

**MANONMANIAM SUNDARANAR UNIVERSITY**

**DIRECTORATE OF DISTANCE & CONTINUING EDUCATION  
TIRUNELVELI 627012, TAMIL NADU**

**B.COM. - III YEAR**

**DJC3B - COST ACCOUNTING  
(From the academic year 2016-17)**



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## **DJC3B - COST ACCOUNTING**

### **Unit – I**

Definition of costing – uses of costing – objects and advantages – difference between cost and financial accounts – installation of costing systems – analysis and classification of costs – preparation of cost sheet – reconciliation of cost and financial books.

### **Unit – II**

Materials – purchase procedure – requisition for material control – recording and controlling of material department – maintenance of stores – minimum level – maximum level – order level – Economic order quantities – perpetual inventory – control of wastage and scrap and spoilage.

### **Unit –III**

Methods of remunerating labour – incentive scheme – idle time – control over idle time – job evaluation – merit rating – time studies – labour turnover – meaning – measurement.

### **Unit – IV**

Accounting of overheads fixed and variable overheads – basis of charging overheads – allocation – apportionment and absorption – distinction between works overhead, administration overhead, selling overhead and distribution overhead – distribution of service overhead including secondary distribution.

### **Unit – V**

Job costing – process costing - normal loss, abnormal loss and abnormal gains only – marginal costing – applications of marginal costing – standard costing – variance analysis – material variance – labour variance – overhead variance – (fixed and variable) – sales variance.

### **Reference Books:**

1. Cost Accounts - S.P.Jain and Narang, Kalyani publications.
2. Cost Accounts - Das Gupta, Sultan Chand Publication, New Delhi
3. Principles and Practice of Cost Accounting – N.Sarkar
4. Cost Accounting - S.P. Iyengar, Sultan Chand Publication, New Delhi.
5. Cost Accounting - R.S.N. Pillai, Sultan Chand Publication, New Delhi.
6. Cost Accounting - M.C. Agarwal, Sahitya, Bhavan Publications.

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## UNIT – I

### INTRODUCTION TO COST ACCOUNTING

#### Definition of cost:

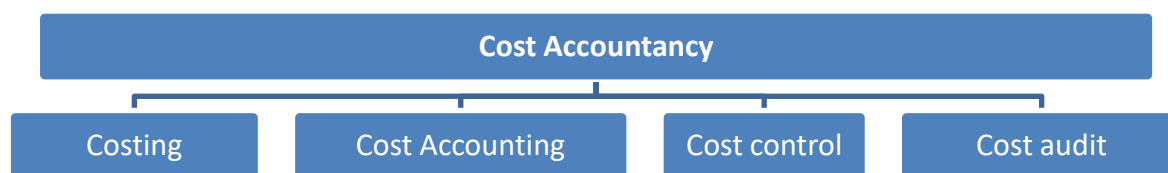
Cost is “The amount of expenditure incurred on or attributable to a given thing” - LC.M.A. London

Cost = Usage x price

#### Definition of cost Accountancy:

ICMA London has defined Cost Accounting as “the .application of costing and cost accounting principles, methods and techniques to the science, art and Practice of cost control and the ascertainment of profitability. It includes the presentation of information derived there from for the purpose of Managerial decision – Making”.

#### Classification of Cost Accountancy



#### Definition:

##### i) Costing:

- a) Costing is "the techniques and process of ascertaining costs"- I.C.M.A
- b) Costing has been defined as "the classifying recording and appropriate allocation of expenditure for the determination of costs, the relation of these costs of sales value, and ascertainment of probability - Wheldon

**ii) Cost Accounting:** Cost Accounting is the process of accounting for .costs. It begins with recording of income and expenditure and ends with the preparation of periodical statements.

**iii) Cost Control:** Cost Control is exercised through a variety of techniques such as standard costing, budgetary control, Inventory control etc..

**iv) Cost Audit:** Cost Audit is "the verification of cost accounts and a check on the adherence to the cost accounting plan".

### **Functions (uses) of cost audit:**

- To verify that cost accounts have been properly maintained and compiled.
- To see that costing plan laid down is carried out
- To detect errors and prevent frauds.

### **Objects of Costing:**

- a) **Ascertainment of costs:** Costing is to ascertain cost of each product, process or operation and to ensure that all expenses have been absorbed in the cost of products, the techniques and process of costing are used.
- b) **Cost Control:** Costing systems are installed in order to control the costs. This may be achieved with the help of certain techniques like standard costing, budgetary control,
- c) **Guide to fix setting price:** Costing helps to serve as a Guide to price fixing.
- d) **Guidelines for Management:** Costing helps management in conducting its business with utmost efficiency. Costing provides Cost data. Cost data provides guidelines for the formulation of business policy and policy decision like a) introduction or discontinuance of a product, b) Utilisation of idle plant capacity, c) make or buy decision, d) selling goods in global market.
- e) **Other objectives of costing:**
  - ❖ To ascertain the cost per unit of different product
  - ❖ To organise cost reduction programmes
  - ❖ To ascertain the profitability of each of the products
  - ❖ To exercise effective control of stock of raw materials, work in progress, consumable stores and finished goods.
  - ❖ To organise internal audit system.
  - ❖ To provide specialised service of cost audit

**Financial Accounting:** Financial accounting is a systematic way of recording the financial transactions of business. Its purpose is the preparation of Profit & Loss a/c and Balance sheet.

**Cost Accounting:** Cost accounting is the branch of accounting which gives detailed cost information to management for various purposes.

### Differences between Financial Accounting and Cost Accounting:

Sl. No.	Financial Accounting	Cost Accounting
1	It gives general information about the profit & Loss a/c and Balance sheet of a business to the owners and outsiders.	It gives cost information to management for the purpose of cost control planning and decision making.
2	These accounts have to be prepared according to the requirement of companies Act and Income tax Act	These accounts are kept voluntarily.
3	It classifies, records and analyses the transactions according to the nature.	It records the expenses according to the purposes for which the costs are incurred.
4	It deals with actual facts and figures.	It deals partly with facts and figures and partly with estimates.
5	It shows net profit or net loss of the business as a whole.	It shows profit or loss of each product.
6	It shows all expenses	It shows only production expenses.
7	It is the accounting system for the above business.	It is only part of the financial accounts.
8	Monetary transactions are recorded.	Both monetary and nonmonetary transactions are recorded.
9	It does not provide for adequate control over costs.	It provides for detailed system of control over cost.
10	It is concerned with external transactions.	It is concerned with internal transactions.
11	These accounts are related with commercial transactions of the business.	These accounts are related with manufacture of goods and services.
12	It gives reports only at the end of the year.	It gives reports as and when required.
13	The costs are reported in aggregate in financial accounts.	The cost are splited into unit wise.
14	It does not provide information about efficiency of labour, plants and machinery.	If gives information about the efficiency of labour, plant and machinery.

### Advantages of Costing:

- 1) Costing shows the profitable and unprofitable activities and helps the management to eliminate or reduce the unprofitable activities.

- 2) It helps the management to maintain a systematic record of analysed and classified costs. So that cost data are available as and when required.
- 3) It guides future production policies.
- 4) It helps in increasing profits by showing sources of waste or loss.
- 5) It gives information upon which estimated and tenders are based.
- 6) It enables a concern to measure the efficiency and then to maintain and improve it
- 7) The exact cause of a decrease or an increase in profit or loss can be detected.
- 8) Costing helps in controlling costs with the help of standard costing and budgetary control,
- 9) It helps the management to fix selling, prices of various goods.
- 10) Cost audit will help in prevention of errors and frauds.
- 11) It guides future production policies.
- 12) It enables the periodical determination of profits and losses without stock taking.
- 13) It gives an efficient check on stores, labour and machines.
- 14) It Informs the management about optimum profitability, idle time of labour and idle capacity of machines.
- 15) It gives management with valuable data for planning, budgeting and control of costs.
- 16) It provides the use of budget and enables the management to rectify inefficiencies.
- 17) It helps the management to take right decision for product mix, introduction of a new product etc.
- 18) It enables the creditors and investors to assess foe financial position and creditworthiness of business.
- 19) It facilitates the assessment of excise duty, income tax.

### **Characteristics of a good (ideal) costing system.**

A good costing system is to achieve the objectives of a costing system and brings all the advantages to the business.

The following are the main characteristics of which good costing system should possess:

- 1) **Suitability:** A costing system is formed according to the nature, requirements, conditions and size of business.
- 2) **Simplicity:** The system of costing should be simple and easy to understand by an average person.
- 3) **Flexibility:** The system of costing must be flexible so that it may be changed according to be changed conditions.
- 4) **Economical:** The system of costing should not be expensive, The benefits to be obtained from the system must be more than its costs.
- 5) **Comparability:** It facilitates facts and figures are compared with past figures.
- 6) **Accurate and Timely Information:** The system must give accurate and timely information to the management so that the management is able to take decision in order to control cost.
- 7) The system must reduce clerical work.
- 8) The system must provide adequate-wage system and procedure.
- 9) The system should by formulated for the collection, allocation, apportionment and absorption of overhead in order to find out cost accurately.
- 10) All forms, and performs necessary to the system should be uniform in Unit size and quality of paper.
- 11) A good costing system should be clearly stated the duties and responsibilities of cost accountant.

### **Installation of a costing system**

A cost accountant should take necessary steps while introducing a system of costing in a business.

#### **Steps for Installation:**

- 1) The installation and operation of the costing system should be economical.
- 2) Costing system should be simple and easy to operate.
- 3) The system should be effective in cost control and cost reduction.
- 4) The business objective to be achieved through costing system.
- 5) To study the existing organisation structure of the business.
- 6) To decide the structure of cost accounts.
- 7) Before introducing the system, co-operation of all the officials could be obtained.



- 8) Methods of wage payment should be studied.
- 9) Technical aspects Of the business should be studied.
- 10) The size and layout of the factory should be studied.
- 11) Methods of purchase, receipts, storage and issue of materials should be studied.
- 12) The system should be effective in cost control and cost reduction.

### **Practical difficulties in Installing a costing system:**

- i. **Lack of support and co-operation from top management:**In most of the organisation, there is no support and co-operation for the introduction of costing system from top management.
- ii. **Lack of trained staff:** There is a shortage of cost accountant to handle cost works functions.
- iii. **Expensive:** The cost of operating a system may be heavy, Hence it is not suitable for small organisation.
- iv. **Non-co-operation at other levels of organisation:** The departmental head, supervisors, foremen, and operating force may not extend their support to system.
- v. **Resistance from the existing accounting staff:** Because they feel that they will lose their importance due to introduction of costing system in a concern.

### **How to overcome practical difficulties in Installing a costing system:**

- 1) We should get assurance to foe system from top management.
- 2) To explain foe need and importance of costing system to foe existing accounting staff.
- 3) To educate the employees regarding the benefits of such systems.
- 4) To provide proper training to the employees regarding costing methods and techniques.-
- 5) There should be proper supervision after installing system.
- 6) The system should be introduced according to the requirements.

### **12. Limitations of cost accounting**

- 1) Lack of uniform procedure .
- 2) There are a large number of conventions, estimations and flexible factors.

- 3) All cost accounting results can be taken as mere estimates.
- 4) It is not suitable for small and medium size concern. It can be used only by big concerns.
- 5) It is argued that the introduction of costing is unnecessary and waste
- 6) It fails to produce the desired results.

### **Objection against cost accounting.**

- 1) It has been argued that expenditure incurred in installing a costing system would be an unnecessary expenditure.
- 2) **Inapplicability:** There is no separate system of costing applicable to all type of business, costs.
- 3) **Failure In many cases:** It is argued that the introduction of costing system failed to produce the desired results.
- 4) **Mere mutter of forms and rulings:** It is argued mat costing system degenerates into a matter and rulings.
- 5) **Expensive:** The system involved more expenses and not economical.

## **METHODS OF COSTING**

The method of costing refers to the techniques and process used in ascertainment of cost of production. There are different methods of costing for different industries.

There are two basic methods of costing.

- 1) Job costing
- 2) Process costing

All other methods of costing improvements or combination of the above two basic methods.

**Job costing:** In this method costs are collected and accumulated for each job or work order separately. Each work is done according to customer's specification. Each job has a separate identity and makes a cost unit.

Examples: This method is used by i) Printing press ii) Repair Shops iii) foundries iv) General engineering workshops, v) Painting and decorating.

**Contract costing:** This method is based on principles of job costing. Contract is a big job a separate account is kept for individual contract.

Examples : This method is used by i) Construction work, ship building constructional engineers etc.

**Batch costing:** This is an extension of job costing. A batch may represent a number of small orders passed through the factory in batch. Each batch is treated as. A cost unit and costs are accumulated for each batch separately.

Example: i) Biscuits manufacture, ii) garments manufacture, iii) Toys, iv) shoes iv) Bicycle spare parts.

**Process costing:** In this method costs are separately collected and accumulated for each process. This is suitable for industries where product passes through different processes for completion. The finished product of one process becomes the raw material of the next process.

Examples: Textile mills, Chemical works, sugar mills, paper nulls, soap manufacturing.

**Operating costing:** This is the application of process costing. This method is used to find out the cost of services rendered. This is suitable for industries which render services rather than producing goods. Examples: Transport undertakings, power supply companies, hospitals, hotels.

**Unit costing (or) Single output costing:** This method is used when production is uniform continuous and units are identical. It consists of only single product two or three types of similar products.

This methods is applied in the following types of industries.

<b>PRODUCT NAME</b>	<b>COST UNIT</b>
Brick works	One thousand
Coal mines	Per tone
Steel works	Per tone

### **MULTIPLE COSTING (OR) COMPOSITE COSTING:**

It is an application of more than one method of costing in respect of the same product. This method is used in industries where a number component parts are separately produced and assembled to product final product.

Example: i) Television, radio manufacturing ii) Scooter and other mo vehicles, iii) Refrigerator manufacture, iv) Locomotive works, v) automobiles, vi) Aeroplanes, vii) Manufacturing cycles.

**Types of costing:** Following are the main types of costing for ascertainment of costs.

**Uniform costing:** Where the same costing principles and practices used by several industries for common control or comparison of costs, is known as uniform costing.

**Marginal costing:** It is ascertainment of marginal cost by differentiating between fixed and variable cost. It is used to ascertain the effect charges in volume or type of output or profit.

**Standard Costing:** A comparison is made between actual cost with predetermined cost and find out any variance is analysed by cause and to take suitable corrective action.

**Historical costing:** In this type costs are ascertained after they have been incurred.

**Absorption costing:** In this type, both, fixed and variable costs: are charged to operations,, processes, or products.

**Dared costing:** In this type all direct costs are charged to operations or products and all indirect costs (overhead) are written off against the profit of period are charged.

## COST UNIT

Cost unit is defined as "The unit of quantity of product service, or time in relation to which cost may be ascertained or expressed".

Example: Tonne in case of coal. 1000 bricks in case of brick manufacturing

It is the unit of product service or time in relation to which cost may be ascertained.

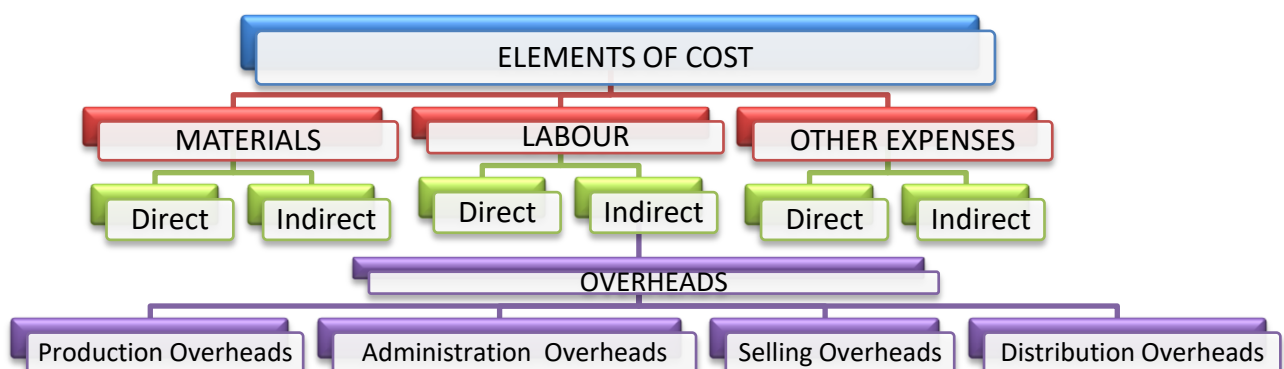
Example:

INDUSTRY	UNIT COST
Steel	Tonne
Cement	Tonne
Brick manufacturing	1000 bricks
Power	kilowatt hour
Transport	passenger-kilometre
Water supply	1000 litres
Cloth	per meter

## ELEMENTS OF COST

Elements of cost are three types:

1. Materials
2. labour
- 3, Other Expenses



**Materials:** materials cost are divided into two

1. Direct Materials
2. Indirect Materials.

**Direct Materials:** They are those materials which can be identified and can be measured and directly charged to a particular product.

Example: Timber in furniture making, bricks in building a house, paper used in note books, leather in shoe making cloth in garments, clay in bricks.

**Direct Labour:** They are those Labours which can be conveniently identified or attributed wholly to a particular job, product or process expended in converting raw materials into furnished goods.

Example : Wages paid to workers who are directly engaged in production:

**Direct expenses or chargeable expenses:** Include all expenditure other than direct material or direct labour that are specifically incurred for a particular product or Process.

Example : Excise duty, Royalty, cost of rectifying defective work, surveyor's fee, Expenses of designing or drawing a model.

(Prime cost=Direct material + Direct labour + Direct expenses)

The aggregate of Direct material Direct labour and Direct Expenses are called prime cost.

**Overhead or on cost:** The Aggregate of indirect material, Indirect labour and Indirect expenses is termed as overhead. Overheads cannot be conveniently be charged to specific cost unit.

(Overheads = Indirect Materials + Indirect labour + Indirect Expenses)

**Division of overheads:**

Overheads are divided into 3 groups.

1. Production overhead
2. Administration overhead
3. Selling and Distribution overhead.

**Production overhead or works overhead or factory overhead:** It includes all indirect cost which is connected with the manufacture of a product.

**It consists of 3 elements:**

**Indirect material:** Example Lubricants, soaps, Water powder, Cotton waste, thread.

**Indirect wages:** Wages of supervisor, Salary of works manager, Foreman salary.

**Indirect expenses:** Factory rent, Rates, Deprecation on Machinery, Power light, heat, Insurance of factory building.

**Administration overhead:** These are the expenses incurred in the management and administration of the business.

**Examples:**

**Indirect Materials:** Office forms, Stationery, Printing.

**Indirect Labour:** Office manager salary, clerk salary, Audit fee.

**Indirect Expenses:** Rent & Rates of office building, Electric?\*-legal charges. Depreciation on office furniture.

**Selling and Distribution overheads:**

Selling overheads are incurred in promoting and securing orders.

**Examples:**

**Indirect Material:** Printing & Stationery, order form.

**Indirect Labour:** Salaries of Salesman,, Sales manager.

**Indirect Expenses:** Advertisement, Showroom expenses,

**Distribution overheads:** Distribution overheads are incurred from the time of the product is complete and put in storage for despatch until it reaches customer.

**Example:** Packing costs, salaries of despath clerk, Warehouse Rent, Depreciation oh delivery van.

### SPECIMEN OF ELEMENTS OF COST

	<b>Rs.</b>
Direct materials	XXX
Direct Labour	XXX
Direct Expenses	XXX
<b>Prime cost</b>	<b>XXX</b>
Add Factory overhead	XXX
<b>Factory cost</b>	<b>XXX</b>
Add Office & Administration overhead	XXX
<b>Cost of Production</b>	<b>XXX</b>
Add Selling & Distribution overhead	XXX
<b>Total cost (or) cost of sales</b>	<b>XXX</b>

Cost: Cost means the total of all expenses.

**Definition of cost:** as the amount of expenditure incurred on or attributable to a given thing or to ascertain the cost of a given thing.

**Cost Centre:** A cost centre is the smallest segment of activity or area of responsibility for which costs are accumulated.

Cost centre as, a location or a person or an item of equipment in or connected with an undertaking in relation to which cost may be ascertained and used for the purpose of cost control -ICMA

A cost centre can be a location or on hem of location - an area - department equipment or a person. Item of equipment - a machine, a lathe, cost centre may be a product centre or service centre, product centre converts raw materials into finished goods.

Service centre render service to production centre in order to carry out the production work easily.

Difference between cost centre and Profit centre:

S.No	COST CENTRE	PROFIT CENTRE
1	It is the smallest unit of activity	It is the segment of activities of of a business.
2	Responsible to collect costs.	Responsible tor revenue & expenses.
3	They are not autonomous.	They are autonomous.
4	It is created for cost control.	It is created for decentralisation of operations.
5	It does not have target cost.	It has profit target.

### Important classification of costs are

1. **By nature or Element wise:** According to this classification, the costs divided into three categories namely material, labour and expenses.
2. **Functional classification:** According to this classification cost, is divided into three namely manufacturing costs, administration cost and selling and distribution costs.
  - I. Manufacturing cost includes the cost of manufacturing of a product
  - II. Administration costs includes the cost of general administration of business.
  - III. Selling & Distribution costs includes cost incurred to create demand and expenditure incurred to deliver the goods to customers.
3. **By Direct and Indirect costs:** Costs are classified as direct and indirect

**Direct costs** are those costs which are incurred for and may be conveniently identified with a particular cost centre or cost unit.



**Example:** Cost of raw materials used and labour engaged in the manufacture of a product

**Indirect costs** are these costs which are incurred for the benefit of a number of cost centres or cost unit and cannot be conveniently identified with a particular cost centre or cost unit

**Example:** Rent of building, Depreciation on machinery, lighting, power Managerial salary.

**4. By variability or cost behaviour:** According to this classification, costs are classified according to change in the volume of production. On this basis there are three costs are classified.

i) fixed      ii) variable      iii) semi-variable

i. **Fixed costs or period costs** are those costs which remain fixed in total and do not increase or decrease when volume of production increases or decreases. But fixed cost per unit will change. Fixed cost per unit increases when the volume of production decreases and fixed cost per unit decreases when the volume of production increases.

**Example:** Office & administration overhead like rent, salary.

ii. **Variable costs or product costs:** are those costs which vary in total indirect proportion to volume of production. When volume of output increases total variable cost also increases when output decreases total variable cost also decreases. But the variable cost per unit remains fixed.

**Example:** Direct material, direct labour, direct expenses and all variable overhead.

iii. **Semi-variable costs:** are those costs which are partly fixed and partly variable.

**Example:** Telephone expenses, Electricity bill.

**5. By controllability:** The costs are classified into two.

i. **Controllable costs:** are those cost which can be directly influenced by the action of a specified member\* of enterprise.

ii. **Uncontrollable costs:** are those cost which cannot be influenced by the actions of a specified number of enterprise.

**6. By Normality:** Under this costs are classified into two

- i) **Normal cost:** These costs are normally incurred at a given level of output in the conditions in which that the level of output is normally attained.
- ii) **Abnormal cost:** These costs are not normally incurred at a given level of output in the conditions in which that the level of output is normally attained.

**7. By capital and Revenue:** The cost which is incurred in purchasing asset either to earn income or increasing the earning capacity of the business is called capital cost.

Expenditure is incurred in order to maintain the earning capacity of the business is called revenue cost.

