk out a realistic budget programme, there must be an accurate sales forecast.

It indicates

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- the quantity of estimated sales and
- the expected unit selling price. These data are often reported by regions or by sales representatives

Once an estimate of the sales volume is obtained, the expected sales revenue can be determined by multiplying the volume by the expected unit sales price. The sales budget represents the total sales in physical quantities and values for a future budget period.

The purposes of sales budget are not to attempt to estimate or guess what the actual sales will be, but rather to develop a plan with clearly defined objectives towards which the operational effort is directed in order to attain or exceed the objective. Hence, sales budget is not merely a sales forecast. The sales budget may be prepared under the following classification or combination of classifications:

- Products or groups of products
- Areas, towns, salesmen and agents
- Types of customers as for example: (i) Government, (ii) Export, (iii) Home sales, (iv) Retail depots
- Period—months, weeks, etc.

2. Production budget

Production budget shows the production for the budget period based upon:

- Sales budget
- Production capacity of the factory,
- Planned increase or decrease in finished stocks, and
- Policy governing outside purchase

Production budget is normally stated in units of output. Production should be carefully coordinated with the sales budget to ensure that production and sales are kept in balance during the period. The number of units to be manufactured to meet budgeted sales and inventory needs for each product is set forth in the production budget

Production budget can, therefore, show

- stabilized production every month, say, the maximum possible production or
- stabilized minimum quantity of stocks which will reduce inventory costs.
- In the case of stabilized production, the production facility will be fully utilized but the inventory carrying costs will vary according to stocks held. In the case of stabilized stocks method, however, the inventory carrying will be the lowest but there may be under utilization of capacity

3. Plant utilisation budget

Plant utilisation budget represents, in terms of working hours, weight or other convenient units of plant facilities required to carry out the programme laid down in the production budget

The main purposes of this budget are

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- To determine the load on each process, cost or groups of machines for the budget period.
- To indicate the processes or cost centres which are overloaded so that corrective action may be taken such as: (i) working overtime (ii) subcontracting (iii) expansion of production facility, etc.
- To dovetail the sales production budgets where it is not possible to increase the capacity of any of the overloaded processes.
- Where surplus capacity is available in any of the processes, to make effort to boost sales to utilise the surplus capacity
-

4. Direct-material usage budget

The steps involved in the compilation of direct materials usage budget are as under:

- The quality standards for each item of material have to be specified. In this connection, standardisation of size, quality, color, etc., may be considered
- Standard requirement of each item of materials required should also be set. While setting the standard quality consideration should be given to normal loss in process. The standard allowance for normal loss may be given on the basis of past performance, test runs, technical estimates etc.
- Standard prices for each item of materials should be set after giving consideration to stock and contracts entered into.

After setting standards for quality, quantity and prices, the direct materials budget can be prepared by multiplying each item of material required for the production by the standard price

5. Direct-material purchase budget

The production budget is the starting point for determining the estimated quantities of direct materials to be purchased. Multiplying these quantities by the expected unit purchase price determines the total cost of direct materials to be purchased.

Two important considerations that govern purchase budgets are as follows:

- Economic order quantity.
- Re-order point with safety stocks to cover fluctuations in demand.

The direct material purchases budget helps management maintain inventory levels within reasonable limits, for this purpose, the timing of the direct materials purchases should he coordinated between the purchasing and production departments

6. Direct-labour (personnel) budget

Once sales budget and Production budget are compiled and thereafter plant utilisation budget is settled, detailed amount of the various machine operations involved, and services required can be arrived at. This will facilitate preparation of an estimate of different grades of labour required. From this the standard hours required to be worked can be prepared. The total

labour complement thus budgeted can be divided into direct and indirect. Standard rates of wages for each grade of labour can be introduced and then the direct and indirect labour cost

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budget can be prepared.