**8. By Time:** cost is classified as i) Historical cost and ii) Predetermined cost.

- i) Historical cost is actual cost which are determined after these have been incurred.
- ii) pre-determined costs are estimated or future costs which are ascertained in advance of production, (costs are determined before the production take place)

**9. For managerial decisions:** On this basis, costs may be classified into the following costs.

- i. **Marginal cost:** It is the total of variable cost (prime cost + variable overhead).
- ii. **Out of pocket costs:** It is a portion of cost which involved payment to outsiders.
- iii. **Differential costs:** The change in costs due to change in the level of activity is known as differential cost
- iv. **Sunk costs:** It is irrecoverable cost and in caused by complete abandonment of a plant such costs are not useful for decision making and are not affected by increase or decrease in volume.
- v. **Imputed costs:** These costs which appear in cost accounts only.

### **Cost sheet**

**Definition:** Cost sheet is “a document which provides for the assembly of the detailed cost of a cost centre or cost unit”. - I.CM. A. London.

Cost sheet is a statement which is prepared at given Intervals of time and gives information regarding the element of cost incurred in production: It gives total cost and cost per unit of product manufactured during the period. Cost sheet is prepared under output or unit costing method.

**Purposes:**

1. It shows the total cost and cost per unit of production.
2. It shows the different elements of cost.
3. It facilitates comparisons with previous years.
4. It helps in the fixation of selling price.
5. It helps in the preparation of estimates for submission of tenders for contracts.

**Production Statement:** It is a statement which shows total costs, sales and profit or loss during the period.

**Specimen of a cost sheet for the period ended 31-12**

	<b>Total cost Rs.</b>	<b>Cost per unit</b>
Direct materials	XXX	XXX
Direct Labour	XXX	XXX
Direct Expenses	XXX	XXX
<b>Prime cost</b>	<b>XXX</b>	<b>XXX</b>
Add Factory overhead	XXX	XXX
<b>Factory cost</b>	<b>XXX</b>	<b>XXX</b>
Add Office & Administration overhead	XXX	XXX
<b>Cost of Production</b>	<b>XXX</b>	<b>XXX</b>
Add Selling & Distribution overhead	XXX	XXX
<b>Total cost (or) cost of sales</b>	<b>XXX</b>	<b>XXX</b>

Type II cost sheet for the period ended 31.12. (Units....)

		<b>Total cost Rs.</b>	<b>Cost per unit</b>
Opening stock of Raw material	XX		
<b>Add:</b> purchase of Raw material	XX		
	XX		
<b>Less:</b> closing stock of Raw material	XX		
Raw materials consumed		XXX	XXX
Direct Labour		XXX	XXX
Direct Expenses		XXX	XXX
<b>Prime cost</b>		<b>XXX</b>	<b>XXX</b>

<b>Add:</b> Factory overhead	XX		
Opening stock of work in progress	XX		
	XX		
<b>Less:</b> closing stock of work in progress	XX	XXX	
<b>Work cost</b>		XXX	XXX
<b>Add:</b> Office & Administration overhead		XXX	XXX
<b>Cost of Production</b>		XXX	XXX
<b>Add:</b> Opening stock of finished goods		XXX	
<b>Less:</b> Closing stock of finished goods		XXX	
<b>Cost of goods sold</b>		XXX	
Add Selling & Distribution overhead		XXX	XXX
<b>Total cost</b>		XXX	XXX
<b>Add:</b> Profit		XXX	XXX
<b>Sales</b>		XXX	XXX

**Problem:** From the following particulars of manufacturing of a company Prepare a statement showing a) Cost of materials used b) Prime cost c) works cost d) cost of production e) percentages of works expenses to wages, percentages of general expenses to works cost

Stock of material 1.1.1999	Rs.25000
Stock of finished goods 1.1.1999	Rs.51000
Purchase of materials	Rs.5,75,000
Production wages	Rs.3,90,000
Works overhead charges	Rs.86,000
Office and General charges	Rs.72,000
Stock of materials 31.12.1999	Rs.30,000
Stock of finished goods 31.12.1999	Rs.48,000
Sale of finished goods	Rs.12,20,000

**Solution:**

#### Cost Sheet for the year 31.12.1999

		<b>Total cost Rs.</b>
Opening stock of raw material	25000	
Add: purchase of material	575000	
	<b>600000</b>	
Less: closing stock raw materials	30000	
<b>A) Raw material consumed</b>		570000
Production wages		390000
<b>B) Prime cost</b>		<b>960000</b>
<b>Add:</b> Works overheads		86000
<b>C) Works cost</b>		<b>1046000</b>
<b>Add:</b> Office and general expenses		72000
<b>D) Cost of production</b>		<b>1118000</b>
<b>Add:</b> Opening stock of finished goods		51000
		<b>1169000</b>
<b>Less:</b> Closing stock of finished goods		48000
		<b>1121000</b>

<b>Add: Selling and distribution overhead</b>		<b>Nil</b>
<b>Total cost</b>		<b>1121000</b>
Profit (b.f.)		99000
<b>Sales</b>		<b>1220000</b>

**Percentage of works expenses to wages** = wages expenses / wages X 100  
= 86000/390000 X 100 = 22.05%

Percentage of general expenses to work cost  
= General expenses / Works cost X 100  
= 72000 / 1046000 X 100 = 6.88%

### Problem:

Mr. Mithilesh Kumar furnished the following data relating to die manufacture of X Standard product during the month of April 2001.

Rawmaterial consumed           Rs. 30,000  
Direct Labour charges           Rs. 15,000  
Machine hours worked           1500 hours.  
Machine hour rate                Rs.8  
Administrative overhead 30% on works cost  
Selling overhead                 75 paise per unit  
Units produced                  15000  
Units sold 12000 of               Rs. 10 per unit

You are required to prepare a cost sheet from the above showing  
a) Cost per unit           b) Profit per unit sold and profit for the period.

### Solution: Cost Sheet For the Period 2001 (Units produced = 15000)

	<b>Total cost</b>	<b>Cost per unit</b>
Raw material consumed 30000/ 15000 = Rs.2	30000	2.00
Direct labour charges	15000	1.00
<b>Prime cost</b>	<b>45000</b>	<b>3.00</b>
<b>Add: Works overhead (1500hours X Rs.8)</b>	12000	0.80
<b>Works cost</b>	<b>57000</b>	<b>3.80</b>
<b>Add:Office &amp; Administration overhead</b> 30% on works cost 57000 X 30/ 100	17100	1.14
<b>Cost of Production</b>	74100	4.94
Less: closing stock 3000units X Rs.4.94	14820	---
Cost of goods sold for 12000 units*	59280	4.94
Add: selling overheads 75 paise per unit 12000 unitss X 75 paise	9000	0.75
<b>Total ccost</b>	68280	5.69
<b>Profit for the period</b>	51720	4.31
Sales 12000 units X Rs. 10	120000	10.00

\* 15000units produed - 3000 units closing stock = 12000 units sold

Per unit = Total cost / Number of units  
 Profit per unit = 51720 / 12000units = Rs.4.31

## **RECONCILIATION OF COST AND FINANCIAL ACCOUNTS**

The cost accounting will deal with the ascertainment of cost of product absorption of overheads into product cost, ascertainment of division wise profitability etc.

Different sets of accounts are maintained under financial accounting and cost accounting. The accounting principles, methods and practices are different under these two accounting systems. The maintenance of different sets of accounts with different objects will cause to show different figures, of profit or loss in cost accounts and financial accounts and it will necessitate to reconciliation the two accounts periodically and a statement of reconciliation is prepared to show the reasons for difference profit or loss shown by cost and financial accounts.

The cost and financial accounts are maintained in different forms or follow different methods, principles and approaches and it will naturally result in difference in profit or loss ascertained in the cost and financial accounts which necessitates the reconciliation of both the sets of accounts to identify the causes for deviation.

In the financial ledger, expenses are recorded in a subjective form. Whereas in cost ledger, expenses are analysed and classified in an objective form. As these two sets of accounts are maintained in different forms, it is quite natural that their results may also differ. Therefore, it becomes necessary that these two accounts should be reconciled.

Why is reconciliation of cost and financial accounts necessary ? State the possible reasons for differences between profits shown by both the accounts.

When cost accounts and financial accounts are independently maintained, the profit or loss shown by one set of accounts may not agree with profit or loss shown by the other. Therefore, it becomes necessary that profit or loss shown by the two sets of accounts be reconciled.

***The need for reconciliation arises due to the following reasons:***

- a) Reconciliation is necessary to find out the reasons for the difference and to ensure that no income or expenditure item has been omitted and that there is no under or over-recovery of overheads.
- b) Cost ascertainment and cost control depend on the accuracy of cost analysis, distribution and allocation. If the total expense which is classified and distributed in cost accounts is not correct, cost allocation and ascertainment would be rendered inaccurate and misleading. It is, therefore, essential that costing figures in total should agree, with the financial records in order to ensure the accuracy of costing data.

### **Reason's for necessity of reconciliation:**

The reasons for difference in profit or loss in cost accounts and financial accounts is analysed and highlighted.

The reliability of cost accounting data and financial accounting data is verified by reconciling both tie accounts.

Reconciliation of both the accounts is necessary to ensure that there is no over or under recovery of overheads.

### **Reasons for disagreement:**

The difference in profit or loss ascertained in cost accounts and financial accounts is due to the following reasons:

#### **a. Certain items only shown in financial accounts that are not coming in cost accounts like:**

- Profit or loss on sale of fixed assets.
- Discount on issue or redemption of shares and debentures.
- Preliminary expenses written off.
- Receipt of interest and dividends on investments.
- Payment of Income-tax
- Goodwill written off

#### **b. Certain items only shown in cost accounts that are not coming in financial accounts like:**

- National rent on premises owned

- Notional rent on Capital

- c. **Disagreement due to under or over absorption of overhead item.**  
 d. **Difference due to use of different methods of stock valuation:**

In financial accounts, the stock of raw materials are valued at cost or market value whichever is lower. Whereas in cost accounts stock may be valued under FIFO, LIFO, Simple Average Cost, Weighted Average Cost, Standard Cost etc.

The finished goods are valued under absorption existing method in financial accounts. But in preparation of cost accounts, the finished stock may be valued under absorption costing, marginal costing, standard costing etc.

- e. **Difference due to use of different rates of depreddation**

In financial accounts the amount of depreciation is charged as per the rates given in the Companies Act, 1956. But in Cost Accounts, appropriate and suitable method is used for calculation of the amount of depreddation.

#### **Model: Reconciliation Statement**

		<b>Rs.</b>	<b>Rs.</b>
	Profit as per cost accounts (or) Loss as per financial accounts		XXX
	<b>ADD:</b>		
1	Take Income in Financial books	XX	
2	Take Expenses in cost books	XX	
3	Excess of income in Financial books over cost accounts	XX	
4	Excess of expenditure in cost accounts over financial accounts	XX	
5	Over absorption of overhead in cost accounts	XX	
6	Under valuation of closing stock in cost accounts	XX	
7	Over valuation of opening stock in financial accounts	XX	XXX
			XXX
	<b>LESS:</b>		
1	Take Income in cost accounts	XX	
2	Take Expense in financial accounts	XX	
3	Excess of income in cost accounts over financial accounts	XX	
4	Excess of Expenditure in financial books over cost accounts	XX	
5	Under absorption of overhead in cost accounts	XX	
6	Over valuation of closing stock in cost accounts	XX	
7	Under valuation of opening stock in cost accounts	XX	XXX
	Profit as per financial accounts (or) Loss as per cost accounts		XXX



**Problem:** Ascertain the profit as per P&L accounts by preparing a Memorandum Reconciliation Account

- a) Profit as per costing records Rs. 1,45,000
- b) Factory overheads under recovered in cost books Rs. 3,500
- c) Office overheads under recovered in Financial books Rs.1,500
- d) Depreciation shows excess in costing books Rs.950
- e) Interest on Investments Rs.495
- f) Receipts of income from share transfer Rs.200
- g) Provision made for Income tax Rs.48500

**Solution:**

### RECONCILIATION STATEMENT

Profit as per cost accounts		1,45,000
<b>Add:</b>		
Excess depreciation in cost books	950	
Interest on investments in financial books	495	
Share transfer fee in financial books	200	<b>1,645</b>
		<b>1,46,645</b>
<b>Less:</b>		
Factory overhead under recovered	3500	
Office overhead under recovered	1500	
Income tax provided in financial books	48500	<b>53500</b>
<b>Profit as per financial books</b>		<b>93145</b>

**Problem:**

The Net profit of Sundar Co., Ltd., appeared at Rs.8200 as per financial records for the year ending 31st March 2003. The cost books should showed a Net profit of Rs.90,000 for the same period A scrutiny of the figures from both the sets of accounts showed the following facts.

1. Factory overhead under recovered in costs 2,000
2. Administrative overhead over recovered in costs 1,000
3. Depreciation charged in financial books 4,500
4. Depreciation recovered in Costs 7,000
5. Interest on investments not included in costs . • 3,000
6. Goodwill written off in financial books 6,000
7. Preliminary expenses written off in financial books 5,000

8. Income tax provided in financial books v: 10,000
9. Loss due to obsolescence charged in financial books 3,500
10. Bank interest and transfer fee credited in financial books 9,000
11. Stores Adjustments credited in financial books 9,000
12. **Value of opening stock:**
  - a) Cost a/c 7000
  - b) Financial a/c 9000
13. Value of closing stock:
  - a) Cost a/c 12000
  - b) Financial a/c 8000
  - c) Interest charged in cost a/c 6000
  - d) Loss an sale of furniture 1000

Prepare a statement showing the reconciliation between the figure of net profit as per cost A/cs and figure of net profit as shown in the financial books.

**Solution:**

### RECONCILIATION STATEMENT

	Rs.	Rs.
Profit as per cost Accounts		90000
<b>Add:</b>		
Administrative overhead charged in cost A/cs	1000	
<i>Excess of Depreciation charged in cost A/cs</i>		
cost A/c . 7000		
Financial A/c 4500	3500	
Income in financial books:		
Interest on investment	3000	
Bank interest & transfer fee	9000	
Stores adjustments	4000	
Expenses charged in cost A/c		
Interest charged in cost A/c	6000	<b>33500</b>
		<b>125500</b>
<b>Less:</b> Expenses and losses in Financial books but not shown in cost books		
Goodwill written off	6000	
Preliminary expenses written off	5000	
Income tax provided	10000	
Loss due to abolescence	3500	
Loss on sale on furniture	1000	

Factory overhead under recovered in cost	2000	
<i>Under valuation of opening stock in cost A/c</i>		
Financial A/c 9000		
Cost A/c 7000	2000	
<i>Over valuation of closing stock in cost A/c:</i>		
Cost A/c 12000		
Financial A/c 8000	4000	<b>33500</b>
Profit as per Financial Accounts		<b>82000</b>

### Problem:

The net profit shown by financial A/c's of a company amounted to Rs.2,85,500 while profit as per cost accounts for that period was Rs. 388600 on reconciliation. The following differences were noticed.

- a) The following items were included in the Financial books:
  - a. Director fees (Dr) 6500
  - b. Bank interest (Cr) 300
  - c. Income tax (Dr) 83000
- b) Bad and doubtful debts for Rs.5700 were written off in financial books.
- c) Overhead in cost accounts absorbed were Rs.85000 with the actual were Rs.83200.
- d) A net loss of Rs.10,000 on sale of old machinery was dealt with in the Financial books.

Reconcile the profits between the cost and financial accounts.

### Solution:

	Rs.	Rs.
Profit as per cost Accounts		388600
<b>Add:</b> Income credited in financial A/c's:		
Bank interest	300	
Overabsorption of overhead in cost accounts (85000-83200)	1800	<b>2100</b>
		<b>390700</b>
<b>Less:</b> Expenses and loss in Financial books		
Director fee	6500	
Income tax	83000	
Bad and doubtful debts	5700	
Loss on sale of machinery	10000	<b>105200</b>
Profit as per Financial Accounts		<b>285500</b>

**Problem:**

The Net profit of a Manufacturing Co., Ltd. appeared of Rs.64377 as per financial Records for the year ended 31st March 2003. The cost books however showed a net profit of Rs. 86,200 for the same period. Prepare a reconciliation statement from the following information.

Works overhead under recovered in costs	1560
Administrative overhead over-recovered in costs	850
Depreciation charged in financial Accounts	5600
Depreciation recovered in costs	6250
Interest on investments not included in costs	4000
Loss due to obsolescence charged in financial A/c's	2850
Income tax provided in Financial A/cs	20150
Bank Interest credited in Financial A/cs	375
Stores Adjustments (credit) in Financial books	237
Loss due to depreciation in Stock values charged in Financial a/cs	3375

**Solution:****Reconciliation Statement**

	Rs.	Rs.
Profit as per cost Accounts		86200
<b>Add:</b>		
Administrative overhead over-recovered in costs	850	
Excess Depreciation in costs book (6250 - 5600)	650	
<i>Income credited in financial A/c's:</i>		
Interest on investment	4000	
Bank interest	375	
Stores Adjustments	237	<b>6112</b>
		<b>92312</b>
<b>Less:</b>		
Work overhead under recovered in costs	1560	
<i>Expenses and loss in Financial books:</i>		
Loss due to obsolescence	2850	
Income tax	20150	
Loss due to depreciation in stock	3375	<b>27935</b>
Profit as per financial accounts		<b>64377</b>

## QUESTIONS

1. Define costing, state its objects and advantages.
2. What are the differences between cost accounting & Financial Accounting?
3. Explain briefly the various methods of costing.
4. Write short notes on a) cost unit b) cost centre
5. How would you classify various costs and explain each of them brief
6. What is a cost sheet? Explain the purposes served by it.
7. What are the advantages of installing costing system in an enterprise?
8. Discuss the limitation of cost Accounting.
9. What is reconciliation cost and financial accounts?
10. What are the reasons for disagreement between cost and financial accounts?

\*\*\*\*\*

**Units – II****MATERIALS**

The term Material refers to all commodities consumed in the Process of manufacturing.

**Purchase of materials:**

- I. Centralised Purchasing:** All purchases should be made by the purchasing department. They are under the control of purchase manager.
- II. Decentralised purchasing:** Heads of various departments make their own purchases.

**The Purchase Procedure:**

- I. Purchase Requisition:** It is a form used as a formal request to the purchasing department for, the purchase of a material. It contains the name of the department requiring materials, description of materials, Quantity etc. This form is prepared by the storekeeper for regular stock of materials.

**Specimen – Purchase Requisition**

Ramkumar Co. Ltd.,						
Purchase Requisition Regular / Special						
Date: _____				No: _____		
Date Required: _____				Dept: _____		
Sl. No.	Quantity	Description	Code No	Purchase No.	order	Supplier
Required by _____				Approved by _____ Purchase officer _____		

- II. Selection of Supplier:** On the basis of purchase requisition the purchasing department should make arrangement for getting Quotation from various suppliers. On receipt of the Quotations from the suppliers should be compared and the supplier who offer best quality at the lowest price should be selected.

**III. Purchase Order:** The purchasing department should place orders with those suppliers who will provide best quality of goods at the lowest price. Purchase order is a written authorisation to the supplier to supply the specified materials at a price and terms mentioned therein.

### Purchase order – Specimen

Ramkumar Co. Ltd.,				
Purchase order				
No: _____		Order No : _____		
Supplier: _____		Date : _____		
		Required No: _____		
Please supply the following items of stores in accordance with the instructions mentioned herein , the following				
Quantity	Description	Code No.	Rate	Delivery date
Terms of Delivery		Purchase officer _____		
Terms of payment				

**IV. Receipts of materials:** In large concerns, all incoming materials are received by receiving department. This department checks the quantity against copy of the purchase order and suppliers advice note. Thereafter a goods received note is prepared in triplicate.

**V. Inspection of materials:** In large concerns, separate inspection and testing department to test the quality of materials purchased. Samples may be tested before the goods are finally approved.

**VI. Returns to supplier:** Where goods received are not of the type ordered or are damaged or are not satisfactory these may be returned to-supplier immediately.

**VII. Approval of Invoices:** The supplier's invoice should be checked before the payment is made. It should be checked with the purchase requisition, order, Goods Received Note, inspection report against quantity, price etc., should be charged correctly.

## MATERIAL CONTROL

Material control is defined as safeguarding of company's property in the form of materials by a proper system of recording and also to maintain them at the maximum level.

### OBJECTS OF MATERIALS CONTROL:

1. **No overstocking:** Investment in materials must be kept as low as possible.
2. **Minimum wastage:** proper storage facilities must be provided for different type of materials in order to avoid losses arises due to theft, deterioration.
3. **Economy in purchasing:** Materials should be purchased at favourable
4. price.
5. **No under stocking:** Investment in materials under stocking will lead to delay or stoppage in production. It may result in to loss of profit.
6. **Information about materials:** This system should give complete and up to date accounting information about the availability of materials.

**Stock levels:** In order to avoid under stocking and overstocking a scientific system of stock level is to be adopted in the business. The stock levels are

- a) Maximum stock level,
- b) Minimum stock level,
- c) Re-order level,
- d) Average stock level,
- e) Danger level

- I. **Maximum stock level:** It means the maximum quantity of an item of, materials which can be held in stock at any time.

**Formula:** Maximum stock level = Reorder level + Re-order Quantity - [Minimum consumption x Minimum re-order period]

- II. **Minimum stock level:** This represents the minimum quantity of materials which must be maintained in hand at all times.

**Formula:** Re-order level - (Normal Consumption x Normal re-order period)

- III. **Re-order level:** It is the level of materials at which a new order of material is placed. This level is above minimum level but below maximum level.



**Formula:** Reorder level = (Maximum consumption x Maximum Re-order period)

**(i) Re-order Quantity:** It is the quantity for which order is placed wh material; reaches at re-order level.

#### IV. Average stock level:

**Formula :** Average stock level=Minimum stock level +1/2 of Re-order Quantity

(or)

$$= \text{Minimum stock level} + \text{Maximum stock level} \div 2$$

**V. Danger level:** It is a level of which issue of material are stopped and issues are made only under specific instructions. It is below the minimum level, (emergency)

**Formula:** Danger level: Average Consumption x Maximum re-order period for emergency purchase.

**Problem:1** Two Components X and Y are used as follows

Normal Usage - 600 Units per week each.  
 Maximum usage - 900 Units per week each.  
 Minimum Usage - 300 Units per week each.  
 Reorder Quantity - X4800 units, Y 7200 units.  
 Reorder period: - X=4to6Weeks  
                           Y = 2 to 4 weeks.

**Calculate for each Component:**

A) Reorder Level B) Minimum Level C) Maximum Level D) Average Stock Level

**Solution:**

**Reorder Level** = Maximum Consumption x Maximum Reorder period.

Component X : 900 units x 6 weeks =5400 units.

Component Y : 900 units x 4 weeks = 3600 units.

**Minimum Stock Level** = Reorder Level - [Normal Consumption x Normal Reorder Period]

X = 5400 units (600 units x 5 weeks) = 5400 - 3000 units=2400 units.

$$Y = 3600 \text{ units} - (600 \text{ units} \times 3 \text{ weeks}) = 3600 - 1800 = 1800 \text{ units}$$

**Maximum Stock Level:** Reorder level + Reorder Quantity - (Minimum consumption x Minimum Reorder period]

$$X = 5400 \text{ units} + 4800 \text{ Units} - [300 \text{ units} \times 4 \text{ weeks}] = 10200 \text{ units} - 1200 = 9000 \text{ units}$$

$$Y = 3600 \text{ units} + 7200 \text{ units} - (300 \text{ units} \times 2 \text{ weeks}) = 10800 \text{ units} - 600 \text{ units} = 10200 \text{ units.}$$

**Average Stock Level:** Minimum Stock Level + 1/2 Reorder quantity

$$X = 2400 \text{ units} = 1/2 \times 4800 \text{ units} = 2400 + 2400 = 4800 \text{ Units. (OR)}$$

$$= \text{Minimum level} + \text{Maximum Level} / 2$$

$$= 2400 + 9000 / 2 = 11400 \text{ units} / 2 = 5700 \text{ units.}$$

$$y = 1800 \text{ units} + 1/2 \text{ of } 7200 \text{ units.} = 1800 + 3600 = 5400 \text{ units}$$

(OR)

$$1800 + 10200 / 2 = 12000 / 2 = 6000 \text{ units.}$$

### **Problem : 2**

Normal usage : 50 units per week .

Minimum Usage: 25 units per week

Maximum usage: 75 units per week

Reorder quantity: 300 units, Reorder period = 4 to 6 weeks.

**Calculate:** Minimum level and Maximum level

**Solution:**

**Reorder level:** Maximum consumption x Maximum Reorder period.

$$75 \text{ units} \times 6 \text{ weeks} = 450 \text{ units}$$

**Minimum stock level:** Reorder level - ( Normal consumption x Normal Reorder period)

$$= 450 \text{ units} - (50 \text{ units} \times 5 \text{ weeks}) = 450 \text{ units} - 250 \text{ units} = 200 \text{ units}$$

**Maximum Stock level:** (Reorder levels + Reorder Quantity) – Maximum consumption x Maximum Reorder period.

$$= (450 \text{ units} + 300 \text{ Units}) - (25 \text{ units} \times 4 \text{ weeks})$$

$$= 750 \text{ units} - 100 \text{ units} = 650 \text{ units.}$$

**Average Stock Level:** Minimum stock Level +1/2 Reorder Quantity

$$=200 \text{ units}+ 150(300/2)= 350 \text{ Units.}$$

[Or]

$$\text{Minimum level} + \text{Maximum Level} / 2 = 200+650 / 2 = 425 \text{ units}$$

**Economic Ordering Quantity (E.O.Q):** The quantity material to be ordered at one time is known as economic ordering quantity. This quantity is fixed in such a manner as to minimise the cost of ordering and carrying the stock.

**Formula:** 
$$E.O.Q = \sqrt{\frac{2AB}{CS}}$$

A = Annual usage

B = Buying cost per order

C = Cost of per unit of material

S = Rate of storage and carrying cost.

The E.O.Q is determined keeping in view the ordering cost and carrying costs.

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

- I. Cost of storage, space
- II. Cost of spoilage in stores
- III. Cost of ins for storing materials
- IV. Cost of maintaining the materials
- V. Clerical cost
- VI. Insurance Cost.

**Ordering Cost:** It is the cost of placing orders for the purchase of Materials and includes cost of stationery, postage, cost of staff in Purchasing dept.

### Problem 3:

X Co; purchases 1600units of certain component from Y Co; the average annual usage is 1600units. The order cost is Rs.100 and the carrying cost is Rs 8 per unit. Calculate E.O.Q.

Solution

$$EOQ = \sqrt{\frac{2 \times 1600 \times 100}{8}} = \sqrt{40000} = 200 \text{ units}$$

**Problem: 4**

Calculate E.O.Q from the following  
 Consumption 600 units.  
 Ordering Cost Rs 12 per order  
 Carrying Cost 20%  
 Price per unit Rs. 20

**Solution:** E.O.Q =  $\sqrt{\frac{2AB}{CS}}$

A= 600 units B = Rs.12 C = 20 S= 20/100

$$= \sqrt{\frac{2 \times 600 \times 12}{20 \times 20 / 100}} = \sqrt{\frac{2 \times 600 \times 12 \times 100}{20 \times 20}} \quad \text{E.O.Q.} = 60 \text{ units}$$

**Problem:5**

Two Components X and Y are used as follows:

Normal Usage -600 Units per week each.  
 Maximum usage -900 Units per week each.  
 Minimum Usage -300 Units per week each.  
 Reorder Quantity -X 4800 units, Y 7200 units.  
 Reorder period: -X= 4 to 6 Weeks  
                                   Y= 2 to 4 weeks.

Calculate for each Component a) Reorder Level b) Minimum Level c) Maximum Level d) Average Stock Level

**Solution:**

**Reorder Level** = Maximum Consumption x Maximum Reorder period.

Component X = 900 units x 6 weeks =5400 units.

Component Y = 900 units x 4 weeks = 3600 units.

**Minimum Stock Level** = Reorder Level - (Normal Consumption x Normal Reorder Period)

X - 5400 units (600 units x 5 weeks) = 5400 - 3000 units = 2400 units.

Y= 3600 units- (600 units x 3 weeks) = 3600 - 1800 = 1800 units

**Maximum Stock Level** = Reorder level + Reorder Quantity - [Minimum consumption x Minimum Reorder period]

X - 5400 units + 4800 units - [300 units x 4 weeks]

10200 units - 1200 = 9000 units

$$Y = 3600 \text{ units} + 7200 \text{ units} - (300 \text{ units} \times 2 \text{ weeks})$$

10800 units. 600 units = 10200 units.

Average Stock Level = Minimum Stock Level + 1/2 Reorder quantity

$$X = 2400 \text{ units} = 1/2 \times 4800 \text{ units} = 2400 + 2400 = 4800 \text{ Units}$$

(OR)

$$= \text{Minimum level} + \text{Maximum Level} / 2$$

$$= 2400 + 9000 = 11400 \text{ units} = 5700 \text{ units}$$

$$y = 1800 \text{ units} + 1/2 \text{ of } 7200 \text{ units} = 1800 + 3600 = 5400 \text{ units} \quad [\text{Or}]$$

$$1800 + 10200 / 2 = 12000 / 2 = 6000 \text{ units.}$$

## **BILL OF MATERIAL**

Sometimes all the materials required for a particular job are listed on a single document is known as a Bill of material. It is a master requisition listing all the materials requested for a particular job.

### **Merits:**

1. Clerical errors is reduced.
2. Costing Job is earlier. It is a material requisition to which is in printed document.

**Material Transfer Note:** Any materials transferred from one job to another should be recorded on a materials transfer note.

### **ABC Analysis (Always Better Control):**

ABC analysis is also known as proportional parts value analysis. It is an analytical method of stock control. This technique of stock control according to value method. Under this technique of material control, materials are listed in A, B and C categories in descending order based on value consumptions.

Item A - has low percentage but of high value.

Item B - has large percentage but of low value.

Item C - falls between item A and B and less importance

Thus ABC analysis measures and significance of each item of material (ie) very close control is exercised over me Item A because it has high value and adequate control is needed for Item B and little control is essential for Item C.

**Example:**

Category	Percentage of Item	Percentage of Cost
A	8%	75%
B	22%	18%
C	70%	7%

In the above example purchase stores and issue of materials are to be strictly controlled in case of item A because it has high material cost. In case the 'C' item little material control is exercised because it has very small portion of costs.

These analysis will facilitate the management to exercise control on the basis value of material.

Material Item	Importance on the basis of value
A	Most important
B	Average
C	Less important

**Advantages:** 1) A strict control is exercised on die item which represent a high percentage of material value 2) investment in inventory is reduced to minimum 3) saving the time of management 4) storage cost ii reduced. 5) Introduction of scientific inventory control.

**VED Analysis:** (Vital, Essential and Desirable analysis)

VED analysis means vital, essential and desirable analysis. It is used for control! of spare parts. The spare parts are divided into 3 categories - Vital Essential ami Desirable.

**The spares:** the stock Out of which even for a short time will stop production for some time, where the cost of stock out is very high are known as 'vital spares'.

The spares the absence of which cannot be tolerated for more than a few. hours and the cost of production is very high and which are essential for the production to continue are known as "Essential spares".

The Desirable spares are these spares which are needed but their absence for a week will not stoppage of production.

### **Perpetual Inventory:**

It is a continuous stock taking system. Under this system certain numbers of items are counted daily or at frequent intervals.

### **Definition:**

Perpetual inventory system as, "a system of records maintained by the controlling department which reflects the physical movement of stocks and their current balance - ICMA.

It is a method of recording stores balances after every receipts and issue to facilitate regular checking to avoid closing down for stock taking. This system consists of three.

**Bin Card:** A card is attached to each bin, drawer containing materials, It is called as Bin card., This card shows quantity of materials received, issued and balance of stock.

**Stores Ledger:** This ledger contains an account for each item of materials in stock It shows both quantity and value of materials received, issued and stock.

**Continuous stock taking:** It means physical verification of the stock records with actual stock.

### **Advantages of the perpetual inventory system:**

1. Difference of units are detected easily.
2. Bin cards and stores ledger give ready reference.
3. over stocking and under stocking can be avoided.
4. Deterioration and obsolescence can be avoided.
5. It is not necessary to stop production to carryout stock taking,
6. It is very easy to prepare final accounts without physical inventory being taken.

7. Continuous stock taking will make the storekeeper and stores accountant more vigilant in their work.
8. Planning of production can be done according to the availability of material in stores.

### Periodic Inventory system

Under periodic inventory system, the stocks are checked and verified only at the end of the financial year. It is otherwise known as continuous stock taking system certain number of items are counted at frequent intervals.

S.No.	Periodic Inventory System	Perpetual Inventory System
1	Physical verification of the stock records with actual stocks.	The system of stock records and continuous stock taking
2	Conducted throughout the year.	Conducted once in a year.
3	It is cheaper method	Expensive method.
4	Routine work will not be affected.	Routine work will be affected.
5	Items are taken at random.	All items are checked.

### BINCARD

Bin is a place, rack or cupboard where materials have been kept. Each bin is attached a card to show the stock position of the bin. This is known as bin card. It is also known as bin tag or stores card. These cards are maintained by the store keeper. It shows quantities of each materials received, issued and balance of stock. It shows Description code of number of material, bin number, maximum, minimum. Bin serves the purpose of providing ready reference.

### Specimen of Bincard

Bincard					
Bin No : _____			Minimum level _____		
Description: _____			Re-order level _____		
Code No : _____					
Date	Receipts	Issues	Balance	Stock verification	
	Qty	Qty	Qty	Date	Initials



**Stores ledger:** This ledger contains an account for each item of material in stock which gives information about that material both quantity and Value. It is maintained by cost accounting department. This ledger shows the Balance in hand at any time.

### Specimen of Stores Ledger

Stores Ledger									
Description: _____			Unit : _____			Minimum level : _____			
Code No : _____		Location : _____			Re-order level : _____				
Bin No : _____		Maximum : _____			Re-order Quantity: _____				
Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount

### Difference between Bin card and Stores Ledger

S. No.	Bin card	Stores Ledger
1	It is kept inside the stores	It is kept outside the stores.
2	It records Quantity only.	It records both quantities and Values.
3	It is maintained by the store keeper.	It is maintained by costing Dept.
4	Entries are made by the store keeper.	Entries are made by the cost clerk.
5	It shows physical information.	It gives both physical as well as value information.
6	postings are made before the transactions.	Postings are made after the transactions.
7	Entries are made along with each transactions.	Entries are made periodically.

### Methods of pricing material Issues:

When pricing materials issued to production from stores there are six methods are followed for pricing material issues,

1. First in First Out (FIFO) Method
2. Last in First out (LIFO) Method
3. Simple average price Method
4. Weighted average price Method

5. Base stock method.
6. Highest in first out (HIFO)

### I. First in First out Method: (FIFO):

Under this method materials which are purchased first are issued first. Materials are issued at the oldest cost price listed in stores ledger account. It uses the price of the first batch of materials purchased for all issues until all units from this batch have been issued. After the first batch is fully issued, the price of the next batch received becomes the issue price.

#### Advantages:

- b. Materials are issued at actual cost.
- c. closing stock valuation is at cost as well as at the latest market price.
- d. This method simple to operate and easy to understand.
- e. When prices are falling, method gives better result.
- f. This method is based on that materials which are received first are issued first.

#### Disadvantages:

- a. Materials are not priced at the current market price.
- b. This method produces unfair results as between one job and another.

Example:

Jan.5 Received 500 kg. @ Rs.5 per kg.  
 Jan. 10 Received 700 kg @ Rs.6 per kg.  
 15 Jan. Issued 800 kg

**Solution:**

Issue Price	Rs.
500Kg@Rs.5	2500
300Kg@Rs.6	1800
800Kg	<b>4300</b>
Balance of Stock	400 kg @Rs. 6 Rs. 2400.

II. **LAST IN FIRST OUT METHOD (LIFO):** This method is just opposite of FIFO. Under this method, materials received last are issued first. Issues are made from the latest purchase.

**Advantages:**

- a. Materials cost represents cost price.
- b. As materials are issued at actual cost, it does not result any unrealised profit
- c. It is suitable when prices are rising.

**Disadvantages:**

- a. This method is not realistic
- b. This method may lead to clerical errors.
- c. This system is not accepted by income tax Department.

**Example:**

Jan.5 Received 500 Kg. @ Rs.5 Per Kg.  
 Jan.10 Jan. Received 700 Kg @ 6 per kg.  
 Jan 15 issued 800 Kg  
 Solution:

	Rs.	
700 kg @ Rs.6	4200	
100 kg @ Rs.5	500	
800 kgs	<b>4700</b>	
Balance of Stock 400 kg @ Rs. 5		Rs. 2000

III. **Simple Average Price Method:** Simple average price is the average of the prices of different lots of material to purchased.

Issue price = Total price / No. of Prices

**Example:**

Jan. 1 100 units purchased of Rs.10 each  
 Jan 5 300 units purchased of Rs. 11 each  
 Jan 10 400 units purchased of Rs.15 each  
 Jan 15 Issue of 500 units.  
 Issue price =  $\frac{Rs. 10 + Rs.11 + Rs. 15}{3} = Rs.36 = Rs. 12$

**Advantages:**

- 1) It is easy to calculate and simple to understand.
2. It reduces clerical work.

**Disadvantages:**

1) Costs cannot be recovered fully. This system is not generally adopted.

**Weighted Average Price Method:** It is a price obtained by dividing the total cost of materials in the stock by total quantity of materials in the stock and issues are priced accordingly.

Issue Price = Total cost\* / Number of Quantity

(\*Total Cost = Quantity x Rate)

Example:

Number of Quantity

Jan 1 100 units purchased of Rs.10

Jan 5 300 units purchased of Rs 11

Jan 10 400 units purchased of Rs. 15

Jan 11 Issue 800 units

Issue price =  $100 \times 10 + 300 \times 11 + 400 \times 15 / 100 + 300 + 400$

= Rs.  $1000 + 3300 + 6000 / 800$  units

=Rs.  $10,300 / 800$  units =Rs. 12.88

### 1. FIFO, (First in First out Method)

Problem No: 1

The following transactions took place in respect of Material during the month of September 2015.

Date	Particulars	Quantity	Rate per unit
Sept. - 1	Received	500	10
Sept. - 10	Received	300	12
Sept. - 15	Issued	700	---
Sept. - 20	Received	400	14
Sept. - 25	Issued	300	---
Sept. - 27	Received	500	11
Sept. - 30	Issued	200	---

You are requested to write up stores Ledger under FIFO, LIFO, Simple Average Method and Weighted Average Cost Method.

**Solution:**

#### STORES LEDGER ACCOUNT (FIFO METHOD)

Date	Particulars	RECEIPTS			ISSUES			BALANCE		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Sept. 1	Goods rec. note No.	500	10	5000	---	---	---	500	10	5000
Sept. 10	Goods rec. note No.	300	12	3600	---	---	---	500	10	5000
								300	12	3600
Sept. 15	Requisition slip No.	---	---	---	500	10	5000			
					200	12	2400	100	12	1200
Sept. 20	Goods rec. note No.	400	14	5600	---	---	---	100	12	1200
								400	14	5600
Sept. 25	Requisition slip No.	---	---	---	100	12	1200			
					200	14	2800	200	14	2800
Sept. 27	Goods rec. note No.	500	11	5500	---	---	---	200	14	2800
								500	11	5500
Sept. 30	Requisition slip No.	---	---	---	200	14	2800	500	11	<b>5500</b>

Answer: closing stock 500 units Rs. 5500

## II. LAST IN FIRST OUT METHOD (LIFO)

Date	Particulars	RECEIPTS			ISSUES			BALANCE		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
Sept. 1	Goods rec. note No.	500	10	5000	---	---	---	500	10	5000
								300	12	3600
Sept. 10	Goods rec. note No.	300	12	3600	---	---	---	300	12	3600
Sept. 15	Requisition slip No.	---	---	---	300	12	3600			
					400	10	4000	100	10	1000
Sept. 20	Goods rec. note No.	400	14	5600	---	---	---	100	10	1000
								400	14	5600
Sept. 25	Requisition slip No.	---	---	---	300	14	4200	100	10	1000
								100	14	1400
Sept. 27	Goods rec. note No.	500	11	5500	---	---	---	100	10	1000
								100	14	1400
								500	11	5500
Sept. 30	Requisition slip No.	---	---	---	200	11	2200	100	10	<b>1000</b>
								100	14	<b>1400</b>
								300	11	<b>3300</b>

Answer : Closing stock 500 units of Rs. 5700

## III. SIMPLE AVERAGE METHOD (STORES LEDGER ACCOUNT)

Date	Particulars	RECEIPTS			ISSUES			BALANCE	
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Amount
Sept. 1	Goods rec. note No.	500	10	5000	---	---	---	500	5000
Sept. 10	Goods rec. note No.	300	12	3600	---	---	---	800	(5000+3600)=8600
Sept. 15	Requisition slip No.	---	---	---	700	11*	7700	100	(8600-7700)=900
Sept. 20	Goods rec. note No.	400	14	5600	---	---	---	500	(900+5600)=6500
Sept. 25	Requisition slip No.	---	---	---	300	13*	3900	200	(6500-3900)=2600
Sept. 27	Goods rec. note No.	500	11	5500	---	---	---	700	(2600+5500)=8100
Sept. 30	Requisition slip No.	---	---	---	200	12.50*	2500	500	(8100+2500)= <b>5600</b>

Answer: closing stock 500 units of Rs. 5600

Sept. 15 =  $10+12 / 2 = 22 / 2 = \text{Rs. } 11^*$

Sept 25 =  $12+14 / 2 = 26 / 2 = \text{Rs. } 13^*$

Sept. 30 =  $14 + 11 / 2 = 25 / 2 = \text{Rs. } 12.50^*$

## IV. WEIGHTED AVERAGE COST METHOD (STORES LEDGER ACCOUNT)

Date	Particulars	RECEIPTS			ISSUES			BALANCE	
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Amount
Sept. 1	Goods rec. note No.	500	10	5000	---	---	---	500	5000

Sept. 10	Goods rec. note No.	300	12	3600	---	---	---	800	8600
Sept. 15	Requisition slip No.	---	---	---	700	10.75*	7525	100	1075
Sept. 20	Goods rec. note No.	400	14	5600	---	---	---	500	6500
Sept. 25	Requisition slip No.	---	---	---	300	13.35*	4005	200	2670
Sept. 27	Goods rec. note No.	500	11	5500	---	---	---	700	8170
Sept. 30	Requisition slip No.	---	---	---	200	11.67*	2334	500	<b>5600</b>

Answer: closing stock 500 units of Rs. 5836

Issue price = Total cost / Total Quantity  
 Sept. 15 = 8600 / 800 = Rs. 10.75\*  
 Sept. 30 = 8170 / 700 = Rs. 11.67\*

Total Cost = (Total Quantity x Rate per unit)  
 Sept 25 = 6675 / 500 = Rs. 13.35\*

**5) BASE STOCK METHOD:** It is the minimum stock which is not to production. The stock in excess of base stock is to be issued second L kae fire, careless handling loading and unloading any one of the method. e.g. FIFO, [or] LIFO. It is also known as safety stock.

**6) HIGHEST IN FIRST OUT METHOD:** In this method issued are always valued at the highest price of the receipts. This rate continues until the material at the high price is exhausted after which the next highest price is used.

**7) REPLACEMENT OF PRICE METHOD:** Under this method, material are charged at the market price on the date of issue. Replacement price is nothing but the price at which materials issued will be replaced i.e., market price.

#### **Advantages:**

1. Materials are issued at the current market price.
2. This is method is simple to operate as no calculations are required.

#### **Disadvantages:**

1. Issues are not priced at actual cost, thus resulting in unrealised profit or loss.
2. The valuation of stock is not at the current prices.
3. The replacement price may not be easily available.

#### **8) Standard Price Method:**

In this method a standard price is calculated and all materials issued are valued at this price. Standard price is a notional price and is not actual cost price.

Standard prices are fixed for each item of material and where prices of materials fluctuate heavily, standard prices should not be fixed on a long-term basis.

Under this method all receipts are posted in Stores Ledger Account at actual cost and issues are priced at a pre-determined a standard rate for each material.

## Material Losses

1. **Wastage:** It is that portion of material which is lost during handling storing or in course of production and has scrap value.

**Causes of wastage:** Wastage of materials arises due to evaporation, leakage, fire careless handling and loading. It may be visible and 'invisible'.

**Types of wastage:** i) Normal wastage ii) Abnormal wastage.

i) **Normal wastage:** It is not avoidable wastages which arises due abnormal conditions. (E.g.) Evaporation, leakage, loading and unloading.

**Abnormal wastage:** It is not avoidable wastage which arises due abnormal conditions. (E.g.) Fire, accident, theft, careless handling. The value of such loss will not be added to cost of production but is transferred to costing Profit & Loss Account.

**Scrap:** it mens fragments or incidental residue of material from certain types of manufacture. It has small value without further processing.

**Example:** Turning, Punching, Sawing, Moulding etc.

**Types of scrap:** i) Legitimate Scrap, ii) Administrative Scrap iii) Defective Scrap.

**Defectives:** Defectives are that portion of production which can be rectified at some extra cost of re-operation. Defectives may arise due to sub- standard materials careless inspection, bad-supervision.

**Spoilage:** spoilage occurs when goods are so damaged in the course of manufacturing process. Spoilage is irreparable or unrectifiable.

**Types of spoilage:**

1. **Normal Spoilage:** The cost of normal spoilage is borne by goods units of product.
2. **Abnormal Spoilage:** The cost of abnormal spoilage is transferred to profit & loss account.

**QUESTIONS:**

1. Explain ABC analysis ?
2. Describe Perpetual Inventory System ?
3. State the difference between bin card and Stores Ledger.
4. Explain the purchase procedure ?
5. Give me specimen of Purchase Requisition ?
6. Explain the various methods of pricing of material issues ?

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## Unit – III

### LABOUR

Labour represents human contribution to production and is second important element of cost

#### Definition:

Direct Labour is that “which can be identified with and allocated to cost centres or cost unit”. I.C.M A., London.

“Direct Labour is all labour expended in altering the construction, composition or condition of the product”. - Wheldon

Indirect labour is of general character and cannot be conveniently identified with a particular cost unit. It helps and facilitates production indirectly. Examples are foreman, supervisor, cleaner, inspector; clerk, etc.

**Types of Labour:** 1) Direct Labour 2) Indirect Labour.

1) **Direct Labour:** Direct Labour is that, "Which can be identified with and allocated to cost centres or cost units. Thus Direct labour is engaged in converting rawmaterials into finished goods, (e.g) machine operator, shoemaker, tailor.

2) **Indirect labour:** are those labour which cannot be conveniently identified with a particular cost unit. (e.g) supervisor, foreman, peon, clerk, etc.

#### Distinguish between Direct and Indirect labour:

Direct labour is that labour which can be conveniently identified or attributed wholly to a particular job, product or process. Thus direct labour includes all labour expended in converting raw materials into finished goods.

Indirect labour is one which is of a general character and cannot be conveniently identified with a particular job, product or process.