Advantages

- It defines the direct and indirect labour force required
- It enables the personnel department to plan ahead in recruitment and training of workers so that labour turnover can be reduced to the minimum
- It reveals the labour cost to be incurred in the manufacture, to facilitate preparation of manufacturing cost budgets and cash budgets for financing the wage bill

7. Production or Factory Overhead Budget

Production overheads consist of all items such as indirect materials, indirect labour and indirect expenses. Indirect expenses include power, fuel, fringe benefits, depreciation etc. These estimated factory overhead costs necessary for production make up the factory overhead cost budget. This budget usually includes the total estimated cost for each item of factory overhead

The production overhead budget is useful for working out the pre-determined over-head recovery rates. A business may prepare supporting departmental schedules, in which the

factory overhead costs are separated into their fixed and variable cost elements. Such schedules enable department managers to direct their attention to those costs for which they are responsible and to evaluate performance. A careful study and determination of the behaviour of different types of costs will be essential in preparation of overhead budget.

8. Production cost budget

Production cost budget covers direct material cost, direct labour cost and manufacturing expenses. After preparing direct material, direct labour and production overhead cost budget, one can prepare production cost budget

9. Ending-inventory budget

This budget shows the cost of closing stock of raw materials and finished goods, etc. This information is required to prepare cost-of-goods-sold budget and budgeted financial statements i.e., budgeted income statement and budgeted balance sheet.

10. Cost of Goods Sold Budget

This budget covers direct material cost, direct labour cost, manufacturing expenses and cost of ending inventory of finished products…

11. Selling and Distribution Cost Budget

Selling and distribution are indispensable aspects of the profit earning function. At the same time, the pre-determination of these costs is also very difficult. Selling cost is defined as the cost of seeking to create and stimulate demand and of securing orders. These costs are, therefore, incurred to maintain and increase the level of sales. All expenses connected with advertising, sales

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promotion, sales office, salesmen, credit collection, market research, after sales service, etc. are generally grouped together to form part of the responsibility of the sales manager

While making a budget, selling costs are divided into fixed and variable. Semi variable costs should also be separated into variable and fixed elements.

Distribution cost has been defined as the cost of the sequence of operations which begins with making the packet of product available for dispatch and ends with making the re-conditioned return of empty package, if any available for re-use. It includes transport cost, storage and warehousing costs, etc.

12. Administrative expenses Budget

The administrative expenses are mostly policy costs and are, therefore, fixed in nature. The most practical method to follow in preparing estimate of these expenses is to follow the past experience with due regard to anticipated changes either in general policy or the volume of business. To bring such expenses under control, it is necessary to review them frequently and to determine at regular intervals whether or not these expenses continue to be adjusted. Examples of such expenses are audit fees, depreciation of office equipment, insurance, subscriptions, postage, stationery, telephone, telegrams, office supplies, etc.

13. Research and Development expense Budget

Research is required in order to develop and/or improve products and methods. When research results in definite benefit to the company, development function begins. After development, formal production can commence on commercial scale and then production function starts. Since the areas of research and development cannot be precisely defined, the costs incurred under both the functions are clubbed together as research and development costs. Research and Development (R & D) plays a vital role in maintaining the business. For example, automobile manufacturers, and those who produce drugs, spend considerable sums on R & D to improve the products.

Research may be either pure research or applied research. Pure research increases knowledge whereas applied research aims at producing definite results like improved methods of production, etc.

Research and development expenses should be controlled carefully and hence a limit on the spending is placed, i.e., the amount to be spent is carefully determined or allocated.

Methods of allocation of R &D Expenses

- A percentage based on total sales value. This method is good if sales value is steady from year to year
- A percentage based on net profit
- A total sum is estimated on the basis of past experience and future R & D plans and policies
- A sum is fixed on the basis of cash resources available with the company

14. Capital expenditure Budget

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The capital expenditure budget represents the planned outlay on fixed assets like land, building, plant and machinery, etc. during the budget period. This budget is subject to strict management control because it entails large amount of expenditure. The budget is prepared to cover a long period of years and it projects the capital costs over the period in which the expenditure is to be incurred and the expected earnings.