#### *Examples of Indirect Labour*

1. Labour employed in Service Departments like Power House, Internal Transport Service, Gate and Security.

2. Labour employed on maintenance work.
3. Storekeeping workers and other such personnel.

## **Organisation of Labour Department**

There are mainly five departments in an organisation dealing with labour:

1. Personnel Department
2. Time Recording Department.
3. Payroll Department
4. Engineering Department and
5. Cost Accounting Department

- 1. Personnel Department:** it plays a very important role as it is primarily concerned with the proper selection and training of workers and placing them to jobs for which they are best suited. This department is a service department and renders only advisory functions.
- 2. Time Recording Department:** The recording of time put in by a worker is required for two purposes, (i.e) for time keeping and time booking.
  - ❖ *Time keeping* is the recording of time for the purpose of attendance and wage calculations.
  - ❖ *Time booking* is the recording of die time for purposes of cost analysis and apportionment of labour costs over various jobs.
- 3. Payroll Department:** The important functions of this department in controlling and accounting for labour costs may be listed as follows:
  - a) To compute the wage and to prepare the payroll for each department
  - b) To compute the payroll deductions.
  - c) To disburse salary and wage payments.
- 4. Engineering Departments:** This department helps in maintaining control over working conditions and production methods for each job, department. It performs the following functions.
  - a) Preparation of plans and specifications for each job.
  - b) Safe and efficient working conditions.
  - c) Preparation of time and motion studies of labour.
  - d) Making job analysis and setting piece rates.

**5. Cost Accounting Department:** This department is responsible for the accumulation and classification of all cost data of which labour, is one of the elements. This department is responsible for analysing the payroll in order to render, routine and special labour cost reports revealing the amount of normal and abnormal idle time, direct and indirect labour, overtime and variances from budgeted labour costs. These reports inform management of the effectiveness of labour policies and permit necessary action to be taken to retain proper control of labour costs.

**Problem:1 Labour Cost per man per day of 8 hours**

From the following particulars ascertain Labour cost per day of 8 hours

Basic Pay - Rs. 200 per month

Leave Pay-5%

Employer Contribution to provident fund 8% of (a) and (b)

Employer's contribution to E.S.I. -2.5% of (a) and (b)

Pro rate amenities Rs. 17.95 per head per month

Working hours in a month-200hours.

**Solution:**

**Statement of Labour Cost per man per day of 8 hours**

Particulars	Per month Rs.	Per day 8 hours
Basic pay	200	
Leave pay $200 \times 5 / 100$	10	
Employer's contribution to P.F. 8% of (a) and (b) $210 \times 8 / 100$	16.80	
Employer's contribution to E.S.I. - 2.5% of (a) and (b) $210 \times 2 \frac{1}{2} / 100$	5.25	
Amenities	17.95	
Total labour cost per man of 200 hours of one month	250	10
Total labour cost per man of 8 hours = $250 \times 8 / 200 = \text{Rs. } 10$		

Problem:

From the following particulars given below, Calculate Labour

cost per man per day of 8 hours:

Basic Salary Rs. 5 per day

Dearness Allowance 20 paise per every point over 100 cost of living index for the workers. Current Cost of Living index is 800 points.

Leave Salary 5% of (1) and (2)

Employer's contribution to P.F. 8% of (1) and (2)

Employer's contribution to State Insurance 5% of (1), (2) and (3)

Number of working days in a month 25 days.

**Solution: Statement of Labour Cost per man per day of 8 hours :**

	<b>Per day of 8 hours: (Rs.)</b>
Basic salary	5.00
D.A. 20 paise per every point over 100 cost of living index for a month of 25 days Per day = $700 \text{ points} \times 20/100 \times 1/25$ (800 points - 100 points = 700 points)	5.60
Leave Salary 5% of (1) and (2) ( $5 + 5.60 = 10.60 \times 5/100$ )	0.53
Employer's Contribution to P.F. 8% of (1) and (2) ( $10.60 \times 8/100$ )	0.85
Employer's Contribution to state * Insurance of 5% of (1), (2) and (3) ( $5 + 5.60 + 0.53 = 11.13 \times 5/100$ )	0.56
<b>Labour Cost per man per day of 8 hours</b>	<b>12.54</b>

### **Time keeping**

Time keeping Department is to keep a record of each worker entering and leaving time in the factory. It is considered important to record the time of workers entering and leaving the factory. It is the recording of each worker's time of coming in and going out of the factory for the purpose of attendance and wage calculations.

### **The objects of time-keeping :**

1. To mark attendance of each worker to satisfy legal requirements.

2. To prepare wage sheets.
3. To maintain discipline in the factory.
4. To ascertain the labour cost chargeable to jobs.
5. To control labour cost.
6. To have a correct record of attendance for meeting statutory requirements.
7. Overhead distribution, if it is based on wages or labour hours.

### **Methods of Time-keeping:**

The methods of time-keeping can be broadly classified into two categories:

(a) Manual methods and (b) Mechanical methods.

**a) Manual Methods:** There are two manual methods. These are:

**Attendance Register or Muster Roll:** This is the oldest method of time keeping. This register may be kept in time office or with the foreman in the department. Attendance may be marked by the time-keeper or the foreman. Under this method a register is maintained for worker's attendance. This method is very simple and cheap to operate. But it can be used in very, small factories. Records may not be accurate. Chances of disputes and mistakes will arise.

**Token or Disc Method:** Under this system, every worker is allotted a disc or token bearing his identification number. All such discs are hung on a board at the entrance of the factory. As and when a worker enters, he removes his disc from the board and puts it into the box or hangs it on another board which is specially kept for this purpose.

After the expiry of the time, the first box is removed and replaced by another for late comers. Alternatively, workers coming late may be required to report at the time office so that the exact time of their arrival can be noted. After the factory gates are closed, the time clerk marks the attendance in register on the basis of tokens in the boxes. The absentees are indicated by the missing tokens in the box.

This system is improvement on the attendance register method. It is difficult to check one worker inserting two discs into the box, one of himself

and the other of his friend. It involves a large amount of clerical work and there is a possibility of mistakes.

**Mechanical Methods:** It is classified into three.

**i. Time Clock Method:** Under the mechanical methods, time clocks are used to record the worker's attendance. In this system the attendance is recorded on a clock card. When a worker enters the gate, he picks up his card from the "out" rack, inserts it into the clock and the time is stamped at the relevant space. He takes his card out and keeps it in the "In" rack. This process is reversed when he goes out of the factory.

Thus every worker is allotted a card which bears the worker's identification number. These cards are kept in racks lying outside the factory gate. There are usually two racks denoting 'out' and 'in' racks. The cards left in the 'Out' racks indicate absent workers.

**Advantages:**

1. It provides for correct recording of attendance.
2. Changes of false and fraudulent entries are reduced.
3. Work in connection with the preparation of wage sheets becomes is very easy.
4. The clocks produce a definite record.

**ii. Dial Tune Recorders:**

This consists of a mechanism with a dial having a number of holes about the circumference. When a worker enters the factory, he presses the dial arm into a hole which denotes his particular number and die time is recorded automatically on an attendance form placed inside.

This attendance sheet forms a part of the payroll and there is no-need of copying out the record. But this method has the following defects

- a) The time of worker's arrival and departure are widely separated on the paper, making the calculation of worker's total time cumbersome.
- b) The capacity of this machine is very much limited as the number of holes is only about 150.

- iii. Key Recorder System:** This is a mechanism with a number of keys, each key bearing the number of a worker. When a worker enters the factory, he inserts his particular key in the key-hole and gives a turn, the ticket number and the clock time are recorded on a sheet of paper.

### **Time Booking:**

It is a process of recording the time spent by a worker on differ jobs carried out by. In during his period of stay m the factory,

#### **The objects of time booking:**

1. To ascertain die cost of work done.
2. To ensure that time for which worker has been paid is properly utilised.
3. To provide a basis for the appointment of over-heads, and
4. To ascertain the idle time so as to control it.

Time booking may be done manually or mechanically depending, upon the size of the organisation. Large organisations, use time recording clocks for recording time on each job.

### **Methods of Time Booking**

There are five methods of Time booking. They are

1. **Daily Time Sheet System:** This is a daily record of the work done by a worker, showing the jobs on which he worked and the time spent against each. One sheet is allotted to each worker and a daily record is made therein. This can be used in small organisations where the number of workers as well as the number of jobs are very much limited.
2. **Weekly Time Sheet:** This is similar to Daily Time sheet. The difference is that instead of recording the work done for a day only, record of time for all jobs is done weekly. Here Weekly Time Sheets are kept. The weekly time sheet gives a consolidation of the total hours worked during the week and this total can be checked against the total shown in the clock cards. This methods is useful-where there are a few jobs in a week.

3. **Job cards:** This card is prepared for each job. This card is allotted to each worker whenever a worker takes up a particular job. Worker enters this card the time of starting the job as well as time of finishing the job.
4. **Time and Job Card:** This system provides a card which consists of two sections, one to be filled up as a job and the other as a time card. This card records the attendance time and the time spent on different jobs on the same form. It consists of two sections - one for recording attendance and the other for recording the work time. Thus, it records both the attendance time and work time of a worker on the same sheet.
5. **Labour Cost Card:** This is a type of circulating job card meant to record the time taken on the job by all the workers employed on it. Instead of allotting one card to each worker, the same card is passed round and the time taken by each worker on that job is recorded on it. Thus, this card gives the total labour cost of a job.
6. **Piece-Work Card:** Where workers are paid on piece rate system, piece-work card is used. Such a card is maintained for each job separately.
7. **Wages Abstract:** This is a summary prepared weekly or monthly, showing the amount of time spent by a worker on different jobs. This shows an analysis of wages paid during a period of time on different jobs.

The Wages Abstract is a medium of allocation of labour cost to different jobs. It provides a basis for writing job ledger.

**Write short notes on:** (a) Out workers, (b) Casual workers

- a) **Out workers:** Out workers are those workers who work outside the factory on behalf of the company.
- b) **Casual Workers:** These are temporary workers who are appointed on daily basis in order to meet increase in production or to replace the absentee workers. These are known as casual workers. Such workers are known as casual workers as they are not regular workers of the organisation.

### **Overtime Wages**

Work done beyond the normal working hours is known as overtime work. According to the Indian Factories Act, no worker should be allowed to work for



more than 9 hours a day or 48 hours a week. Suppose a worker works for more than 9 hours in a day or more than 48 hours in a week he has to be paid for his overtime at double the normal rate of wages. Overtime work involves extra cost as it has to be paid at double of pauses of idle time

**Treatment of Overtime Costs.**

1. If overtime is required to make up any shortfall in production or for meeting urgent orders, the overtime premium should be treated as overhead cost of the department concerned.
2. When the customer agrees to bear the entire charge of overtime due to urgency of work, it should be charged direct to the job or work order concerned.
3. Where overtime is worked due to seasonal nature, it should be treated as general overhead.
4. Overtime worked on account of abnormal conditions like floods, earthquakes, etc., should be transferred to Costing Profit and Loss Account.
5. Overtime work is work done beyond normal working hours. The Factories Act provides for payments of overtime wages at double the normal rate wages.

**Control of overtime:**

1. All overtime work should be duly authorised by higher officials.
2. Overtime cost should be recorded separately and shown against the department incurring it. It will help in proper planning in future.
3. If overtime is due to limited capacity of plant, new plant may be installed.

### **Idle time**

Give reasons for idle time, How do you treat idle time in cost accounting.

**Meaning of Idle time:** Idle time is that time for which wages are paid but no production is obtained. Idle time may be defined as that time for which wages are paid but no production is obtained. This is the time which cannot be attributed directly to any productive work. Idle time may represent loss of time of labour, machines or equipments due to lack of material, breakdown of machinery, failure of power supply, etc.

**Causes of idle time:**

- a) Productive Causes.
- b) Administrative causes
- c) Economic causes

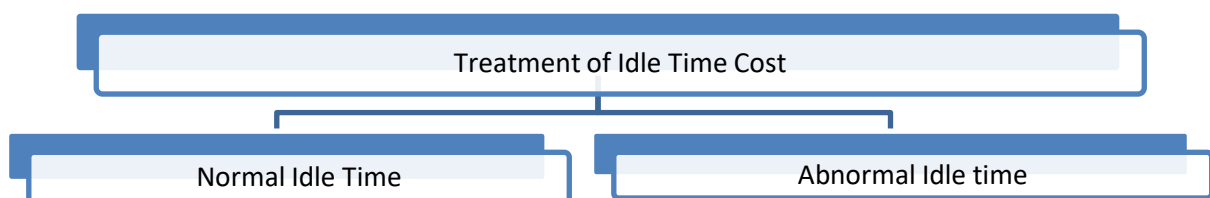
I. **Productive causes:** The productive causes may further be classified as follows:

1. Idle time due to machine break down.
2. Power failures.
3. Workers waiting for raw materials and tools.
4. Workers waiting for work.
5. Workers waiting for instructions.

In all the above cases, idle time can be controlled by proper planning in advance.

II. **Administrative causes:** Idle time is frequently caused by administrative decisions. Sometimes administrative decisions are also responsible for idle time. For example, in case of a surplus capacity of plant and machinery, management may decide not to work fully and there may be some idle time. Therefore, such idle time arises out of abnormal situations, and it cannot be helped.

III. **Economic causes:** Idle time, may arise due to severe competition or seasonal nature of industries. Idle time may arise due to seasonal nature of industries. For example, in the case of woollen goods, ice-cream industry, production cannot be evenly distributed throughout the whole year. It is not possible to employ a number of workers in the busy season and to leave them during slack season.



**Normal Idle Time:** It refers to that loss of time which is generally unavoidable and is incidental to production.

**For example:**

- a. Time taken from the factory gate to the department where worker is engaged and the reverse journey at the end of the day.
- b. Time which elapses between completion of one job and commencement of the next.
- c. Time spent in machine maintenance.
- d. Tea breaks (if any), personal needs, etc.

Thus, normal idle time is of such a nature that it cannot be avoided and its cost is an expense which the employer must bear.

**Treatment of Normal Idle Time:**

- a) It is directly charged to factory overhead account.
- b) Wage rate may be inflated so as to make allowance for normal loss of labour time.

**Abnormal Idle Time:** This type of idle time arises due to inefficiency of management, bad luck or reasons beyond control.

**Examples:** Strikes and lockouts, major breakdown of machinery, fire, flood, power failure, delay in material supply, etc. Measurement of Labour Turnover here are three different methods of measurement of labour turnover

**Treatment of Abnormal Idle Time:** Cost of abnormal idle time should be collected separately and written off to costing profit & loss Account. It cannot be regarded as a cost of production.

**Control of Idle Time:** For control purpose, idle time should be divided into three categories:

- i. *Idle time controllable by foremen*, e.g., waiting for instructions, waiting for tools, faulty tool setting, interrupted flow of work, etc.
- ii. *Idle time beyond the control of foreman but controllable from the standpoint of factory*, e.g., shortage of raw material, power failure.
- iii. *Idle time essentially beyond control*, e.g., unforeseen accidents, shortage of work due to economic conditions, failure of power supply, work stoppage due to strike, etc.

The different causes which lead to idle time should be properly analysed and responsibility should be fixed on appropriate persons to control it.

## **Labour Turnover**

What do you understand by Labour Turnover? How is it measured? What are the causes? What are the remedial steps you would suggest to minimise its occurrence?

**Labour Turnover:** It is rate of displacement of labour employed in an organisation. It is a normal feature in every business organisation that some workers leave their jobs and some new workers take their place. This mobility or change in the labour force is known as labour turnover, labour turnover may be defined as the number of workers left during the period in relation to the average number of workers on the roll during the period. In the other words,

### **MEASUREMENT OF LABOUR TURNOVER**

There are three different methods of measurement of labour turnover:

- i. Separation Rate Method:** This is the most commonly used method. Under this method, measurement is made by dividing the total number of separations during a period by the average number of workers on the roll during the period.

Labour Turnover = No. of workers left during a period / Average No. of workers in the period x 100

**Average number of workers is calculated as under:**

No. of workers in the beginning of period + Number at the end / 2

Multiplying the labour turnover formula by 100; gives the rate in percentage. The period for which labour turnover rate is calculated may be one month, six months, one year period.

**Replacement Rate Method:** This method calculates labour turnover rate by taking into consideration only the number of workers joined.

**Formula:**

**Labour Turnover** = No. of replacement in a period / Average number of workers in the period X 100

While calculating the number of replacements, new workers recruited because of expansion should not be taken into account

**Flux Rate Method:** This method takes into consideration both the number of workers left as well as number of new workers who have joined .

*Formula:*

**Labour Turnover** = No. of workers left + No.of workers replaced / Average No. of workers x 100

This method is a combination of method 1 and method 2

## CAUSES OF LABOUR TURNOVER

The causes of high labour turnover may be classified in two categories:

- (i) Avoidable; and
- (ii) Unavoidable

### **Avoidable Causes:**

1. Redundancy due to seasonal fluctuations, contraction in the market lack of proper planning.
2. Low wages and allowances
3. Unsatisfactory working conditions.
4. Disputes between rival trade unions.
5. Dissatisfaction with the job.
6. Lack of facilities like transport, medical, accommodation, etc.
7. Strained relationship with supervisors or fellow workers.

### **Unavoidable Causes:**

1. Change of service for personal betterment, ,
2. Retirement due to old age and ill health,
3. Death,
4. Discharge on disciplinary grounds on continents long absence,

5. Marriage or pregnancy.

### **Effect of High Labour Turnover**

Effects of Labour Turnover will increase cost of production. There are two types of Cost. (i) Preventive cost (ii) Replacement cost

**I. Preventive Costs:** Preventive costs refer to all those expenses and costs which are incurred by a firm to keep the labour force contented so that excessive labour turnover may be prevented. The major items of preventive costs are:

1. Personal administration.
2. Cost of medical services.
3. Cost of welfare activities and schemes.
4. Pension and or provident fund schemes.

**II. Replacement Costs:** Replacement costs include all such losses, wastage arising because of the inexperienced new labour force replacing the existing ones as well as the cost of recruitment and training of the new workers. It includes the following elements:

- a. Loss of output due to sometime taken in obtaining new labour,
- b. Loss of output and quality due to inefficiency of new labour,
- c. Employment department expenses,
- d. Cost of training of new workers,
- e. Cost of tool and machine breakages,
- f. Cost of scrap and defective work, and
- g. Cost of accidents.

**Reduction of Labour Turnover:** Labour turnover rate may be reduced by taking preventive remedial measures and by removing avoidable causes. The various steps are given below

1. A satisfactory wage system.
2. Improving working conditions.
3. Strengthening the welfare measures.
4. A satisfactory policy for transfers and promotions,
5. Labour participation in management.
6. Efficient and impartial personnel administration.

7. A sound personnel policy for recruitment induction and training of labour
8. A satisfactory level of amenities add welfare measures like canteen facilities, medical services, recreation etc.
9. A satisfactory security scheme like family pension, provident fund, accident compensation, etc.
10. A satisfactory policy for transfers and promotions.
11. Labour participation in management and joint consultation scheme.

## **Time & Motion Study**

What do you understand by Time and Motion Study?

Time study aims at determining the proper speed of movements made by the workers and motion study aims at eliminating unnecessary movements.

**Time study:** It may be defined as "the art of observing and recording the time required to do each detailed element of an industrial operation" Its main object is to determine the standard time required to carry out a job most efficiently.

**Motion Study:** This study deals with one aspect of methods study, i.e., to eliminate unnecessary movements of men and material. "Motion study is the science of eliminating wastefulness resulting from using unnecessary, ill-directed and inefficient motions". It is a detailed study and analysis of the movements of an operation in performing an operation for the purpose of eliminating unnecessary and useless motions:

**Write notes on the following:** (a) Job Evaluation and (b) Merit Rating

- I. Job evaluation:** Job evaluation may be defined as the rating of various jobs according to the responsibility and skill required from them. The basic object of job evaluation is to ascertain the relative worth of each job through an objective evaluation so that relative remuneration can be fixed for different jobs.
- II. Merit Rating:** Merit rating is a systematic evaluation of the personality and performance of each employee by his supervisors or some other labour qualified persons. It is a system by which the performance of an employee is objectively evaluated and compared with that of others in his work group.

## Methods of Wage Payment

*There are mainly three methods of labour remuneration:*

- a) Time Rate System
- b) Piece Rate System
- c) Incentive Schemes.

If a worker may be paid on the basis of time that he spends on his job is known as Time Rate. If he may be paid on the basis of quantity of work done by him is known as piece rate.

**Time Rate System:** This is the oldest of the wage payment systems. In this system time is made the basis of payment. Labour is paid for the time worked irrespective of the volume of production during that time. The formula for calculating wages under this system is:

$$\text{Time Rate (T.R)} = \text{Hours worked} \times \text{Rate per hour}$$

Payment may be based upon the hour, the day or the week, or it may be at the fixed salary rate.

$$\text{Wages} = \text{Time spent} \times \text{Rate per hour (T} \times \text{R)}$$

E.g.: Mr. X is paid at the rate of Rs. 10 per hour. During the month he spends 200 hours. Calculate Mr. X earnings.

$$\text{Earnings} = 200 \text{ hours} \times \text{Rs. 10 per hour} = \text{Rs. 2000 per month.}$$

### Types of Time Rates :

**a) Times Rates at Ordinary Levels:** In this system, time is made the basis of payment irrespective of quantity of work done by a worker payment is made at a rate on attendance by hour, week or a month.

*Formula:*

$$\text{Time Rate} = \text{hours worked} \times \text{Rate per hour}$$

**Time Rate at High Levels:** Under this system, the worker is paid at a wages which is substantially higher than the rate prevailing in that area or industry.

**Graduated Time Rates:** This system provides for variation in the wage



according to changes in the cost of living index. The rates are to be adjusted periodically according to index.

**Advantages:**

1. The workers are assured of minimum wages which gives them a sense of security.
2. The calculation of the amount of wages is simplified.
3. Workers avoid over-speeding and thus cause less damage to equipment.
4. Quality of work produced this method does not give weight to the volume of work done.
5. Trade unions generally oppose this mode of payment.

**Drawback:**

1. It does not distinguish between efficient and inefficient workers.
2. There is no incentive to work more.
3. From costing point of view, it creates difficulties in the calculation of labour cost per unit as the output is quite fluctuating.
4. It needs extra provision for supervision so that workers do not waste their time.

**Piece Rate System:** Under this system a worker is paid a fixed amount per unit produced irrespective of the time taken. A rate per unit of output is fixed and wages are calculated as follows:

**Piece rate** = No. of units produced x Rate per unit (N x R)

**Earnings** = No. of Units produced x Rate per unit (N x R)

**Example:** Mr. X is paid at the Rate of Rs. 4 per unit He produced 500 unit during the month. Calculate his total earnings?

Earnings = 500 Units x Rs. 4 per unit=Rs. 2000 per month.

**Advantages:**

1. It distinguishes between efficient and inefficient workers.
2. It provides a strong incentive because remuneration is in direct ratio to the worker's effort.
3. Costing is simplified because the exact cost of labour per unit is known in advance.

4. Strict supervision is not necessary.

### **Drawbacks:**

1. Workers try to produce maximum quantity to increase, their wages. In the process quality of products is ignored.
2. Minimum amount of wages is not guaranteed.
3. High speed has injurious effect on the health of workers and also on equipment and machinery.
4. Trade unions generally oppose this mode of payment.
5. It involves maintenance of larger records for payroll.

### **TYPES OF PIECE RATES**

- i. **Straight Piece Rates:** This system makes quantity of work as the basis wage payment. A fixed sum per unit of output is given to a worker irrespective of the time taken by him.

The formula is:

**Piece Rate** = Units produced x Rate per unit (N x R)

- ii. **Piece Rates with guaranteed day rate:** In this system, some minimum wage is guaranteed to a worker and if his wage at piece rates, by chance, con out to be less than the guaranteed minimum wage, he shall get the minim wage and not the piece wage.
- iii. **Differential Piece Rates:** Under this system, rates of wages vary at different levels of output. As the output increases, the rate also increases. The crease in rates may be proportionate to the increase in output or proportion a more or less than that. The object of this system is to reward the efficient workers and at the same time to encourage the less efficient to attain standards. Taylor, Merrick, Gantt task and Bonus and Emerson efficiency plan are used this system of payment.
- iv. **Bonus System and Incentive Schemes**

The bonus system may take either of two forms - Individual Bonus System or Group Bonus System.

### **Indirect Monetary Incentives:**

***Profit Sharing Scheme:*** Profit sharing schemes are those where there is an agreement between the employer and his workers whereby the employer agrees to pay to workers, in addition to their wages, a share of profit at an agreed rate.

***Co-partnership:*** Workers are given the opportunity to have a share in the capital of business and to receive the profits accruing to their share

***Non - memory benefits*** may be given in numerous ways like medical facilities, educational facilities, subsidised canteen, better working conditions, housing facilities and such other welfare measures.

Discuss the principles of a good incentive scheme. What are the advantages and disadvantages of incentives schemes?

**Incentive Wage Plan:** Incentive may be defined as "the stimulation of effort and effectiveness by offering monetary inducement or enhanced facilities" An incentive may be monetary, i.e., cash benefit, or non-monetary.

### **Principles of a Good Incentive Scheme:**

1. The scheme should be simple and easily understandable by workers
2. The scheme should be fair, to both employer and employee.
3. The cost of operating the scheme should be reasonably low,
4. The standard of performance should be scientifically set and should be within the reasonable reach of an average worker.
5. No limit should be put on the earnings of workers.
6. The scheme should have the approval of workers and the union.
7. The scheme bonus provide a satisfactory system of supervision and production control.
8. The scheme must be relatively permanent.
9. Indirect workers should also be included under this scheme.
10. Workers should be properly educated.

## Incentive Schemes

Under Incentive schemes, time rate and piece rate systems are combined in such a way that workers are induced to increase their productivity. Various Incentive plans are

### 1. Halsey Plan:

This plan was first introduced by F.A. Halsey, a mechanical engineer in America, in 1891. This is a simple combination of time and piece basis of payment. Under this plan, bonus is paid on the basis of time saved. The amount of bonus depends upon the time saved by the worker. Where,

$$\text{Time saved} = \text{standard time} - \text{Actual Time taken}$$

A standard time is set for each job. If a worker takes the standard time to do it or even exceeds the standard time limit, he gets normal wages calculated at the time rate. If he completes his job in less than the standard time, he gets a bonus equal to 50% of the value of time saved. Therefore, the total earnings of a worker under this system are wages for the actual time spent plus a bonus equal to 50% of the value of time saved.

The formula: Bonus 50% of [Time saved x Time rate]

Total earnings - Time rate x Time taken +50% [Time saved x Time rate]

Example: Time rate = Re. 1.00; Time allowed = 7 hours

Time taken = 6 hours and Time saved = 1 hour.

Bonus = 50% [Time saved x Time rate]

$$= 50\% [1 \text{ hour} \times \text{Re. } 1.00]$$

$$= 50\% [\text{Re. } 1.00] - 50 \text{ paise}$$

Total earnings - (6 hour \ Re. 1.00 + 50 paise - Rs. 6.50.

### Advantages:

1. It is easy to understand and simple to operate.
2. This plan provides a strong incentive to improve efficiency.

3. The worker earns bonus on every job individually and the time saved by a worker on one-job is not set off against the excess time taken on some other job.
4. It guarantees minimum wages according to time rate and thus provides a sense of security to workers.
5. The benefit of time saved is equally distributed between workers and employers.
6. It provides a strong incentive to increase production.

### Disadvantages:

1. Incentive is not as strong as with piece rate system. Generally, the harder the worker works, the lesser he gets per unit.
2. It does not give full protection to employer against wrong rate setting.
3. Workers do not welcome the sharing principle.

### Problem : 1

Rate per hour                      =Rs.4  
 Time allowed for Job        =40 hours  
 Time taken                         =32 hours

### Solution:

Time saved =40hours-32hours = 8hours  
 Bonus        = 50% of time saved = 8 hours =4 hours  
 Bonus        = 50% Time saved x Rate per hour  
                   = 4hoursxRs.4=Rs. 16  
 Time wages = Actual time taken x Rate per hour  
                   = 32 hours x Rs.4 = Rs. 128  
 Total Earnings = Rs. 128+ Rs. 16 = Rs. 144.

### Problem: 2

Calculate earnings of a worker, Under Halsey Premium Plan

Time allowed        = 70 hours  
 Time taken         = 60 hours  
 Rate per hour      = Rs. 3  
 Time saved         = Standard Time - Actual time  
                           = 70 hours - 60 hours =10 hours  
 Bonus                = 50% Time Saved x Rate per hour  
                           = 10hours / 2 x Rs.3 =Rs. 15  
 Wages                = Actual time x Rate per hour

$$\begin{aligned} &= 60 \text{ hours} \times \text{Rs. } 3 = \text{Rs. } 180 \\ \text{Total Earnings} &= \text{Actual wages} + \text{Bonus} = 180 + 15 = \text{Rs. } 195 \end{aligned}$$

**2. Halsey Weir Plan:** This system was introduced by G.T. Weir and is a modified form of the original Halsey plan. The only difference between the two is that under the Halsey Weir plan the bonus is equal to 30% of time saved.

E.g:

$$\begin{aligned} \text{Standard time} &= 40 \text{ hours} \\ \text{Actual time} &= 34 \text{ hours} \\ \text{Rate per hour} &= \text{Rs. } 10 \\ \text{Calculate Halsey weir plan?} \end{aligned}$$

$$\begin{aligned} \text{Bonus} &= 30\% \text{ of Time saved} \times \text{Rate per hour} \\ 40 - 34 \text{ hours} &= 6 \text{ hours} \times 30 / 100 \times \text{Rs. } 10 = \text{Rs. } 18 \\ \text{Wages} &= 34 \text{ hours} \times \text{Rs. } 10 = \text{Rs. } 340 \\ \text{Total Earnings} &= \text{Rs. } 340 + 18 = \text{Rs. } 358 \end{aligned}$$

**3. Rowan Plan :** This plan was introduced by David Rowan and is similar to Halsey Plan, except in the calculation of the amount of bonus. Bonus is that proportion of the wages of the time taken which the time saved bears to the standard time. Its formula is :

$$\begin{aligned} \text{Bonus} &= \text{Time saved} / \text{Standard time} \times \text{time taken} \times \text{Rate per hour} \\ \text{Total earnings} &= (\text{Time taken} \times \text{Rate per hour} + \text{Bonus}) \\ \text{Suppose Time Rate} &= \text{Re. } 1.00 \text{ per Hour; Standard time} = 8 \text{ hours;} \\ \text{Time taken} &= 6 \text{ hours; Time saved} = 2 \text{ hours.} \\ \% \text{ of Time saved to Standard time} &= 2/8 = 25\% \\ \text{Bonus} &= 25\% \text{ of Rs. } 6 = \text{Rs. } 1.50. \\ \text{Total earnings} &= 6 \text{ hours} \times \text{Re. } 1.00 + \text{Rs. } 1.50 = \text{Rs. } 7.50. \end{aligned}$$

### Advantages:

1. It provides a guaranteed minimum wage as well as incentive for efficiency.
2. It provides the employer an incentive to increase production facilities as he receives a large share in savings achieved.
3. The Rowan plan provides a better bonus than the Halsey 50% scheme.

4. Up to 50% of the time saved, it provides a higher bonus than under Halsey Plan. It offers protection to the employer when standard has not been properly fixed,
5. As the bonus increases at a decreasing rate, at higher levels of efficiency, the worker is not induced to rush through the work.

**Disadvantages:**

1. It is more complicated and costlier than the Halsey system.
2. It is not easily understood by workers and leads sometimes to disputes.
3. It does not provide adequate incentives beyond a certain level.
4. Where time saved is more than 50% of the standard, time, the total earnings start decreasing.

$$\text{Bonus} = \text{Time saved} / \text{Standard Time} \times \text{Rate per hour} \times \text{Actual time}$$

**Problem: 3**

Calculate Earnings under Rowan scheme:

Standard Time = 100 hours

Time taken = 80 hours

Rate per hour = Rs.10

Bonus = time saved / standard time x Actual time x Rate per hour

$$= 20 \text{ hours} / 100 \text{ hours} \times 80 \text{ hours} \times 10 = \text{Rs.160}$$

Time wage = Actual time x Rate per hour

$$= 80 \text{ hours} \times \text{Rs. } 10 = \text{Rs.800}$$

Total Earnings = Rs.800 +160=Rs. 960 .

**Problem: 4**

Calculate Halsey and Rowan Premium plan from the following data:

Time allowed = 96 hours

Time taken = 80 hours

Rate per hour = Rs. 2

**Solution:**

**Halsey Plan:**

$$\text{Bonus} = 50\% \text{ Time saved} = 96-80=16 / 2 = 8 \text{ hours}$$

$$\begin{aligned} &= 8 \text{ hours} \times \text{Rs. } 2 = \text{Rs. } 16 \\ \text{Total Earnings} &= \text{Rs. } 160 (80 \times 2) + 16 = \text{Rs. } 176. \end{aligned}$$

**Rowan Plan:**

$$\begin{aligned} \text{Bonus} &= 16 / 96 \times 80 \times 2 = \text{Rs. } 26.66 \\ \text{Time wages} &= 80 \times 2 = 160 \\ \text{Total Earnings} &= 160 + 26.66 = \text{Rs. } 186.66 \end{aligned}$$

**Problem: 5**

A worker takes 12 hours to complete a job on daily wages and 9 hours on a scheme of payment by results. His day rate is Rs. 4 per hour. The material cost of the product is Rs. 6 and the overheads are recovered at 150% of total direct wages. Calculate Factory cost of the product under.

a) Piece Work Plan, b) Rowan Plan, c) Halsey Plan.

**Solution:**

**a) Wages under piece work plan:**

$$9 \text{ hours @ Rs. } 4 \text{ per hour} = \text{Rs. } 36$$

**b) Wages under Rowan plan:**

$$\text{Bonus} = 3/12 \times \text{Rs. } 9 \times 4 = \text{Rs. } 9.00$$

$$\text{Time wages} = 9 \text{ hours} \times 4 = \text{Rs. } 36.00$$

$$\text{Total Earning} = \text{Rs. } 45 \text{ (Rs. } 36 + 9)$$

**c) Wages under Halsey plan:**

$$\text{Bonus} = 50\% \text{ } 3 \text{ hours} \times \text{Rate per hour}$$

$$= 1 \frac{1}{2} \text{ hours} \times 4 = \text{Rs. } 6$$

$$\text{Time wages} = 9 \text{ hours} \times 4 = \text{Rs. } 36.00$$

**STATEMENT OF FACTORY COST**

ELEMENTS OF COST	PIECE WORK PLAN	ROWAN PLAN	HALSEY PLAN
Material	6.00	6.00	6.00
Wages	36.00	45.00	42.00



Prime cost	42.00	51.00	48.00
Factory overhead 150% wages	54.00	67.50	63.00
<b>Factory cost</b>	<b>96.00</b>	<b>118.50</b>	<b>111.00</b>

**Taylor's Differential Piece Rate System:** This system was introduced by Taylor, who was the father of Scientific Management Under this plan no time basis wages are guaranteed, but two piece rates are fixed, low piece rate and high piece rate. The lower rate is for those who are not able to achieve the standard output and higher rate is for those whose output is at or above the standard. Under this system, the standard job is established after careful time and motion study and two piece rates are set.

*The features of the scheme:*

- 1) Day wages are not guaranteed.
- 2) A standard time for job established.
- 3) Two piece work rates are fixed. If the worker does the work in less than the standard time, he receives the higher piece rate, whereas if he takes longer time he receives the lower piece rate.

Suppose Standard Production = 100 units per day.

**Piece Rates:**

- 1) 10 paise per unit for 100 units or more.
- 2) 8 paise per unit for less than 100 units.

Therefore a worker producing 100 units will get Rs.10 and one producing 110 units will get Rs. 11. On the other hand, a worker producing 90 units will get at the lower rate of 8 paise per unit,  $(90 \times 0.08)$  i.e., Rs. 7.20.

**Advantages:**

- 1) This method is simple to understand and calculation of wages is not difficult. It also provides a strong incentive to efficient workers.
- 2) It is advantageous from the point of view of the employer since it helps much in increasing production by offering higher rates to more efficient workers.
- 3) It attracts efficient workers.
- 4) Where the overhead's are high its incidence per unit cost is reduced because of increased production.

### **Disadvantages:**

- 1) It penalises very slow or inefficient workers.
- 2) It does not guarantee, the minimum day wages and this insecurity affects the morale of workers.
- 3) Labour cost will differ between the two levels of performance because of two different rates.
- 4) It makes differences between efficient and inefficient workers and thus creative rivalry.
- 5) This system is unfair to beginners who cannot attain the standard output immediately.

### **Problem: 6**

Standard production -200 Units per day

Low piece rate - 8 paise per unit .

High piece rate -10 paise per unit

Mr. X who produced 240 units and Y produced 190 units. Calculate their Earnings under Taylor's Differential piece rate system?

### **Solution:**

Standard output = 200 units per day

X Produced - 240 units he will get high piece rate.

X earnings = 240 units x 10 paise = Rs. 24

Y produced = 190 units he will get low piece rate

Y earnings = 190 units x 6 paise=Rs. 15.20

### **Problem: 7**

Calculate earnings of worker Mithilash and Sailesh under straight piece rate system and Taylor's Differential piece rate system from the following particulars.

Normal rate per hour =Rs. 18.00

Standard time per unit = 10 seconds

Differentials to be applied:

80% of piece rate below standard

120% of piece rate at or above standard

Worker Mithilash produced 2700 units per day and worker Sailesh produced 3200 units per day,

Per day = 8 hours

### **Solution:**

Standard production 10 seconds= 1 unit

Standard production one minute  $60 \text{ seconds} / 10 \text{ seconds} = 6 \text{ units}$

standard production per hour (60 minutes)

$$= 6 \text{ units} \times 60 \text{ minutes} = 360 \text{ units}$$

standard production per day of 8 hours

$$= 360 \text{ units} \times 8 \text{ hours} = 2880 \text{ units.}$$

Normal rate per hour = Rs. 18.00

Normal piece rate = Rs. 18.00 / 360 units = 0.05 piece

Low piece rate = 5 paise  $\times 80 / 100 \times 0.04$  paise

High piece rate = 5 paise  $\times 120 / 100 \times 0.06$  paise

### **Earnings of worker Mithilesh:**

#### **a) Under straight piece rate system**

Number of units produced  $\times$  Rate per unit

$$= 2700 \text{ units} \times 0.05 \text{ paise} = \text{Rs. } 135$$

#### **b) Under Taylor's Differential piece rate system**

$$= 2700 \text{ units} \times 0.04 \text{ paise} = \text{Rs. } 108$$

**Merrick's Differential Piece Rate System:** It is a modified version of the Taylor's scheme and is also known Multiple Piece Rate System. Workers producing below die standard output are not penalised by the low piece rate. This plan lays down three rates, one for the beginner, the second for die developing workers and the third for die highly efficient workers.

- a) Upto 83% of the standard output, the workers are paid at the ordinary piece rate i.e., the lowest of the three rates.
- b) Those, whose output exceeds 83% of the standard but does not reach 100%, are paid at 110% of the ordinary piece rate.
- c) Those whose output is 100% or above, get the highest rate which is 120% of the ordinary piece rate.

### **Features of the scheme:**

- a) Up to 83% of the standard output, workers are paid at the on piece rate.
- b) 83% to 100 % of the standard output, at 110% ordinary piece rate and
- c) above 100% at 120% of the ordinary rate.

The earnings increase with increased efficiency, performance above the standard will be rewarded by more than one higher differential piece rate. This plan is effective for high-level production.

### **Problem: 8**

Calculate the earnings of worker. Sundar, Sankar, Mani straight piece rate system and Merrick multiple piece rate system the following particulars:

Normal rate per hour = Rs. 18

*Output per day of hours is as follows:*

Worker Sundar = 380 units.

Worker Sankar = 460 units.

Worker Mani = 540 units.

### **Solution:**

Standard output per minute = 1 unit

Standard output per hour 1 x 60 minutes = 60 units.

Standard output per day of 8 hours = 60 units x 8 hours = 480 units

Normal rate per hour = Rs. 18.00

Normal Output per hour = 60 units.

Normal piece rate =  $18.00 / 60 \text{ units} = 0.30 \text{ paise.}$

*Calculation of Efficiency of workers:*

% of Efficiency =  $\text{Actual output} / \text{Standard Output} \times 100$

*Worker Sundar output per day 380 units.*

Sundar's Efficiency =  $380 \text{ units} / 480 \text{ units} \times 100 = 79\%$

***Worker Sankar output per day 460 units***

Sankar's efficiency =  $460 \text{ units} / 480 \text{ units} \times 100 = 96\%$

***Worker Mani output per day 540 units***

Mani's Efficiency =  $540 \text{ units} / 480 \text{ units} \times 100 = 112.5 \%$

***Earnings of Worker Sundar***

*Under Straight piece rate system:*

$380 \text{ units} \times 0.30 \text{ paise} = \text{Rs. } 114$

*Under Merrick Multiple system:*

$380 \text{ units} \times 0.30 = \text{Rs. } 114$

***Worker Sankar Earnings:***

*Under Straight piece rate:*

$460 \text{ units} \times 0.30 = \text{Rs. } 138$

*Under Merrick System:*

$460 \times 0.33 \text{ paise} = \text{Rs. } 151.80$

***Worker Mani Earnings:***

*Under Straight piece rate:*

$540 \text{ units} \times 0.30 = \text{Rs. } 162.$

*Under Merrick System:*

$540 \text{ units} \times 0.36 \text{ paise} = \text{Rs. } 194.40$

**Emerson's Efficiency Plan:** This is an American scheme which combines guaranteed fixed day wage with a differential piece rate. This system guarantees time wages even to those whose output is below standard. Standard output is fixed to represent 100% efficiency. A bonus is paid to a worker whose output exceeds  $66 \frac{2}{3} \%$  of the standard output. The bonus increases gradually at a stated rate so that at 100% efficiency bonus would rise to 20%. Beyond this, bonus would increase at 1% of basic rate for every 1% increase in output.

### Features of the scheme:

A certain standard output is fixed for a worker for each job. A worker who is able to attain two - thirds of standard output is deemed a normal worker and gets only guaranteed time rate. A worker who goes above the two-thirds standard, is paid, in addition to his normal wage, a bonus the rate of which increases as the extent of the excess of the output over two-thirds standard increases.

### Advantages:

- 1) The system is simple to understand and easy calculation. It provides incentives for beginners also.
- 2) The disparity in wages among workers under the other systems is also reduced here.
- 3) It provides security to the worker as day wage is guaranteed.

### Disadvantages:

The incentive is quite small to attract very different and ambitious workers.

### Problem: 9

Standard Output per day of 8 hours is 32 units. Actual output of a workers for 8 hours is 40 unite Rate per hour is Rs.8. Calculate wages payable for worker according to the Emerson's Efficiency plan.

$$\begin{aligned} \text{Level of Efficiency} &= \text{Actual Output} / \text{Standard Output} \times 100. \\ &= 40 \text{ units} / 32 \text{ units} \times 100 = 125\% \text{ efficiency} \\ &20\% \text{ Bonus} = 25\% \text{ Bonus} \\ &= \text{Rs. } 64.00 \text{ 3-31} \\ &\text{Bonus is payable 45\% efficiency} \\ &\text{(i.e) upto 100\% Efficiency} \quad = 20\% \text{ Bonus} \\ &\text{Above 100\% Efficiency} \quad = 25\% \text{ Bonus} \\ &25\% [125 - 100\%] \\ &\text{Time wages for 8 hours of} \\ &\text{Rs.8 per hour (8x8)} \quad = \quad \text{Rs. } 64.00 \\ &45 / 100 \times 64.00 \quad = \quad \text{Rs. } 28.80 \\ &\text{Total Earnings payable to worker} = \quad \text{Rs. } \mathbf{92.80} \end{aligned}$$

**Gand's Task and Bonus Plan:** This plan is a combination of time rate, piece rate and bonus. It guarantees wages according to time basis. A high standard is

set and if this standard is achieved or exceeded, payment is made at a high piece rate. This piece rate is so fixed so as to include a bonus of 20% over the time rate of the worker. A worker who is not able to achieve the standard or whose efficiency is below 100%, gets wages at time rate and is not entitled to bonus.

**The main feature as of this system are:**

1. It is a combination of time rate, differential piece rate and bonus.
2. Day wages are guaranteed.
3. A standard task is set, on which a bonus may be earned if completed within the standard time.
4. The bonus is a fixed percentage on the time taken.
5. A worker who attains the standard is paid a bonus, usually of 20% on his time rate. Where he goes above the standard he gets at a higher piece rate on the worker's whole output.

Thus under this system, both time and piece rates are set and normal wages are paid at the time rate or piece rate, whichever is higher, in addition, a bonus is also given if the work is completed within standard time.

**Advantages:**

1. It is simple to understand and easy to operate.
2. It provides an incentive to the efficient worker as well as security for less efficient by guaranteeing the time rate.
3. It is useful where the overheads are very high.
4. It encourages better supervision and planning as under this scheme, foreman also receives bonus.

**Disadvantages:** Guaranteed time rate Wage may act as a disincentive for improved production in case rate is fixed at a high level.

**Bedaux Point Premium System:**

This is premium bonus system in which standard time determined by work study, the time unit being the minute. A minute allowed time is termed as Bedaux point or "B", sixty units make in hour's work, and the number of Bedaux points being determined in respect of each job.

**Example:**

Allowed time for a job = 600 B's

No. of points earned = 720  
 Time rate = 1.80 per hour  
 Points earned = 720  
 Points allowed = 600  
**No. of points saved = 120**

Time rate per minute is Re. 0.03 i.e., Rs. 1.80 / 60  
 Wages at time rate for 600 points = Rs. 18.00  
 Bonus = 75% of points saved at 3 paise per minute  
           = 120 x 75% x Re.0.03=Rs. 2.70  
 Total wages = 18.00 + 2.70=20.70.

### **Problem:10**

Standard time required for a job is 30 hours.  
 Actual time taken for a job = 24 hours.  
 Rate per hour = Rs. 10 per hour.  
 Calculate worker earnings under Bedeaux point Premium plan:

### **Solution:**

Standard time - 30 hours; one B = 1 minute  
 30 hours = 30 x 60 minutes = 1800 minutes  
 1800 B's = 1800 minutes

### **Actual time 24 hours**

24 hours = 24 x 60 minutes = 1440 minutes  
 1440 B's = 1440 minutes  
 Time saved = Standard minutes - Actual minutes  
               = 1800 - 1440 = 360 minutes  
               360 minutes = 6 hours

Bonus payable to worker  $\frac{3}{4}$  of time saved  
                                   = 6 hours x  $\frac{3}{4}$  = 4  $\frac{1}{2}$  hours.

### **Calculation of Total Earnings:**

Time wages 24 hours x Rs.10 = 240  
**Add:** bonus 4 1/2 hours x Rs.10 = 45



**Total Earnings** = 285

### **Group Bonus Scheme**

Bonus may be given individually to every worker or collectively to a group of workers. When it is given collectively, it is known as group bonus scheme. It is a scheme in which the bonus is calculated on the collective production of a group of interdependent workers and distributed among the individual members of the group on some agreed basis.

This system is employed in cases where the output of individual workers cannot be measured and the ultimate production is dependent on the collective efforts of a group of workers as a whole.

Group system of payment encourages co-operation and team work among the workers. Supervision work is reduced.