The preparation of this budget is based on the following considerations

- Overhead on production facilities of certain departments as indicated by the plant utilisation budget
- Future development plans to increase output by expansion of plant facilities
- Replacement requests from the concerned departments
- Factors like sales potential to absorb the increased output, possibility of price reductions, increased costs of advertising and sales promotion to absorb increased output, etc.

Merits

- It outlines the capital development programme and estimated capital expenditure during the budget period
- It enables the company to establish a system of priorities. When there is a shortage of funds, capital rationing becomes necessary
- It serves as a tool for controlling expenditure
- It provides the amount of expenditure to be incorporated in the future budget summaries for calculation of estimated return on capital employed
- This enables the cash budget to be completed. With other cash commitments capital expenditure commitment should also be considered for the completion of the budget
- It facilitates cost reduction programme, particularly when modernization and renovation is covered by this budget.

15. Cash Budget

Cash budget represents the cash requirements of the business during the budget period. It is the plan of receipts and payments of cash for the budget period, analysed to show the monthly flow of cash drawn up in such a way that the balance can be forecasted at regular intervals

The cash budgets one of the most important elements of the budgeted balance sheet. Information from the various operating budgets, such as the sales budget, the direct materials purchases budget, and the selling and administrative expenses budget, affects the cash budget. In addition, the capital expenditures budget, dividend policies, and plans for equity or long-term debt financing also affect the cash budget.

16. Master Budget

When all the necessary functional budgets have been prepared, the budget officer will prepare the master budget which may consist of budgeted profit and loss account and budgeted balance sheet. These are in fact the budget summaries

- When the master budget is approved by the board of directors, it represents a standard for the achievement of which all the departments will work.

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- On the basis of the various budgets (schedules) prepared earlier in this study, we prepare below budgeted income statement and budgeted balance sheet.

Period-wise

These types of Budgets are classified on the basis of time periods. These types of budgets reflect the planning period of the organisation.

1. Long term Budget

The Budgets are prepared to depict long term planning of the business. The period of long-term Budgets varies between three to ten years. These budgets are useful for those industries where gestation period is long i.e., machinery, electricity etc.

2. Short term Budget

These budgets are generally for one or two years and are in the form of monetary terms. The consumer's good industries like Sugar, Cotton, and textile use short term budgets

3. Current Budgets

The period of current budgets is generally of months and weeks. These budgets relate to the current activities of the business. According to CIMA London "Current budget is a budget which is created which is established for use over a short period of time and is related to current conditions

Zero Based Budgeting (ZBB)

Zero-based Budgeting (ZBB) is an emergent form of budgeting which arises to overcome the limitations of incremental (traditional) budgeting system. Zero- based Budgeting (ZBB) is defined as 'a method of budgeting which requires each cost element to be specifically justified, although the activities to which the budget relates are being undertaken for the first time, without approval, the budget allowance is zero'.

ZBB is an activity-based budgeting system where budgets are prepared for each activity rather than functional department. Justification in the form of cost benefits for the activity is required to be given. The activities are then evaluated and prioritized by the management on the basis of factors like synchronization with organisational objectives, availability of funds, regulatory requirement etc.

ZBB is suitable for both corporate and non-corporate entities. In case of non-corporate entities like Government department, local bodies, not for profit organisations, where these entities need to justify the benefits of expenditures on social programmes like mid-day meal, installation of streetlights, provision of drinking water etc.

Stages of Zero – based budgeting

ZBB involves the following stages

1. Identification and description of Decision packages

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Decision packages are the programmes or activities for which decision is required to be taken. The programmes or activities are described for technical specifications, financial impact in the form of cost benefit analysis and other issues like environmental, regulatory, social etc.