#### **Advantages:**

1. It infuses co-operation and team-work among the workers.
2. Absenteeism is often reduced because an absent member weakens the group and most workers do not like to let down their team
3. This system requires less clerical work.
4. Supervision work is reduced.
5. Indirect workers can also be included in the scheme.

#### **Disadvantages:**

1. This system is unfair to hard-working and efficient workers of the group as an efficient worker is penalised for in efficiency of other members of the group.
2. It is difficult to get workers acceptance of the scheme.
3. There may be some practical difficulties regarding fixing the amount of incentive and how it is to be distributed to individual workers.
4. The amount paid as bonus to each member of the group is as small and that may not prove to be an effective incentive.

### **ESSENTIALS OF A GOOD WAGE SYSTEM**

*Simplicity:* The method should be simple and easy to understand by workers so that workers so that workers can calculate their own wages.

*Minimum wage:* A good system should guarantee minimum wage to give workers a sense of security.

*Incentive:* The scheme of payment should provide sufficient incentive to workers to work more taking into account the quality of production.

*Flexibility:* The system should be flexible enough so that changes may be introduced, if necessary.

*Satisfaction:* The system should be satisfactory from the point of view of both worker and the employer.

*Low labour turnover and absenteeism:* A good system should reduce labour turnover and absenteeism.

*Economical:* It should be economical in operation.

*Approval of Trade Union:* It should be acceptable to trade union.

**Fringe benefits:**

*Fringe Benefits ( Individual Monetary benefits):*

Dearness Allowance

Sick Pay

Provident Fund

Employee's State Insurance

Maternity Leave Pay

Night Shift Allowance

Holiday Pay

Gratuity; Pension

Annual Bonus

*Fringe Benefits ( Group Non-Monetary):*

Subsidised Conveyance

Subsidised Canteen Facilities.

Medical Care

Free Housing.

## **CONTROL OVER LABOUR COSTS**

Labour control is primarily concerned with the proper employment and efficient utilization of labour force. Labour cost control aims at the control of the labour cost per unit-of production and not at the reduction of wage rates of workmen.

1. *Control over labour cost can be exercised in the following manner:*
2. *Production Planning:* Production should be so planned as to have the maximum and rational utilization of labour. Production planning consists of the product and process engineering, programming, routing and direction.
3. *Recruitment of Efficient Workers:* Proper selection and training of workers and placing them to the jobs for which they are best suited helps in achieving the optimum output and minimum labour cost per unit.
4. *Wage Policy:* Wage plan including incentive scheme should be studied to find out how far the remuneration paid on the basis of incentive plan matches with increased production.
5. *Setting up of Standards:* With the help of work study time study and motion study, standards are set for production operations.
6. *Labour Budgets:* Labour budgets are also used for control over labour costs.
7. *Labour Performance Reports:* Management can also exercise control on labour and labour cost with the help of periodical labour utilization and labour efficiency reports.

### **Direct Expenses. (Chargeable Expenses)**

A chargeable expense is an expense which is specifically incurred in connection with the execution of a particular job or work order. It includes all direct expenses other than those of direct material and direct labour. It forms a part of prime cost of the product.

*Examples for chargeable expenses are:*

1. Hire of special plant and machinery required for a. particular job product or process.
2. Cost of patents and royalties.
3. Cost of special layout designs or drawings.
4. Experimental costs and expenditure in connection with models and pilot schemes.
5. Fees paid to architects surveyors and other consultants in connection with a job.

Chargeable expense is that which can be allocated directly to a cost unit. But overhead expenses cannot be allocated to cost units. These have to be apportioned or absorbed by cost centres or cost units.

### **Questions**

1. What do you understand by Time-keeping & Time-booking ?
2. What is labour turnover? How is it measured? Explain causes of labour turnover. How to control it ?
3. What is Idle time ? What are the causes of Idle time ?
4. Write short notes on (a) Halsey Plan (b) Rowan Plan (c) Taylor differential Piece rate system.
5. Explain Group bonus system?
6. State the essentials of good incentive scheme ?

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## OVERHEAD

**Definition:** Overhead is defined as “the aggregate of indirect Material cost, Indirect wages, and indirect expenses”.

It is the total of all indirect expenditure.

$$\text{Overhead} = \text{Indirect material} + \text{Indirect wages} + \text{Indirect expenses}$$

ICMA defines overhead as total cost of indirect materials, wages and expenses.

Overheads costs cannot be allocated but it can be apportioned and absorbed on-an equitable basis.

It is also known as "On cost", "burden", indirect expenses.

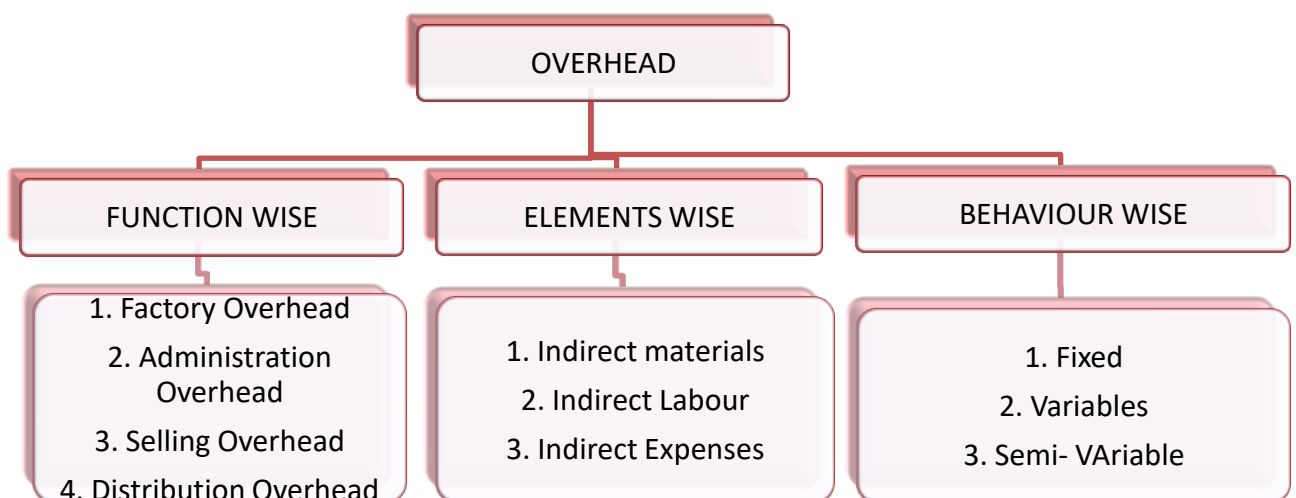
### Cost Allocation and Apportionment

**Cost Allocation:** It means the allotment of whole items of cost to cost centre or cost units.

**Cost Apportionment:** It involves allotment of proportion of items of cost to cost centres or cost units.

### CLASSIFY OVERHEAD

#### OVERHEAD CLASSIFICATION



**Function Wise Classification:** This classification is made on the basis of four major function in a concern. i) Factory Overhead ii) Administration Overhead iii) Selling Overhead iv) Distribution Overhead.

- I. **Factory Overhead:** It is all indirect expenditure incurred in connection with manufacturing operations. It consists of indirect material, indirect labour and indirect expenses incurred in producing an article.  
**Examples:** Power, Factory rent, Lighting & Heating Foreman Salary, Depreciation on Plant & Machinery.
- II. **Administration Overhead:** It includes all those costs which are incurred in general and financial management of a concern.  
**Examples:** Audit fees, legal charges, postage/ telegrams and telephone] printing & stationery, Depreciation, of office building, Director's fee, office rent, salary to office staff.
- III. **Selling Overhead:** It refers to those indirect costs which are associated with marketing and selling activities.  
**Examples:** Advertisement costs, Bad debts, sales office expenses, show room expenses, salesman salaries.
- IV. **Distribution Overhead:** It means the expenses incurred from the stage of product is completed in the works till the product reaches its distribution.  
**Examples:** Packing, godown rent, Depreciation, on delivery van, carriage outwards.

**Element Wise Classification:** On this basis, overheads are classified under three groups.

i) Indirect Material ii) Indirect labour iii) Indirect expenses

- I. **Indirect Material:** are those material its cost cannot be allocated to specific cost unit but which can be apportioned to or absorbed by and does not form a part of finished goods.  
**Examples:** Lubricants, cotton waste, consumable stores.
- II. **Indirect Labour:** The wages of Indirect labour which cannot be allocated but which can be apportioned to or absorbed by cost centre or cost unit is known as indirect labour.  
**Examples:** salary of supervisor, wages for maintenance workers overtime, holiday pay, employee's contribution to provident fund.
- III. **Indirect Expenses:** are those expenses which cannot be allocated but which can be apportioned to or absorbed by cost centres or cost units.

**Examples:** Rent, rates, insurance, taxes, welfare expenses, lighting and heating, Depreciation an plant Sc. machinery printing, stationery, telephone, telegram etc.

### **Behaviour Wise Classification:**

According to his behaviour, overheads are grouped into i) Fixed ii) Variable iii) Semi variable.

- I. **Fixed Costs:** These costs remain fixed in total and do not increase or decrease when the volume of production increases or decreases. But the fixed cost per unit increases when the volume of production decreases and fixed cost per unit decreases when the volume of production increases. It is also known as period cost.

**Examples:** Rent, insurance on building, salary to staff, Depreciation of plant and machinery postage, stationery.

Example:

For 10000 output

Total Fixed overhead Rs. 1,00,000

Fixed cost per unit =  $1,00,000 / 10,000 \text{ units} = \text{Rs.}10 \text{ per unit}$

suppose output is increased to = 20,000 units

Total Fixed overhead = 1,00,000

Fixed cost perunit =  $1,00,000 / 20000 \text{ units} = \text{Rs.} 5 \text{ per unit}$

- II. **Variable Costs:** These cost will change in proportion to the volume of production (ie) when volume of production increases total variable cost also increases and when volume of production decreases total variable cost also decreases. But variable cost per unit remains fixed.

**Examples:** Direct Material Cost, Direct Wages, Power, Royalties, Royalties, Fuel, Spoilage, Indirect Material, Indirect Labour, Idle Time etc.

**Example:**

Output 10000 units

Variable overhead = Rs.1,00,000

Per unit = Rs.  $1,00,000 / 10000 \text{ units} = \text{Rs.}10$

If the output increases to 20,000 units

Variable overhead =  $1,00,000 / 10,000 \text{ units} \times 20,000 = \text{Rs.}200000$

Variable overhead per unit = 2,00,000 / 20,000 units = Rs. 10

Variable Cost = Prime cost + All variable-overheads

III. **Semi-variable Costs:** These are certain items of cost which are part fixed and partly variable. These are called semi variable costs.

**Examples:** Telephone, compensation to salesman, repairs and maintenance, depreciation of plant & machinery.

### **ALLOCATION AND APPORTIONMENT (PRIMARY DISTRIBUTION)**

#### **Allocation:**

It means charging the full amount of overhead cost to a cost centre.

**Definition:** Allocation has been defined as, “the allotment of whole item of cost to cost centres or cost unite”. It depends on the nature of cost.

#### **Examples:**

#### **Allocation**

Salary of a time keeper --- Time keeping Department

Salary of a foreman --- Production Department

#### **Apportionment:**

It is "allotment of proportions of items of cost to cost centres or cost units".

#### **Examples:**

<b>Overhead</b>	<b>Basis</b>
Rent of building	Area occupied

#### **Difference between cost Allocation and Apportionment :**

<b>S.No</b>	<b>Allocation</b>	<b>Apportionment</b>
1	It deals with whole items.	It deals with proportion of items of cost.
2	Some costs may be directly allocated.	Costs can be apportioned on a suitable basis.



## **Bases of Apportionment:**

The following are main bases of overhead apportionment:

- I. **Direct Allocation:** Overheads are directly allocated to various departments on the basis of expenses for each department respectively.  
**E.g.:** Indirect Material, Indirect Wages. Power & Light (when separate metres are installed)
- II. **Direct Labour:** Under this basis the overhead expenses are distributed to various dept, in the ratio of a total number of labour / hours worked in each Dept.  
**E.g.:** Salary of supervisor, Administrative expenses.
- III. **Direct Wages:** According to this basis, expenses are distributed amongst the departments in the ratio of direct wages.  
**E.g.:** Contribution to provident fund workers compensation workers insurance.
- IV. **Electric Light** - Number, of light points
- V. **Electric Power** - Kilowatt hours.
- VI. **Floor Area:** This basis is adopted for the apportionment of certain expenses like rent, rates on building lighting and heating.
- VII. **Capital Values:** In this method the Capital value of certain assets like machinery and building are used for the apportionment of certain expenses. **E.g.:** Rent taxes of building, Depreciation of plant.

## **Cost Classification:**

This is the process of grouping costs according to the common characteristics.

Cost may be classified according to various characteristics nature, functions, variability etc.

## **Departmentalisation of Overhead Expenses:**

In a factory there are two types of departments a) production department  
b) service department.

Manufacturing processes carried out in the product. A service department provides service for the benefit of other departments.

Departmentalisation of overhead expenses refers to the apportionment of overhead between production and service departments and the reapportionment of all service, department overheads to the production departments.

### Primary distribution of overhead

Common expenses have to be apportioned or distributed between production and service department on some equitable basis. The process of distribution is usually known as primary distribution.

#### Problem: 1 Primary Distribution Overhead

Moorthy Company Ltd is divided into four Department A, B and C are production Departments and D is service Department. The actual costs for a period are as follows:

	Rs.		Rs.
Rent	5000	Supervision	3000
Repairs to plant	1400	Fire Insurance for stock	800
Depreciation on plant	2800	Power	2000
Employer's liability for insurance	2200	Light	300
Stores overhead	5000	Welfare expenses	4500

The following information available in respect of four departments.

Overhead	Dept. A	Dept.B	Dept. C	Dept.D
Area (Sq. Meters)	2000	1500	1000	500
No. of Employees	500	400	350	250
Direct wages	4000	2500	3000	1500
Value of plant	6000	4800	3600	2400
Value of stock	2000	3000	2000	1000
H.P. Plant	15	10	10	5
Direct material	1200	800	300	200

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

#### Solution:

Overhead	Basis of apportionment	Total Amount	Production Department			Service Department
			Dept. A	Dept.B	Dept. C	Dept.D
Rent	Floor area 4 : 3 : 2 : 1	5000	2000	1500	1000	500
Repairs to plant	Plant value 5: 4 : 3: 2	1400	500	400	300	200

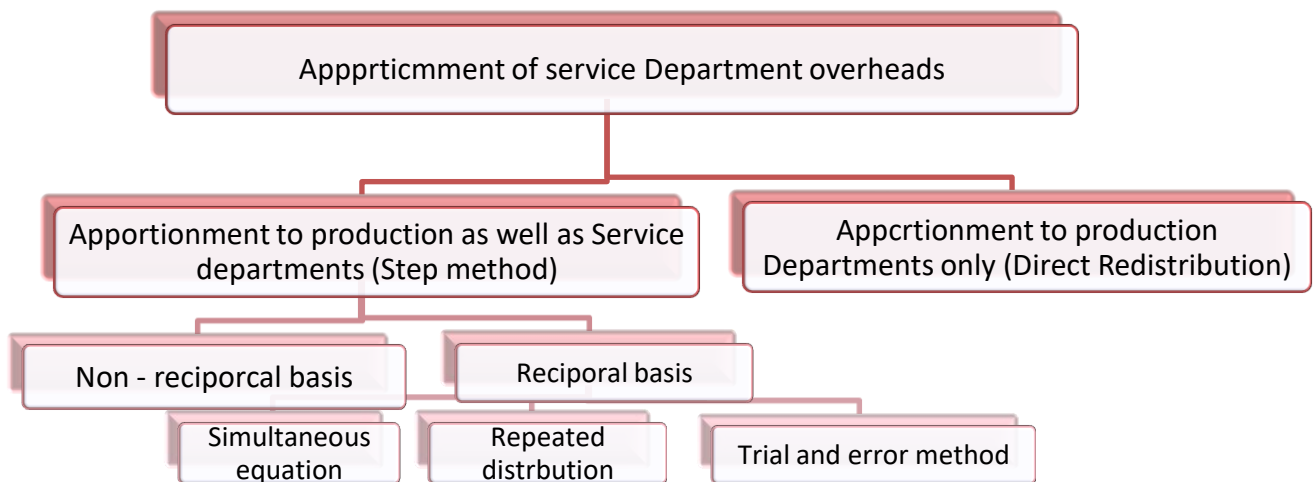
Depreciation	Plant value 5 : 4 : 3 : 2	2800	1000	800	600	400
Employer's liability for Insurance	Direct wages 8 : 5 : 6 : 3	2200	800	500	600	300
Stores overhead	Direct material 12 : 8 : 3 : 2	5000	2400	1600	600	400
Supervision	No. of employees 10 : 8 : 7 : 5	3000	1000	800	700	500
Fire insurance stock	Direct material 12 : 8 : 3 : 2	800	200	300	200	100
Power	H.P. plant 3 : 2 : 2 : 1	2000	750	500	500	250
Light	Floor area 4 : 3 : 2 : 1	300	120	90	60	30
Welfare expenses	No. of employees 10 : 8 : 7 : 5	4500	1500	1200	1050	750
<b>Total overhead</b>		<b>27000</b>	<b>10270</b>	<b>7690</b>	<b>5610</b>	<b>3430</b>

### Secondary Distribution of Overhead:

Service department costs are to be reapportioned to the production departments or cost centres where production is going on. This Process of apportionment of overhead expenses is known as second Distribution.

### Methods of distribution of service department overhead to production departments:

#### *Methods of Re-apportionment. (Methods of Redistribution)*



### Apportion to Production and Service department:

Under this method cost of service department is apportioned to production department and other service department on some suitable basis. It may be reciprocal and non-reciprocal basis.

### Problem: 2

#### Direct Reapportionment Non-Reciprocal Method:

	Production Dept.			Service Dept.	
Primary distribution	A	B	C	D	E
Overhead summary	8000	6000	5000	1000	800

Apportion expenses of service Dept. D in the ratio of 2:2 :1 and service Dept. E in the ratio of 2:1:1.

### Solution:

	Production Department			Service Department	
	A	B	C	D	E
Total overhead	8000	6000	5000	1000	800
Dept. D Rs. 1000 allocated	400	400	200	---	---
Dept. E 2:1:1 Rs. 800 allocated	400	200	200	---	---
Total	8800	6600	5400	Nil	Nil

### Apportionment and Non-reciprocal basis (step method)

The service department costs are arranged in the descending order of their serviceability. The cost of most serviceable department-is first apportioned to other service departments and production departments. The next best service department cost is apportioned and' tins process, goes on till the cost of each service department is apportioned, thus the cost of last service department is apportioned. Thus the cost of service department is apportioned only to production department.

### Step method Problem : 3

A manufacturing company has two production Department namely A and B and three Service Depts. Time keeping, stores and maintenance.

	Production Department		Service Department		
	A	B	Time keeping S1	Stores S2	Maintenance S3
Primary overhead summary	20000	30000	4000	3000	2000
Other information	S1	S2	S3	A	B
No. of Employees	---	10	5	40	25
No. of Stores requisition	---	---	4	16	15
Machine hours	---	---	---	3000	2300

**Solution:**

	A	B	S 1	S 2	S 3
Overhead summary	20000	30000	4000	3000	2000
S 1 (Time Keeping) A:B:S2:S3 (40:25:10:5)	2000	1250	(-)4000	500	250
S 2 (Stores) A:B:S1:S2 (16:15:4)	1600	1500	---	(-)3500	400
S 3 (Maintenance) A:B (30:23)	1500	1150	---	---	(-) 400
	<b>25000</b>	<b>33900</b>	<b>Nil</b>	<b>Nil</b>	<b>Nil</b>

**Apportionment for reciprocal basis**

Each service department has to receive and give their cost each other on the basis of agreed ratio. There are three methods which may be used for the reciprocal basis.

- i. Simultaneous Equation Method
- ii. Repeated distribution Method
- iii. Trial and Error Method.

**1. Simultaneous Equation Method:**

In this method, the total overhead cost for each service department is expressed in the form of algebraic equation with the help of percentage of distribution of the service cost.

**Draw backs:** It needs a large number of calculations and is not suitable where there are more than two service department.

**2. Repeated Distribution Method:**

Under this method overhead of service departments are redistributed to the production department as well as service department on the basis of agreed percentage. This process is repeated till the amount of service departments are exhausted.

### 3. Trial and Error method:

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

#### Problem: 4

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

**Production Departments:** **Rs.**

X - Rs-1000; Y - Rs.900 and Z - Rs.600 = 2500

**Service Departments:**

A – Rs. 200; B - Rs.150 = 350

Total 2850

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

	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>A</b>	<b>B</b>
Service Dept A	20%	40%	30%	---	10%
Service Dept B	30%	20%	30%	20%	---

Prepare a statement showing the apportionment of two service department expenses to production departments under Repeated distributed Method.

**Solution: Repeated Distributed Method:**

	<b>X</b>	<b>Y</b>	<b>Z</b>	<b>A</b>	<b>B</b>
As per overhead summary	1000	900	600	200	150
Service Dept. A Rs.200 X:Y:Z:B 2:4:3:1	40	80	60	(-) 200	20
Service Dept. B Rs.170 X:Y:Z:A 3:2:3:2	51	34	51	34	(-) 170
Service Dept. A Rs.34 X:Y:Z:B 2:4:3:1	7	14	10	(-) 34	3
Service Dept. B Rs.3	1	1	1	---	---

X:Y:Z 3:2:3					
	<b>1099</b>	<b>1029</b>	<b>722</b>	---	---

**Simulation Equation Method:**

Let X = Total overhead of Department A  
 Let Y = Total overhead of Department B  
 $X = 200 + 20y / 100$  (or)  $200 + 0.2 y$   
 $Y = 150 + 10x / 100$  (or)  $150 + 0.1x$   
 To eliminate decimals multiplying both equation by 10  
 $10x - 2y = 2000$  -----(1)  
 $x + 10y = 1500$  -----(2)  
 Multiplying equation (1) by 5  
 $50x - 10y = 10000$   
 $x + 10y = 1500$   
 $49x = 11500$   
 $X = 11500 / 49 = 234.9$  or 235  
 Substitute this value in equation (1)  
 $235X - 2y = 2000$ :  $2Y = 2347 - 2000$   
 $2Y = 234$  :  $Y = 347 / 2 = 173.5$  Rs.174

	Total	X	Y	Z
As per distribution summary	2500	1000	900	600
Service Dept. A – 90% 235 (235 x 90/100) 2:4:3	211	47	94	70
Service Dept. B – 80% 174 (174 X 80 / 100)3:2:3	139	52	35	52
<b>TOTAL</b>	<b>2850</b>	<b>1099</b>	<b>1029</b>	<b>722</b>

**Absorption of Overheads:**

Overhead absorption is the process of charging to the product or cost centre all the overheads allocated and apportioned to it.

**Definition:** Overhead absorption is the "allotment of overhead to cost units". -I.C.W.A

**Meaning:** Distribution of overhead expenses allotted to a particular department over the units produced in that department.

**Methods of absorption:**

1. Direct Material cost percentage rate
2. Direct labour percentage rate

3. Prime cost percentage rate
4. Direct labour hour rate.
5. Machine hour rate
6. Rate per unit of production.

**1. Direct Material cost percentage rate:** Under this method factory overhead are absorbed on the basis of direct materials consumed in producing the product.

$$\text{overhead rate} = \text{Overhead expenses} / \text{Direct material cost} \times 100$$

**E.g.:** Factory overhead Rs. 20000

Direct material Rs. 80000

$$\text{Overhead Rate} = 20000 / 80000 \times 100 = 25 \%$$

**Advantages:** It is easy and simple to use.

**Disadvantages:**

1. It ignores time factor.
2. There is no logical relationship between manufacturing cost and cost of raw materials used.
3. This method does not make distinction between skilled and unskilled workers.