2. Evaluation of Decision packages

Once Decision packages are identified and described, it is evaluated against factors like synchronisation with organisational objectives, availability of funds, regulatory requirement etc.

3. Ranking (Prioritization) of the Decision packages

After evaluation of the decision packages, it is ranked on the basis priority of the activities. Because of this prioritization feature ZBB is also known as Priority-based Budgeting

4. Allocation of resources

After ranking of the decision packages, resources are allocated for decision packages. Budgets are prepared like it is done first time without taking reference to previous budgets.

Advantages of Zero-based costing

The advantages of zero-based budgeting are as follows:

- It provides a systematic approach for the evaluation of different activities and rank them in order of preference for the allocation of scarce resources
- It ensures that the various functions undertaken by the organisation are critical for the achievement of its objectives and are being performed in the best possible way.
- It provides an opportunity to the management to allocate resources for various activities only after having a thorough cost-benefit-analysis. The chances of arbitrary cuts and enhancement are thus avoided
- The areas of wasteful expenditure can be easily identified and eliminated
- Departmental budgets are closely linked with corporation objectives.
- The technique can also be used for the introduction and implementation of the system of management by objective.' Thus, it cannot only be used for fulfillment of the objectives of traditional budgeting, but it can also be used for a variety of other purposes

Zero based budgeting is superior to traditional budgeting

Zero based budgeting is superior to traditional budgeting in the following manner:

- It provides a systematic approach for evaluation of different activities.
- It ensures that the function undertaken are critical for the achievement of the objectives
- It provides an opportunity for management to allocate resources to various activities after a thorough – cost benefit analysis.
- It helps in the identification of wasteful expenditure and then their elimination. If facilitates the close linkage of departmental budgets with corporate objectives
- It helps in the introduction of a system of Management by Objectives.

Difference between Traditional Budgeting and Zero-based budgeting

Following are the points of difference between traditional budgeting and zero-based budgeting:

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- Traditional budgeting is accounting oriented. Main stress happens to be on previous level of expenditure. Zero-based budgeting makes a decision-oriented approach. It is very rational in nature and requires all programmes, old and new, to compete for scarce resources
- In traditional budgeting, first reference is made to past level of spending and then demand for inflation and new programmes. In zero- based budgeting, management focuses attention to only on decision packages, which enjoy priority to others.
- In tradition budgeting, some managers deliberately inflate their budget request so that after the cuts they still get what they want. In zero-based budgeting, a rationale analysis of budget proposals is attempted. The managers, who unnecessarily try to inflate the budget request, are likely to be caught and exposed. Management accords its approval only to a carefully devised result-oriented package.
- Traditional budgeting is not as clear and as responsive as zero-base-budgeting
- In traditional budgeting, it's for top management to decide why a particular amount should be spent on a particular decision unit. In Zero-based budgeting, this responsibility is shifted from top management to the manager of decision unit.
- Traditional budgeting makes a routine approach. Zero-based budgeting makes a very straightforward approach and immediately spotlights the decision packages enjoying priority over others

Limitations of Zero-based Budgeting

- The work involves in the creation of decision-making and their subsequent ranking has to be made on the basis of new data. This process is very tedious to management.
- The activity selected for the purpose of ZBB are on the basis of the traditional functional departments. So, the consideration scheme may not be implemented properly.

Performance Budgeting

Performance Budgeting provide a meaningful relationship between estimated inputs and expected outputs as an integral part of the budgeting system. 'A performance budget is one which presents the purposes and objectives for which funds are required, the costs of the programmes proposed for achieving those objectives, and quantities data measuring the accomplishments and work performed under each programme. Thus, PB is a technique of presenting budgets for costs and revenues in terms of functions. Programmes and activities are correlating the physical and financial aspect of the individual items comprising the budget.

Traditional budgeting vs. Performance budgeting

- The traditional budgeting gives more emphasis on the financial aspect than the physical aspects or performance. PB aims at establishing a relationship between the inputs and the outputs
- Traditional budgets are generally prepared with the main basis towards the objects or items of expenditure i.e. it highlights the items of expenditure, namely, salaries, stores and materials, rates, rents and taxes and so on. In the PB emphasis is more on the functions of the organisation, the programmes to discharge these functions and the activities which will be involved in undertaking these programmes

Steps in Performance Budgeting

According to the Administrative Reforms Commission (ARC) the following steps are the basic ones in PB:

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- Establishing a meaningful functional programme and activity classification of government operations;
- Bring the system of accounting and financial management in accord with this classification
- Evolving suitable norms, yardsticks, work units of performance and units' costs, wherever possible under each programme and activity for their reporting and evaluation

The Report of the ARC use the following terms in an integrated sequence:



The team 'function' is used in the sense of 'objective'. For achieving objective 'programmes' will have to be evolved. In respect of time horizon, it is essentially replacement of traditional annual fiscal budgeting by a more output-oriented, but still an annual, exercise.

Performance Reporting at various levels of management

Report: A major part of the management account's job consists of preparing reports to provide information for purposes of control and planning: The important consideration in drawing up of reports and determining their scope are the following

Significance: Are the facts in the reports reliable? Does it either called for action or demonstrate the effect of action? It is material enough

Timeliness: How small should be an inaccuracy which does not alter the significance of the information?

Appropriateness: Is the recipient the right person to take any action that is needed? Is there any other information which is required to support the information to anyone else jointly interested?

Discrimination: Will anything be lost by omitting the item? Will any of the items gain from the omission? Is the responsibility for suppressing the item acceptable?

Presentation: Is the report clear and unbiased? Is the form of it is suitable to the subject? Is the form of it suitable to the recipient?

The following are certain types of reports which are to be prepared and submitted to management regularly at predetermined time interval:

1. **Top Management**
   - Balance Sheet
   - Profit & Loss Statement
   - Position of stocks
   - Disposition of funds or working capital;
   - Capital expenditure & forward commitments together with progress of projects in hands;
   - Cash-flow statements;

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- Sales, production, and other appropriate statistics

2. **Sales Management**
   - Actual sales compared with budgeted sales to measure performance by:
     - Products,
     - Territories
     - Individual salesmen, and
     - Customers
   - Standard profit and loss by product
     - For fixing selling prices, and
     - To concentrate on sales of most profitable products.
   - Selling expenses in relation to budget and sales value analysed by:
     - Products,
     - Territories
     - Individual salesmen, and
     - Customers
   - Bad debts and accounts which are slow and difficult in collection.
   - Status reports on new or doubtful customers.
3. **Production Management**
   - To Buyer: Price variations on purchases analysed by commodities
   - To Foreman:
     - Operational efficiency for individual operators duly summarized as departmental average;
     - Labour utilization report and causes of lost time and controllable time;
     - Indirect shop expenses against the standard allowed; and
     - Scrap report.
   - To Works Managers
     - Departmental operating statement;
     - General works operating statements (Expenses relating to all works expenses not directly allocable or controllable by departments);
     - Plant utilization report;
     - Department Scrap report; and
     - Material usage report.
4. **Special Reports**

   These reports may be prepared at the request of general management or at the initiative of the management accountant. The necessity for them may, in some cases, arise on account of the need for more detailed information on matters of interest first revealed; by the routine, reports. These reports may range over a very wide area. Some of the matters in respect of which such reports may be required can be:
   - Taxation legislation and its effect on profits.
   - Estimates of the earning capacity of a new project.
   - Break-even analysis
   - Replacement of capital equipment.
   - Special pricing analysis
   - Make or buy certain components
   - Statement of surplus available for payment of bonus under the labour appellate tribunal formula.

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Budget Ratio

These ratios provide information about the performance level, i.e., the extent of deviation of actual performance from the budgeted performance and whether the actual performance is favorable or unfavorable. If the ratio is 100% or more, the performance is considered as favorable and if ratio is less than 100% the performance is considered as unfavorable.