**2. Direct labour percentage rate:**

This is another simple and easy method. In this method percentage of factory overheads to direct labour cost is calculated as follows:

$$\text{Overhead rate} = \text{Factory overhead} / \text{Direct labour cost} \times 100$$

**E.g.:** Factory overhead = Rs.5000

Direct wages =Rs. 50,000

$$\text{Overhead Rate} = 5000 / 50000 \times 100 = 10\%$$

**Advantages:**

- i. Labour rate do not change frequently. Hence this method gives stable results.
- ii. Simple and easy to use.

**Disadvantage:**



- i. When workers are paid as piece basis. This, method will not give satisfactory result.
- ii. Where the labour is not the main factor of production absorption of overhead is not equitable.

### 3. Percentage on Prime Cost Method:

This method takes both direct material and direct wages for the absorption of overhead. Overhead rate in his method is calculated by dividing the factory overhead by the prime cost.

<b>E.g.:</b> Factory overhead	=Rs. 30000
Prime cost	=Rs. 60000
Overhead rate	= 30000/ 60000 x 100 = 50%

#### Advantages:

- i. This method is simple and easy
- ii. It does not require any special accounting records to be kept for its operation.

#### Disadvantage:

- i. This method combines the limitation of both direct material and direct labour method.
- ii. It does not give proper labour method.

**4. Direct Labour Hour Rate:** The direct labour hour rate is the overhead cost of a direct worker working for one hour. This rate is determined by dividing the overhead expenses by the total number of direct labour hours.

$$= \text{Factory overhead} / \text{direct labour hours (Direct wages)} \times 100$$

Factory overhead	=Rs. 20000
Direct labour hours	=Rs. 4000
	=20000 / 4000 x 100 = 50%

Thus for a job requiring direct wages Rs. 100, overheads to be absorbed by that job shall be 50% Rs.50.

#### Advantages:

- i. It gives due consideration to time factor.

- ii. It is most suitable where labour constitutes the major factor of production.
- iii. This rate is not affected by the method of wage payment.
- iv. Labour rates are more stable than material prices.

**Disadvantages:** Additional records of labour must be maintained if this method is to be used. It will lead to increase the clerical work.

**5. Machine Hour Rate:** This method is applicable where work performed mainly on machines.

Machine hour rate means the cost of running a machine for one hour. Under this method overheads are charged to production on the basis of the number of hours a machine is used for a particular job. Thus machine hour rate means the expenses incurred in running a machine for one hour. Machine hour rate is obtained by dividing the amount of factory overhead by the number of machine hours.

<b>E.g.:</b> Overhead for machine A	- Rs.10,000
No. of machine hours	- 5,000
Machine hour rate	= $10,000 / 5000 = \text{Rs.2 per hour.}$

**Advantages:**

1. It is a scientific and accurate method of allotting overhead expenses of each job.
2. It gives a basis for the measurement of the monthly cost of idle machine.
3. It gives useful data for estimating the cost production and helps in the fixation of selling price.

**Disadvantage:**

1. This method can be used only in those departments where work is done by machines.
2. It is difficult to estimate total machine hours in advance.

**Problem: 5** Work out the machine hour rate of a saw mill from the following information of a wood working shop:

- a) Purchase price of the saw mill Rs. 90000
- b) Railway freight and installation charges Rs.,100

- c) Life of the saw mill is 10 years and 2000 working hours per year.
- d) Repair charges 50% of depreciation.
- e) Consumption of electric power 10 units per hour @70 paise per unit.  
Lubricating oil Rs.20 per day of 8 hours.
- f) Consumable stores 100 per day of 8 hours
- g) Wages of machine operator Rs. 40 per day of 8 hours

**Solution: Computation of Machine Hour Rate**

**Depreciation:**

Cost price saw mill	90000
Add Installation charges & Railway freight	10000
<b>Total Cost Price</b>	<b>Rs. 100000</b>
Life of saw mill	=10 years
Working hours one year	=2000 hours
10 years working hours	=20000 hours

	<b>Per hour</b>
Depreciation per hour = Cost Price / Estimate life hours (100000 / 20000hours )	5.00
Repair charges -50% Depreciation Rs. 5.00 / 2 = Rs. 2.50	2.50
Power (10 Units x 70 paise) = Rs.7.00	7.00
Lubricating oil expenses Rs. 20 / 8 hours=Rs. 2.50	2.50
consumable stores = Rs. 40 /8 hours - Rs. 5.00	5.00
<b>Machine Hour Rate</b>	<b>22.00</b>

**Problem: 6**

Calculate Machine Hour Rate from the following:

- a) Cost of Machine Rs. 20,000
- b) Estimated scrap value Rs. 1000
- c) Repairs & Maintenance charges per month Rs. 225
- d) Standing charges allocated to machine per month Rs.150
- e) Effective working life of machine 1000 hours.
- f) Running time per month 150 hours.
- g) Powers used by machines; 10 units per hour 50 paise per unit.

**Solution: Computation of Machine Hour Rate**

	<b>Rate Per Hour</b>
<b>Standing charges:</b>	
Standing charges per month	
Running time per month 150 hours	
Standing charges per hour = Rs.150/150 hours = 1.00	1.00
<b>Variable expenses:</b>	
Depreciation = Cost Price – Scrap Value / Estimate Life of Machine (Rs. 20000 – Rs. 10000 / 10000hours)	1.90
Repair & Maintenance charges Rs. 225 per month (225/ 150 hours)	1.50
Power (10 units x 0.50 paise)	5.00
<b>Machine Hour Rate</b>	<b>9.40</b>

### **Rate per unit of production:**

It is the simplest of all the methods total overheads of a department are divided by the number of units produced to give an overhead rate of per unit of output.

#### **E.g.:**

Production overhead = Rs. 20000  
Number of units produced = 2000  
Overhead rate = Rs. 20000/ 2000 =Rs.10 per unit

### **Overhead Rate**

Overhead rate may be either (i) Actual rate ii) Predetermined rate.

**Actual rate:** This is the rate of overhead absorption which is calculated by dividing actual overheads to be absorbed by actual quantity

$$\text{Overheads} = \text{Actual overheads} / \text{Actual Quantity}$$

**Predetermined Overhead Rate:** This is the rate of overhead absorption which is calculated in advance of expenses incurred. This is calculated by dividing the predetermined expenses by predetermined quantity.

$$= \text{Predetermined Expenses} / \text{Predetermined Quantity}$$

### **Under and over absorption of overhead**

Absorption of overhead may be based on actual rate or Predetermined rate, under Actual rate method of absorption costs are fully absorbed. But in

case of predetermined rates, overhead are not fully absorbed. (ie) overhaed are not equal actual overhead incurred. It may be over or under absorption of overheads.

**Over Absorption:** Over absorbed means that the amount of overheads absorbed are more than actual overhead incurred.

**E.g.:**

Overheads Absorbed	Rs. 50000
Less: Actual overheads	Rs. 48000
<b>Over absorption</b>	<b>2000</b>

**Under Absorption:** It means the amount of overhead absorbed is Less than actual overhead incurred.

**E.g.:**

Overhead Absorbed	50000
Less: Actual overhead	54000
<b>Under absorption</b>	<b>4000</b>

### **CAUSES OF OVER AND UNDER ABSORPTION:**

- a) Errors in estimating overhead expenses.
- b) Unexpected changes in the method of production affecting the amount of overheads.
- c) Error in estimating the quantity of production.
- d) Unforeseen changes in the production capacity.
- e) Seasonal fluctuations in overhead in certain industries.

### **b) Accounting treatment of over and under absorption:**

The under or over absorbed overhead may be adopted in the following three ways:

**Write off to costing profit and Loss account:** When the amount of over or under absorbed overheads is not large, the simple method is to write off to costing profit & loss account.

**Use of supplementary Rates:** Where the amount of over or under absorption is large this method is significant. A supplementary rate is calculated to adjust

amount of under or over absorbed overheads in the cost of work in progress, finished stock and cost of sales.

This rate is calculated by dividing the amount of over [or] under absorption by the actual base:

In case of under absorption, overhead is adjusted by a plus rate since the amount is to be added, while over absorption is adjusted by minus rate since the amount is to be deducted.

***Carry over to the next year accounts:*** Under this method, the balance in under and over absorbed overhead account at the end of the year carried to next year.

### **Administration Overhead**

Administration overhead is the indirect expenditure incurred formulating policies, planning and controlling the functions, directing and motivating the personnel of an organisation in the attainment of its objectives.

**E.g.:** Office salaries, postage, telephone, stationery, audit fee etc.

***Accounting Treatment (Apportionment):*** There are three methods of accounting of administration overheads.

#### **1. Apportionment to Production and Selling Function:**

Under this method office and administrative overheads are not treated separately but are apportioned to production and selling function on some suitable basis.

**2. Addition as a separate item of cost:** In this method administration overhead is added as a separate element to the cost units and shown in the cost sheet.

Adm. overhead Rate =  $\frac{\text{Administration overhead}}{\text{works cost}} \times 100$

**3. Transfer to Costing Profit & Loss a/c:** In this method administration overhead are closed by transfer to costing profit & loss a/c at the end of year.

### **SELLING AND DISTRIBUTION OVERHEAD**

- i. **Selling Overhead:** It is the cost of seeking and to create and stimulating demand and of securing orders.  
**E.g.:** Advertisement cost, salesman salary, show room expenses, after sales service cost
- ii. **Distribution Overhead:** It is the cost incurred in placing the sold goods in possession of customers. It includes all expenditure incurred from time of product is complete until it reaches its destination.  
**E.g.:** Packing costs, insurance of goods in transit, warehouse expenses.

**Differences between Selling Overhead and Distribution Overhead:**

S. No.	Selling Overhead	Distribution Overhead
1	It is incurred for promoting sales.	It is incurred in moving goods from the company's godown to customer's place.
2	The object of selling overhead is to solicit the! orders and to make efforts to find and retain customers.	The object of distribution expenses is the safe delivery of the product to the customer.

**Absorption of Selling and Distribution Overhead:**

The following methods are usually adopted for the absorption of selling and distribution, expenses.

- a) **A Rate per unit:** under this method the total estimated selling and distribution overhead is divided by the estimated number of units to be sold. This gives rate per unit sold.
- b) **A percentage of selling price:** on the basis of past records a percentage of selling and distribution overheads to sales is determined.
- c) **A percentage on works cost:** In this method a percentage of selling and distribution overhead for works cost is ascertained. This percentage is used to recover selling & Distribution overhead.

**Control of Factory Overheads:**

*Control of factory overheads involves following steps:*

- i. **Overheads should be classified according to variability:** (fixed, variable and semi-variable)

- ii. **Overhead cost should be budgeted by each classification and department:** The budgets are determined with reference to budgeted level of activity of that department.
- iii. Actual overheads should be collected and classified in the same frame work as budget.
- iv. Due to introduction of standard costing, the variance between actual and standard costs are analysed and reported for corrective action.

**Problem: 7**

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

Days	Hours worked
Monday	8
Tuesday	11
Wednesday	9
Thursday	10
Friday	10
Saturday	4

Normal working hours: 8 hours per day; Normal rate: Rs.5 per hour. Overtime rate upto 9 hours in a day at single rate and over 9 hours in a day at double rate [or] upto 48 hours in a week at single rate and over 48 hours at double rate whichever is more beneficial to the worker.

**Solution: Calculation of Normal and overtime wages**

Days	Hours Worked	Normal Hours	Overtime Single Rate	Overtime Double Rate
Monday	8	8	---	---
Tuesday	11	8	1	2
Wednesday	9	8	1	---
Thursday	10	8	1	1
Friday	10	8	1	1
Saturday	4	4	---	---
<b>Total</b>	<b>52</b>	<b>44</b>	<b>4</b>	<b>4</b>

**Method: 1**

Normal wages; 44 hours @Rs. 5 per hour	=	220.00
Overtime: Single 4 hours @Rs. 5 per hour	=	20.00
Double 4 hours @Rs. 10 per hour	=	40.00
<b>Total Rs.</b>	=	<b>280.00</b>



### Method III

Normal wages @ Rs.5 per hour for 48 hours	=	240.00
Overtime wages @ Rs.10 per hour for 4 hours	=	40.00
<b>Total Rs.</b>	=	<b>280.00</b>

The wages payable under both methods will be the same.

### Questions:

Explain overhead classification ?

Shorts notes on a) Absorption & Allocation of overhead.

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**UNIT OR OUTPUT COSTING BATCH & JOB COSTING**

It is defined as “the unit of quantity of product, service or time in relation to which cost may be ascertained or expressed”. Cost unite are the ‘things’ that the enterprise is set upto provide.

For example, in a sugar mill the cost per tonne of sugar may be ascertained.

The cost units may be:

**Units of Production:** Tonnes of materials, pairs of shoes, gallons of liquids, jobs, contracts, etc.

**Units of Service:** Cinema seats, passenger miles, tonne-kilometres, kilowatt hours, consulting hours, etc.

**A few more example of cost units:**

Industry	Normal Cost Unit
Steel	Tonne
Cement	Tonne
Brick manufacturing	1000 bricks
Transport	Passenger – kilometre or Tonne - kilometer

**Job Costing (or Job-Order Costing):**

In this method costs are collected and accumulated for each job or work order separately. This is because in each job work is done according to customer’s specifications. Each job has a separate identity and makes a cost unit The industries where this method of costing is used are:

- I. Repair shops
- II. Printing press
- III. Painting and decording
- IV. Production of made to order articles, etc.

**Contract Costing:**

This method is based on the principles of job costing. If a job is big, it is known as a contract. Contract is a big job and job is a small contract. Each

contract is taken as a separate cost unit for the purpose of cost ascertainment  
Contract costing is most suited to:

1. Construction work
2. Ship building
3. Architects
4. Constructional engineers, etc.

### **Batch Costing:**

Like contract costing, it is also a variation of job costing. In this method, orders for identical products, are arranged in convenient groups or batches. Each batch is treated as a cost unit and costs are accumulated for each batch separately. It is used in the production of:

- i. Ready-made Garments
- ii. Shoes
- iii. Toys
- iv. Bicycle parts
- v. Biscuits and Confectionary

### **Single Output or Unit Costing:**

This method, is used when production is uniform and consists of only a single product or two or three types of similar products or different grades of the same product This method is applied in the following types of industries:

- i. Mines
- ii. Oil drilling
- iii. Steel works
- iv. Brick works

## **Job Costing**

### **Job costing:**

Job costing is also known as job order costing. It is a method of costing in which costs are accumulated for each job.

Under this method, costs are collected and accumulated according to jobs, contracts, projects, or work orders. Each job has a separate identity and therefore, it becomes essential to analyse and segregate costs according to each job or order. This method is also known as specific order, production order.

Job costing, also known as job order costing, is a method of costing in which costs are accumulated for each job or work order undertaken.

### **Characteristics of Job Costing:**

1. The production is always against customer's orders and not for stock.
2. Each job has its own characteristics and needs special treatment.
3. There is no uniformity in the flow of production from department to department.
4. The department through which the job has to be processed depends purely on the nature of each job.
5. The work-in-progress differs from period to period according to the number of jobs on hand. Therefore, cost is ascertained for each job.
6. Job costing is applicable to engineering concerns, printing presses, repair shops, automobile garages.
7. There is no uniformity in the flow of production from one department to another.
8. It is the nature of each job which determines the departments through which it is to be processed.
9. The main purpose of job costing is to determine the profit or loss made on each job.
10. Job costing is applicable to repair shops, printing press, engineering companies, etc.

### **Costing Procedure:**

- I. Job Order Number:** Job costing accumulates costs by specific jobs, a number must be assigned to each job.
- II. Production Order:** It is a written order to the foreman to proceed with a job. It gives the foreman instruction relating to the job and also authorises him to start the work.
- III. Job Cost Sheet:** Cost of for each job are accumulated on job cost sheets. The various elements of cost are treated as shown below:
  - a) **Materials:** Materials are issued to the job on the basis of bill of materials or stores requisitions.

- b) **Labour:** The information regarding direct labour cost of different jobs can be drawn from time and job cards. Wages paid to indirect labour form a part of factory overhead.
- c) **Overhead:** Overheads are usually charged at predetermined rates. Separate charges are made for factory, administration and selling & Distribution overheads.

**IV. Completion of Job:** when the work on a job is completed, a completion report is end to costing department. The cost under each element of cost is ascertained and totalled to compute the total cost of the job concerned.

**V. Profit or Loss on each Job:** The total cost of each job is compared against its price to determine the profit or loss of each job.

**Difference between Job Costing and Process Costing:**

S. No	Job Costing	Process Costing
1	Production is against specific orders.	Continuous or mass production of homogeneous products.
2	Costs are collected and accumulated for each job separately.	Costs are collected and accumulated process-wise.
3	Costs are calculated only when a job is completed.	Process costs are calculated at the end of cost period.
4	There is no transfers from one job to another unless some surplus there is work.	The product moves from one process to another, so cost of one process is transferred to another process.
5	There may or may not be work-in-process at the beginning or close of the accounting period.	There is always some work-in-process as the production is continuous.
6	Control is very difficult because each job differs and production is continuous.	Control is very easier because there is standardised and production is mass production.
7	Costs are calculated when a job is completed	Costs are calculated at the end o specific period.



Estimated at Rs.20,000 for 10,000 Normal working hours.  
 You are required to calculate the cost of job No.565 and calculate die price to give profit of 25% on selling price.

**Solution:**

<b>Job Cost Sheet (Job No. 565)</b>		
	<b>Amount Rs.</b>	<b>Amount Rs.</b>
Direct materials		4010
<b>Wages:</b> Dept. A 60 hrs. x Rs. 3	180	
B 40 hrs. x rs. 2	80	
C 20 hrs. x Rs. 5	100	<b>360</b>
<b>Overhead–Variable:</b>		
Dept. A 60 x Rs. 5000 / 5000 hrs.	60	
B 40 x Rs. 3000 / 1500 hrs.	80	
C 20 x Rs. 2000 / 5000 hrs.	80	<b>220</b>
<b>Fixed overheads:</b>		
120 hours @ Rs. 20000 / 10000 hrs.		240
<b>Total cost</b>		<b>4830</b>
Profit 25% on selling price		1610
<b>Selling price</b>		<b>6440</b>

**Illustration:**

A factory uses job costing. The following data are obtained from its books for the year ended 31<sup>st</sup> December 2016.

	<b>Rs.</b>		<b>Rs.</b>
Direct materials	90000	Selling and distribution overheads	52500
Direct wages	75000	Administrative overheads	42000
Profit	60900	Factory overheads	45000

Prepare a job cost sheet indicating the prime cost, works cost, production cost, cost of sales and sales value.

In 2002, the factory receives an order for a number of jobs. It is estimated that direct materials required will be Rs.1,20,000 and direct labour will cost Rs. 75,000. What should be the price for these jobs if factory intends to earn the same rate of profit on sales assuming that the selling and distribution overheads have gone up by 15% ? The factory recovers overheads as a percentage of direct wages and





	Rs.
Direct materials	120000
Direct wages	75000
<b>Prime cost</b>	<b>195000</b>
Factory cost (60% of direct labour)	45000
<b>Work cost</b>	<b>240000</b>
Administrative overheads (20% of works cost)	48000
<b>Cost of production</b>	<b>288000</b>
Selling and Distribution overheads (28.75% of works cost)	69000
<b>Cost of sales</b>	<b>357000</b>
Profit (16.67% of sales)	71400
<b>Sales</b>	<b>428400</b>

## PROCESS-COSTING

Process costing is used where the production moves from one process to the next until its final completion and there is a continuous mass production of identical units through a series of processing operations. It is applied for a various industries like Chemicals and Drugs, Oil Refining, Food Processing, Paints and varnish, Plastics, Soaps, Textiles, Paper etc.

**CIMA defines process costing as follows:** "The costing method applicable where goods or services result from a sequence of continuous or repetitive operations or processes. Costs are averaged over the units produced during the period."

Process costing method may also be adopted in firms that, produce, a variety of products, provided that the overall production process can be broken down into sub-operation of a continuous repetitive nature like automobiles, toy, plastics etc.

### **Features of Process Costing:**

1. The process cost centres are clearly defined and all costs relating to each process cost centre are accumulated.
2. The cost and stock records for each process cost centre are maintained accurately. The records give clear picture of the units introduced in the process cost centre and also units passed to the next process.
3. The total costs of each process are averaged over the total production of that process, including partly completed units.
4. The charging of the cost of the output of one process as the raw materials input cost of the following process.
5. Appropriate method is used in absorption of overheads to the process cost centres.
6. The process loss may arise due to wastage, spoilage, evaporation, etc.
7. Since the production is continuous in nature, there will be closing work-in-progress which must be valued separately.
8. The output from the process may be a single product, but there may also be a by-products and / or Joint products.

## **JOB COSTING VS. PROCESS COSTING:**

<b>S.No.</b>	<b>Job Costing</b>	<b>Process Costing</b>
1	It is concerned with the cost of an individual Job or batch regardless of the time taken to produce it.	It is impossible to identify individual Jobs and Costs are calculated on time basis for all units of output in that time.
2	A job is carried out or a product is produced to meet the specific requirements of the order. It may be related to single unit or a batch of similar units.	All the products are identical there is a continuous flow of production. It is applied to a large number of units.
3	Standardisation of controls is comparatively difficult as each job differs and more detailed supervision and control is necessary.	Proper control is relatively easy as there are standard applied for costs, process loss, time of production, etc.
4	Costs are collected to each Job at the end of its completion.	Costs are accumulated and collected for each process at the end of specified accounting period and transferred to next process/department till the last process is completed.
5	Only Prime Cost element are traceable and the overheads are apportioned to each Job on some appropriate basis and sometimes it is difficult to select a suitable method of absorption of overheads to individual Jobs.	Process Costing system is easier to operate than Job costing system because the detailed work of allocating costs to many individual job is unnecessary. Many of the costs that are indirect in a Job Costing system may be regarded as direct in process costing system.
6	Work-in-process may or may not exist at the end of accounting period.	Normally, there will be opening and closing work-in-progress for the accounting period.
7	The costs of each Job is ascertained by adding materials, labour and overheads.	The unit cost is the average cost of the process for a given period.
8	It is a specific order costing.	It is used to ascertain the cost of a product at each process.

## PROCESS LOSSES AND GAINS

### Normal loss:

The loss expected during the normal course of operations, for unavoidable reasons is called normal loss and this is due to inherent result of the particular process and thus uncontrollable in the short run. Management, overtime, are usually able to identify an average percentage of normal losses expected to arise from the production process.

The normal losses are absorbed by the completed production. The cost of normal losses should be borne by the goods production. If any value can be recouped from sale of scrap or wastage or spoilage etc., then this would be credited to the process account thus reducing the overall cost of the process.

### Journal Entry:

Normal loss A/c   Dr  
    To process account A/c

**Abnormal loss:** Abnormal losses are those losses the level deemed to be the normal loss rate for the process. The abnormal loss is the amount by which the actual loss exceeds the normal loss and it is expected to arise under efficient operating conditions.