The following ratios are usually used by the management to measure development from budget

Capacity Usage Ratio

This relationship between the budgeted number of working hours and the maximum possible number of working hours in a budget period.

Standard Capacity Employed Ratio

This ratio indicates the extent to which facilities were actually utilized during the budget period

Level of Activity Ratio

This may be defined as the number of standard hours equivalent to work produced expressed as a percentage of the budget of standard hours.

Efficiency Ratio

This ratio may be defined as standard hours equivalent of work produced expressed as a percentage of the actual hours spent in producing the work.

Calendar Ratio

This ratio may be defined as the relationship between the number of working days in a period and the number of working as in the relative budget period.

Budget Ratios

1. $Efficiency\ Ratio\ = \frac{Standard\ Hours}{Actual\ Hours} \times 100$
2. $Activity\ Ratio = \frac{Standard\ Hours}{Budgeted\ Hours} \times\ 100$
3. $Calender\ Ratio = \frac{Available\ working\ Hours}{Budgeted\ Working\ Hours} \times 100$
4. $Standard\ Capacity\ Usage\ Ratio = \frac{Budgeted\ hours}{Max.\ possible\ Hours\ in\ the\ Budgeted\ period} \times\ 100$
5. $Actual\ Capacity\ Usage\ Ratio = \frac{Actual\ Hours\ worked}{Max.\ possible\ working\ in\ a\ period} \times 100$

$$Actual\ Usage\ of\ Budgeted\ Capacity = \frac{Actual\ hours\ Worked}{Budgeted\ Hours} \times 100$$

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Illustrations

Illustration - 1

A factory which expects to operate 7,000 hours, i.e., at 70% level of activity, furnishes details of expenses as under: - Variable expenses Rs.1,260 - Semi-variable expenses Rs. 1,200 - Fixed expenses Rs. 1,800 The semi-variable expenses go up by 10% between 85% and 95% activity and by 20% above 95% activity. Construct a flexible budget for 80, 90 and 100 per cent activities.

Illustration – 2

A department of Company X attains sale of ₹6,00,000 at 80 % of its normal capacity and its expenses are given below:

Particulars	**Amount (Rs.)**
Administration costs:	
• Office salaries	90,000
• General expenses	2 % of sales
• Depreciation	7,500
• Rates and taxes	8,750
Selling costs:	
• Salaries	8 % of sales
• Travelling expenses	2 % of sales
• Sales office expenses	1 % of sales
• General expenses	1 % of sales
Distribution costs:	
• Wages	15,000
• Rent	1 % of sales
• Other expenses	4 % of sales

Draw up flexible administration, selling and distribution costs budget, operating at 90 % 100 % and 110 % of normal capacity.

Illustration - 3

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Action Plan Manufacturers normally produce 8,000 units of their product in a month, in their Machine Shop. For the month of January, they had planned for a production of 10,000 units. Owing to a sudden cancellation of a contract in the middle of January, they could only produce 6,000 units in January.

Indirect manufacturing costs are carefully planned and monitored in the Machine Shop and the Foreman of the shop is paid a 10% of the savings as bonus when in any month the indirect manufacturing cost incurred is less than the budgeted provision.

The Foreman has put in a claim that he should be paid a bonus of ` 88.50 for the month of January. The Works Manager wonders how anyone can claim a bonus when the Company has lost a sizeable contract. The relevant figures are as under:

Indirect manufacturing	**Expenses for a normal month (Rs.) 8000 units**	**Planned for January (Rs.) 10,000 units**	**Actual costs in January (Rs.) 6000 units**
Salary of foreman	1,000	1,000	1,000
Indirect labour	720	900	600
Indirect material	800	1,000	700
Repairs and maintenance	600	650	600
Power	800	875	740
Tools consumed	320	400	300
Rates and taxes	150	150	150
Depreciation	800	800	800
Insurance	100	100	100
	5,290	**5,875**	**4,990**

Do you agree with the Works Manager?

Is the Foreman entitled to any bonus for the performance in January? Substantiate your answer with facts and figures.

Illustration – 4

A single product company estimated its sales for the next year quarter-wise as under:

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Quarter	Sales (Units)
1	30000
2	37500
3	41250
4	45000

The opening stock of finished goods is 10,000 units and the company expect to maintain the closing stock of finished goods at 16,250 units at the end of the year. The production pattern in each quarter is based on 80% of the sales of the current quarter and 20% of the sales of the next quarter.

The opening stock of raw materials in the beginning of the year is 10,000 kg. and the closing stock at the end of the year is required to be maintained at 5,000 kg. Each unit of finished output requires 2 kg. of raw materials.

The company proposes to purchase the entire annual requirement of raw materials in the first three quarters in the proportion and at the prices given below:

Quarter	Purchase of raw materials % to total annual requirement in quantity	Price per kg (Rs)
1	30%	2
2	50%	3
3	20%	4

The value of the opening stock of raw materials in the beginning of the year is Rs 20,000. You are required to present the following for the next year, quarter wise:

(i) Production budget (in units).

(ii) Raw material consumption budget (in quantity).

(iii) Raw material purchase budget (in quantity and value).

(iv) Priced stores ledger card of the raw material using First in First out method

Illustration - 5

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A company is engaged in the manufacture of specialized sub-assemblies required for certain electronic equipment. The company envisages that in the forthcoming month, December 2018, the sales will take a pattern in the ratio of 3: 4: 2 respectively of sub-assemblies, ACB, MCB and DP

The following is the schedule of components required for manufacture:

Sub – Assembly	**Selling Price**	**Base Board**	**Component Requirements**		
			IC08	IC12	IC26
ACB	520	1	8	4	2
MCB	500	1	2	10	6
DP	350	1	2	4	8
Purchase Price (Rs)		60	20	12	8

The direct labour time and variable overheads required for each of the sub-assemblies are:

Labour hours per Assembly			
	Grade A	**Grade B**	**Variable Overheads per Sub – Assembly (Rs)**
ACB	8	16	36
MCB	6	12	24
DP	4	8	24
Direct wage rate per hour (Rs)	5	4	_

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The labourers work 8 hours a day for 25 days a month.

The opening stocks of sub-assemblies and components for December 2018 are as under:

	Sub – Assemblies	Components	
ACB	800	**Base Board**	1600
MCB	1200	IC08	1200
DP	2800	IC12	6000
		IC26	4000

Fixed overheads amount to Rs 7,57,200 for the month and a monthly profit target of Rs 12 lacs has been set.

The company is eager for a reduction of *closing inventories for December 2012 of sub-assemblies and components by 10% of quantity as compared to the opening stock.

Prepare the following budgets for December 2018:

(a) Sales budget in quantity and value.

(b) Production budget in quantity

(c) Component usage budget in quantity.

(d) Component purchase budget in quantity and value.

(e) Manpower budget showing the number of workers and the amount of wages payable

Illustration - 6

Floatglass Manufacturing Company requires you to present the Master budget for the next year from the following information:

Particulars	**Amount (Rs)**
Sales	

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Toughened Glass Bent Glass	600000 200000
Direct material cost	60% of Sales
Direct wages	20 workers @ Rs 150/ month
Factory overheads: Indirect labour • Works manager • Foreman	 500 per month 400 per month
Stores and spares	2.5% on Sales
Depreciation on machinery	12600
Light and power	3000
Repairs and maintenance	8000
Other sundries	10% on Direct wages
Administration, selling and distribution expenses	36000 per year

Illustration - 7

ABC Ltd. is currently operating at 75% of its capacity. In the past two years, the levels of operations were 55% and 65% respectively. Presently, the production is 75,000 units. The company is planning for 85% capacity level during 20X3-20X4. The cost details are as follows:

	55% (Rs)	65% (Rs)	75% (Rs)
Direct Materials	11,00,000	13,00,000	15,00,000
Direct Labour	5,50,000	6,50,000	7,50,000
Factory Overheads	3,10,000	3,30,000	3,50,000
Selling Overheads	3,20,000	3,60,000	4,00,000
Administrative Overheads	1,60,000	1,60,000	1,60,000

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	24,40,000	**28,00,000**	**31,60,000**

Profit is estimated @ 20% on sale

The following increases in costs are expected during the year:

	(%)
Direct Material	8
Direct Labour	5
Variable Factory Overheads	5
Variable Selling Overheads	8
Fixed Factory Overheads	10
Fixed Selling Overheads	15
Administrative Overheads	10

Prepare flexible budget for the period 20X3-20X4 at 85% level of capacity. Also ascertain profit and contribution.

Illustration - 8

The accountant of manufacturing company provides you the following details for year 20X2

	(Rs.)		**(Rs.)**
Direct materials	1,75,000	Other variable costs	80,000
Direct Wages	1,00,000	Other fixed costs	80,000
Fixed factory overheads	1,00,000	Profit	1,15,000
Variable factory overheads	1,00,000	Sales	7,50,000

During the year, the company manufactured two products A and B and the output and costs were:

	A		**B**
Output (units)		2,00,000	1,00,000
Selling price per unit		Rs.2.00	Rs.3.50

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Direct materials per unit		Rs. 0.50	Rs. 0.75
Direct wages per unit		Rs. 0.25	Rs. 0.50

Variable factory overhead is absorbed as a percentage of direct wages. Other variable costs have been computed as: Product A Rs.0.25 per unit; and B Rs.0.30 per unit.

During 20X3, it is expected that the demand for product A will fall by 25 % and for B by 30%. It is decided to manufacture a further product C, the cost for which are estimated as follows:

	Product C
Output (units)	2,00,000
Selling price per unit	Rs.1.75
Direct materials per unit	Rs.0.40
Direct wages per unit	Rs.0.25

It is anticipated that the other variable costs per unit will be the same as for product A.

Prepare a budget to present to the management, showing the current position and the position for 20X3. Comment on the comparative results

Illustration - 9

Jigyasa Ltd. is drawing a production plan for its two products Minimax (MM) and Heavyhigh (HH) for the year 20X3-X4. The company's policy is to hold closing stock of finished goods at 25% of the anticipated volume of sales of the succeeding month.

The following are the estimated data for two products:

	Minimax (MM)	Heavyhigh (HH)
Budgeted Production Units	1,80,000	1,20,000
	(Rs.)	**(Rs.)**
Direct material cost per unit	220	280

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Direct labour cost per unit	130	120
Manufacturing overhead	4,00,000	5,00,000

The estimated units to be sold in the first four months of the year 20X3-X4 are as under

	April	**May**	**June**	**July**
Minimax	8,000	10,000	12,000	16,000
Heavyhigh	6,000	8,000	9,000	14,000

Prepare production budget for the first quarter in month wise.

Illustration - 10

Following data is available for DKG and Co:

Standard working hours	8 hours per day of 5 days per week
Maximum capacity	50 employees
Actual working	40 employees
Actual hours expected to be worked per four weeks	6,400 hours
Std. hours expected to be earned per four weeks	8,000 hours
Actual hours worked in the four- week period	6,000 hours
Standard hours earned in the four- week period	7,000 hours

The related period is of 4 weeks. In this period there was a one special day holiday due to national event. Calculate the following ratios:

(1) Efficiency Ratio, (2) Activity Ratio, (3) Calendar Ratio, (4) Standard Capacity Usage Ratio, (5) Actual Capacity Usage Ratio. (6) Actual Usage of Budgeted Capacity Ratio.

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