The abnormal losses are not included in the process costs but are removed from the appropriate process account and reported separately as an abnormal loss. The abnormal loss is treated as a period cost and written off to the profit and loss account at the end of the period.

$$\text{Abnormal Loss (units)} = \text{Normal output} - \text{Actual output}$$

### Journal Entry:

Abnormal Loss a/c   Dr   xx  
    To process a/c                      xx

### Transfer:

Costing profit & loss a/c   . xx  
    To Abnormal loss a/c    xx

**Calculation of Abnormal loss in terms of unit:**

$$\text{Abnormal loss} = \text{Normal output} - \text{Actual output}$$

**Value of Abnormal Loss:**

Amount (Rs) 1000 100

$$= \text{Normal cost of Normal Output} / \text{Normal output} \times \text{Unit of Abnormal loss}$$

**Example:** Input 100 units of Rs.1000; Normal loss 10% scrap Rs.100  
 Actual output 87 units Calculate Abnormal loss

**Answer:**

	<b>Unit</b>	<b>Amount (Rs.)</b>
Input	100	1000
Less: Normal loss	10	100
<b>Normal output</b>	<b>90</b>	<b>(Normal cost) 900</b>
Less: Actual output	87	---
<b>Abnormal loss</b>	<b>3</b>	---

**Calculation of value of Abnormal Loss:**

$$\text{Normal cost} / \text{Normal output} \times \text{Unit of Abnormal loss} = 900 / 90 \times 3 = \text{Rs.30}$$

<b>Dr</b>	<b>Unit</b>	<b>Amount</b>	<b>Cr</b>	<b>Unit</b>	<b>Amount</b>
To Input	100	1000	By Normal loss	10	100
			By abnormal loss	3	30
			By actual output	87	(b.f.) 870
	<b>100</b>	<b>1000</b>		<b>100</b>	<b>1000</b>

**Abnormal Gain:**

If the loss is less than the normal expected loss, the difference is considered as abnormal gain. Abnormal gain is accounted similar to that abnormal loss. Abnormal gains will be debited to the process account and credited to an abnormal gains account. The abnormal gain account is debited with the figure of reduced normal loss in quantity and value. At the end of the accounting year the balance in the abnormal gains account will be carried to Profit and Loss Account.

### Calculation of value of Abnormal gain:

= Normal cost / Normal output x Unit of Abnormal gain.

### Journal Entry:

Process a/c Dr        xx  
    To abnormal gain a/c (Value of abnormal gain) xx

### Transfer:

Abnormal gain a/c Dr .    xx  
    To costing profit and Loss a/c    xx

### Example:

Input                    100 units    = Cost Rs. 1000  
Normal Loss            10% ;        Scrap Rs, 100  
Actual output          95 units     Calculate Abnormal gain ?

	Unit	Amount (Rs.)
Input	100	1000
Less: Normal loss	10	100
Normal output	<b>90</b>	<b>Normal cost 900</b>
Less: Actual output	95	---
Abnormal gain	5	---

### Calculation of Abnormal gain:

= Normal cost / Normal Output x Unit of Abnormal

$$= 900 / 90 \times 5 = \text{Rs.}50/-$$

Dr	Unit	Amount	Cr	Unit	Amount
To Input	100	1000	By Normal loss	10	100
To abnormal gain	5	50	By Actual output	95	(b.f.) 950
	<b>105</b>	<b>1050</b>		<b>105</b>	<b>1050</b>

### Problem:

From the under mentioned figures prepare process accounts indicating the cost of each process and the total cost. The production was 480 articles per week.

Particulars	Process I	Process II	Process III
	Rs.	Rs.	Rs.
Material	3000	1000	400

Labour	1600	4000	1200
Factory overheads	520	1440	500

Office overheads amounting of Rs1700 should be apportioned on the basis of wages. Ignore stock in hand and work-in-process at the beginning and end of week.

**Solution:**

**Process No. I A/c**

	Cost per unit	Toal cost		Cost per unit	Toal cost
To material	*6.25	3000	By Process II A/c (Output Transferred)	11.50	5520
To labour	3.33	1600			
To factory overheads	1.08	520			
To office overheads (1700x4/17)	0.84	*400			
<b>Total</b>	<b>11.50</b>	<b>5520</b>	<b>Total</b>	<b>11.50</b>	<b>5520</b>

**Office Overhead Allocated on the basis of Labour:**

Process	I	II	III	
Labour	1600	4000	1200	
	4	10	3	=17

Office O.H. process I =  $1700 \times 4 / 17 = 400^*$

Cost per unit = Total cost / Total output

Example: Material cost per unit =  $Rs.3000 / 480 \text{ units} = rs. 6.25^*$

**Process No. II A/c**

	Cost per unit	Total cost		Cost per unit	Toal cost
To process I A/c	11.50	5520	By Process II A/c (Output Transferred)	27.00	12960
To material	2.08	1000			
To labour	8.34	4000			
To factory overheads	3.00	1440			
To office overheads (1700x10/17)	2.08	1000			
<b>Total</b>	<b>27.00</b>	<b>12960</b>	<b>Total</b>	<b>27.00</b>	<b>12960</b>

**Process No. II A/c**

	Cost per unit	Total cost		Cost per unit	Toal cost
To process II A/c	27.00	12960	By finished stock A/c	32.00	15360

			(Output Transferred)		
To material	0.83	400			
To labour	2.50	1200			
To factory overheads	1.04	500			
To office overheads (1700x3/17)	0.63	300			
<b>Total</b>	<b>32.00</b>	<b>15360</b>	<b>Total</b>	<b>32.00</b>	<b>15360</b>



## MARGINAL COSTING AND BREAK-EVEN ANALYSIS

### Definitions of Marginal cost and Marginal costing

According to the Terminology of Cost Accountancy of the Institute of Cost and Management Accountants, London, Marginal Cost represents "the amount of any given volume of output by which aggregate costs are changed if the volume of output is increased by one unit.

Marginal cost may also be defined as "the aggregate of variable costs" or "prime cost plus variable overheads".

Thus, if for the production of 1,000 units of a product the manufacturer has to incur Rs. 75,000 for materials, Rs. 50,000 for direct wages, Rs. 25,000 for variable overheads and Rs. 50,000 fixed overheads, the marginal cost can be ascertained as follows :

	Total (1,000 units) Rs.	Per unit Rs.
Direct materials	75,000	75
Direct Wages	50,000	50
Prime Cost	1,25,000	125
Variable Overheads	25,000	25
Marginal Cost	1,50,000	150

### MARGINAL COSTING

.The Institute of Cost and Management Accountants, London, has defined Marginal Costing as "the ascertainment of marginal costs and of the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs.

### BASIC CHARACTERISTICS OF MARGINAL COSTING

1. The stocks of finished goods and work-in-process are valued at marginal costs only.
2. It is a technique of analysis and presentation of costs which help management in taking many managerial decisions; and is not an independent system of costing such as process costing or job costing.
3. The variable costs (marginal costs) are regarded as the costs of the products.

4. All elements of cost production, administration and selling and distribution are classified into r variable and fixed component.
5. Fixed costs are treated as period costs.

### **ASSUMPTIONS OF MARGINAL COSTING**

1. The volume of production or output is the only factor which influences the costs.
2. All elements of cost production, administration and selling and distribution— can be segregated into fixed and variable components.
3. The selling price per unit remains unchanged or constant at all levels of activity.
4. Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.
5. Fixed costs remain unchanged or constant for the entire volume of production.

### **MARGINAL COSTING VS. DIRECT/DIFFERENTIAL /VARIABLE COSTING**

The term marginal costing is also referred to as 'variable costing', 'direct costing', 'differential costing' or incremental costing.

### **MARGINAL COSTING VS. ABSORPTION COSTING OR FULL COSTING**

1. Absorption costing is the total cost technique. Under absorption costing all costs whether variable or fixed are treated as product costs. In marginal costing technique only variable costs are treated as product costs.
2. In absorption costing arbitrary apportionment of fixed costs, over the products, results in under or over-absorption of such costs. While marginal costing excludes fixed costs and the question of under or over absorption of fixed costs does not arise.
3. Absorption costing differs from marginal costing from the point of view of inventory valuation also. In absorption costing, the stock of finished goods and work-in-process is valued at total cost which includes both variable and fixed cost. In marginal costing, such stocks are valued at marginal cost.
4. In absorption costing, managerial decision-making is based upon 'profit' which is the excess of sales value over total cost. While in marginal costing, the managerial decisions are guided by 'contribution' which is the excess of sales value over variable cost.

## **CONTRIBUTION:**

Contribution is the difference between sales and variable cost or marginal cost of sales. It may also be defined as the excess of selling price over variable cost per unit. Contribution is also known as Contribution Margin or Gross Margin. Contribution being the excess of sales over variable cost is the amount that is contributed towards fixed expenses and profit

If the selling price of a product is Rs. 20/- per unit and its variable cost is Rs.15/- per unit contribution per unit is Rs. 5/- (i.e. Rs. 20-15).

$$\text{Contribution} = \text{Sales} - \text{Variable (Marginal) Cost}$$

*or Contribution per unit = Selling Price-Variable (or marginal) cost per unit*

*or Contribution = Fixed Costs + Profit (—Loss)*

### **Advantages of contribution:**

1. It helps the management in deciding whether to purchase or manufacture a product or a component
2. It helps the management in the fixation of selling prices. It assists in determining the break-even point
3. It helps in taking a decision as regards to adding a new product in the market.
4. It helps management in the selection of a suitable product mix for profit maximisation.
5. It helps in choosing from among alternative methods of production; the method which gives highest contribution per limiting factor is adopted.

### **Marginal Cost Equation:**

$$\text{Sales} - \text{Variable cost} = \text{Contribution}$$

$$\text{or, } \text{sales} = \text{Variable cost} + \text{Contribution}$$

$$\text{or, } \text{Sales} = \text{Variable cost} + \text{Fixed Cost} \pm \text{Profit/Loss}$$

$$\text{or, } \text{Sales-Variable cost} = \text{Fixed cost} \pm \text{Profit/Loss}$$

$$\text{or, } S - V = F \pm P$$

where 'S' stands for Sales

'V' stands for Variable cost

'F' stands for Fixed cost

'P' stands for Profit/Loss

Determine the amount of variable cost from the following particulars:

Sales      150000  
Fixed Cost      30000.  
Profit              40000

**Solution:**

Sales - Variable cost = Fixed Cost ± Profit / Loss

or       $150000 - V.C. = 30,000 + 40,000$  .

or      Variable cost =  $1,50,000 - 70,000 = \text{Rs.}80,000$ .

Illustration: From the following information find out the amount of profit earned during the year using the marginal costing technique:

Fixed Cost	Rs. 250000
Variable cost	Rs. 10 per unit
Selling price	Rs. 15 per unit
Output level	75000 units

**Solution:**

$$S - V = F + P$$

$$\text{Sales} = \text{Rs. } 75,000 \times 15 = \text{Rs. } 11,25,000$$

$$\text{Variable Cost} = 75,000 \times 10 = \text{Rs. } 7,50,000$$

$$\text{Fixed Cost} = \text{Rs. } 2,50,000$$

$$\text{Profit (P)} = ?$$

$$11,25,000 - 7,50,000 = 2,50,000 + P$$

$$3,75,000 = 2,50,000 + P$$

$$P = 3,75,000 - 2,50,000$$

$$\text{Profit} = \text{Rs. } 1,25,000.$$

## Profit/Volume Ratio (P/V ratio or C/S Ratio)

The Profit/volume ratio, which is also called the 'contribution ratio' or 'marginal ratio', expresses the relation of contribution to sales and can be expressed as under :

$$\text{P/V Ratio} = \text{Contribution} / \text{Sales}$$

$$\text{P/V Ratio} = \text{Sales} - \text{Variable cost} / \text{Sales} \text{ i.e. } S - V / S$$

$$\text{or, P/V Ratio} = \text{Fixed cost} + \text{Profit} / \text{Sales}$$

$$\text{or, P/V Ratio} = \text{Change in profit or Contribute} / \text{Change in Sales}$$

$$\text{P/V Ratio} = 20 - 15 / 20 \times 100 = 5 / 20 \times 100 = 25\%$$

The PA/ ratio, which establishes the relationship between contribution and sales is of vital importance for studying the profitability of operations of a business. It reveals the effect on profit of changes in the volume.

The formula for the sales volumes required to earn a given profit is :

$$\text{P/V Ratio} = \text{Contribution} / \text{Sales}$$

$$\text{or, P/V Ratio} = \text{Fixed Cost} + \text{Profit} / \text{Sales}$$

$$\text{or, Sales} = \text{Fixed cost} + \text{Profit} / \text{P/V Ratio} = \text{F+P} / \text{P/V Ratio}$$

### Illustration:

Sales	Rs.100000
Profit	Rs. 10000
Variable cost	70%

Find out (i) PA/ ratio, (ii) Fixed Cost (iii) Sales Volume to earn a Profit of Rs. 40000

$$\text{Sales} = \text{Rs.100000}$$

$$\text{Variable cost} = 70\%$$

$$= 70 / 100 \times 100000 = \text{Rs. 70000}$$

$$\text{P/V Ratio} = \text{sales} - \text{variable cost} / \text{sales} \times 100$$

$$= 100000 - 70000 / 100000 \times 100 = 30\%$$

Contribution = Fixed cost + profit

30000 = fixed cost + 10000 = Rs. 20000

Fixed cost = 30000 - 10000

Sales = Fixed cost + profit / P/V Ratio

= 20000 + 40000 / 30%

= 60000 x 100 / 30 =Rs. 200000

**Illustration:**

The sales turnover and profit during two years were as follows:

Year	Sales Rs.	Profit Rs.
2015	140000	15000
2016	160000	20000

**You are required to calculate:**

- a) P/V ratio
- b) Sales required to earn a profit of Rs. 40,000,
- c) Profit when sales are Rs. 1,20,000.

**Solution:**

a) P/V Ratio = Change Profit / Change in Sales x100

= 5000 / 20000 = 100 = 25%

b) Sales required to earn a profit of Rs. 40,000

P/V Ratio = Fixed cost + profit / Sales

or 25 / 100 = F+15,000 / 1,40,000

or 140000 x 25 / 100 = F + 15000 = 35000 – 15000 = F

or Fixed cost = Rs. 20000

or Fixed Cost =Rs. 20,000

Desired Sales = F+P / P/V Ratio

$$= 20000 + 40000 / 25 / 100 = 60000 \times 100 / 25 = \text{Rs.}240000$$

c) Profit when sales are Rs. 1,20,000

$$S = F + P / P/V \text{ Ratio}$$

$$S \times P/V \text{ ratio} = F + P$$

$$1,20,000 \times 25 / 100 = 20,000 + P$$

$$30,000 = 20,000 + P$$

$$\text{Profit} = 30,000 - 20,000 = \text{Rs. } 10,000$$

## **COST-VOLUME & PROFIT ANALYSIS**

Cost-Volume-Profit Analysis a technique for studying the relationship between cost, volume and profit. Profits of an undertaking depend upon a large number of factors. The CVP relationship is an important tool used for the profit planning of a business. In cost-volume-profit analysis an attempt is made to analyse the relationship between variations in cost with variations in volume.

The cost-volume-profit relationship is of immense utility to management as it assists in profit planning, cost control and decision making. Cost-volume-profit analysis can be used to answer questions such as:

1. How much sales should be made to avoid losses?
2. How much should be the sales to earn a desired profit?
3. What will be the effect of change in prices, costs and volume on profits?
4. Which product or product mix is most profitable?
5. Should we manufacture or buy some product or component? and so on.

## **BREAK-EVEN ANALYSIS**

The study of cost-volume profit analysis is often referred to as 'break-even analysis'. The term "break-even analysis" is used in two senses. In its broad sense, break-even analysis refers to the study of relationship between costs, volume and profit at different levels of sales or production. In its narrow sense, it refers to a technique of determining that level of operations where total revenues equal total expenses, i.e., the point of no profit, no loss.

## **ASSUMPTIONS OF BREAK-EVEN ANALYSIS**

1. The break-even analysis is based upon the following assumptions :

2. All elements of cost, i.e., production, administration and selling and distribution can be segregated into fixed and variable components.
3. Selling price per unit remains unchanged or constant at all levels of output.
4. There is only one product or in case of multi-products, the sales mix remains unchanged.
5. Variable cost remains constant per unit of output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.
6. There will be no change in the general price-level.
7. Fixed cost remains constant at all volumes of output.
8. Volume of production is the only factor that influences cost.
9. There is synchronisation between production and sales.

### **BREAK EVEN POINT**

The break-even point may be defined as that point of sales volume at which total revenue is equal to total cost. It is a point of no profit no loss. A business is said to break-even when its total sales are equal to its total costs. At this point contribution, i.e., sales minus marginal cost equals the fixed costs and hence this point is often called as 'Critical Point' or 'Equilibrium Point' or 'Balancing Point' or no profit no loss. If production/sales are increased beyond this level, there shall be profit to the organisation and if it is decrease from this level, there shall be loss to the organisation.

*Break-even point can be stated in the form of an equation:*

$$\text{Sales revenue at break-even point} = \text{Fixed Costs} + \text{Variable Costs.}$$

### **ALGEBRAIC FORMULA METHOD FOR COMPUTING THE BREAK-EVEN POINT**

The break-even point can be computed in terms of:

- a. Units of sales volume.
- b. Budget total or in terms of money value.
- c. As a percentage of estimated capacity.

#### **(a) Break-Even Point in Units:**



As the break-even point is the point of no profit no loss, it is that level of output at which the total contribution equals the total fixed costs, It can be calculated with the help of following formula:

$$\begin{aligned}\text{Break Even Point} &= \text{Fixed Cost} / \text{Selling Price per unit} - \text{Variable Cost per unit} \\ &= \text{Fixed Cost} / \text{Contribution per unit}\end{aligned}$$

**(b) Break-Even Point in terms of budget-total or money value:**

**At break-even point:**

$$\text{Total Sales} = \text{Total Fixed Cost} + \text{Total Variable Cost}$$

or  $S = F + V$

(where S = Sales, F=Fixed Cost and V=Variable cost)

$$\begin{aligned}\text{Break-Even Sales} &= \text{Fixed Cost} / \text{Sales} - \text{Variable Cost} \times \text{Sales} \\ &= \text{Fixed Cost} / \text{Contribution} \times \text{Sales}\end{aligned}$$

With the use of P/V Ratio, B.E.P = Fixed cost / P/V Ratio

(As, contribution / sales = P/V Ratio)

**MARGIN OF SAFETY**

The excess of actual or budgeted sales over the break-even sales is known as the margin of safety. It is the difference between actual sales minus the sales at break-even point.

$$\text{Margin of Safety} = \text{Total Sales} - \text{Sales at Break - Even Point}$$

$$\text{Margin of Safety (M/S)} = \text{Profit} / \text{P/V Ratio}$$

**ANGLE OF INCIDENCE )**

The angle of incidence is the angle between the sales line and the total cost line formed at the breakeven point where the sales line and the total cost line intersect each other. The angle of incidence indicates the profit earning capacity of a business. A large angle of incidence indicates a high rate of profit and, on the other hand, a small angle of incidence indicates a low rate of profit.

## **MANAGERIAL APPLICATIONS OF MARGINAL COSTING**

(Decisions Involving Alternative Choices)

Marginal costing technique is a valuable aid to management in taking many managerial decisions. It is a useful tool for making policy decisions, profit planning and cost control. The following are some of the important managerial problems where marginal costing technique can be applied.

1. Pricing Decisions.
2. Profit Planning and Maintaining a Desired Level of Profit.
3. Make or Buy Decisions.
4. Problems of Key or Limiting Factor.
5. Selection of a Suitable or Profitable Sales Mix.
6. Effect of Changes in Sales Price.
7. Alternative Methods of Production.
8. Determination of Optimum Level of Activity.
9. Evaluation of Performance.
10. Capital Investment Decisions.

### **PRICING DECISIONS**

Fixing of selling prices is one of the most important functions of management. Although prices are generally determined by market conditions and other economic factors yet marginal costing technique assists the management in the fixation of selling prices under various circumstances as:

- a) Pricing under normal conditions
- b) During stiff competition
- c) During trade depression.

### **Profit Planning and Maintaining a Desired Level of Profit**

Marginal costing techniques can be applied for profit planning as well. Profit planning involves the planning of future operations to achieve maximum profits or to maintain a desired level of profits.

## Make or Buy Decisions:

Sometimes a concern has to decide whether a certain product or a component should be made in the factory itself (having unused production facilities) or bought from outside from a firm which specialises in it. In taking such a 'make or buy' decision, the technique of marginal costing is of immense help.

Materials

Direct labour

Other Variable Expenses

Depreciation and other Fixed Expenses

Solution:

Since fixed costs are to be incurred whether we manufacture this component or not the decision depends upon the marginal cost of making the component which is calculated as follows:

Marginal Cost of Component 0.51 (per unit)	Rs.
Materials	3.00
Direct Labour	2.00
Other Variable Expenses	_Llfi

It is advisable to make the component itself if the marginal cost of making the component is lower than the purchase price because every component produced will give some contribution to the company. But in case the marginal cost is higher than the purchase price, it is better to buy the component from outside than to make it

In the above example, if the purchase price is Rs. 6.50, it is not advisable to buy the component from outside. We should rather make the component of our own because every component manufactured will give a contribution of 50 paise. But the company should not manufacture the component if it is available at Rs. 5.50 from outside. In that case it is better to buy than to make.

### Problem of Key or Limiting Factor:

A limiting factor is a factor which limits or restricts production or sales and thus prevents a concern from making unlimited profits. Limiting factor is also known as key factor. The limiting factor may be any factor of production such as availability of raw material, labour, capital, plant capacity and even sales.

### Effect of Changes in Sales Price:

Management is generally confronted with a problem of analysing the effect of changes in sales price upon the profitability of the concern. It may be required to reduce the prices on account of competition, depression.

### Alternative Methods of Production:

Sometimes the management has to choose from among alternative methods of production, e.g., machine work or hand work. The same product may be produced either by employing machine No. 1 or Machine No. 2, and the management may be confronted with the problem of choosing one among them. In such circumstances, technique of marginal costing can be applied and the method which gives the highest contribution can be adopted keeping in view, of course, the limiting factor.

### Evaluation of Performance:

Evaluation of performance efficiency of various departments, product lines or markets can also be made with the use of the technique of managerial costing.

### Capital Investment Decisions:

The technique of marginal costing also helps the management in taking capital investment decisions.

### ADVANTAGES OF MARGINAL COSTING:

1. The technique of marginal costing is very simple to operate and easy to understand.
2. It does away with the need for allocation, apportionment and absorption of fixed overheads and hence removes the complexities of under-absorption of overheads.
3. Marginal cost remains the same per unit of output irrespective of the level of activity. It is constant in nature and helps the management in production planning.
4. There is no possibility of factitious profits by over-valuing stocks.
5. It facilitates the calculation of various important factors.
6. It is a valuable aid to management for decision-making and fixation of selling prices, selection of a profitable product/sales mix.
7. It facilitates the study of relative profitability of different product lines, departments.
8. It is complimentary to standard costing and budgetary control.
9. Help in cost control
10. It helps the management in profit planning.
11. It is very useful in management reporting.

### **LIMITATIONS OR DISADVANTAGES OF MARGINAL COSTING**

1. The technique of marginal costing is based upon a number of assumptions which may not hold good under all circumstances.
2. All costs are not divisible into fixed and variable.
3. Variable costs do not always remain constant.
4. Selling prices do not remain constant.
5. Fixed costs do not remain constant after a certain level of activity
6. The exclusion of fixed costs from the stocks of finished goods and work-in-progress is illogical.
7. Although the technique of marginal costing overcomes the problem of under or over-absorption of fixed overheads, the problem still exists in regard to under or over-absorption of variable overheads.
8. Marginal costing completely ignores the time factor.
9. The technique of marginal costing cannot be applied in contract or ship-building industry.
10. Cost control can be better achieved with the help of other techniques, viz., standard costing and budgetary control than by marginal costing technique.

11. Fixation of selling prices in the long run cannot be done without considering fixed costs. Thus, pricing decisions cannot be based on marginal cost alone.
12. Managerial decisions based upon only the marginal cost ignoring equally important element of fixed cost may not be correct.

### QUESTIONS:

1. Define marginal cost.
2. What is contribution?
3. What is P/V ratio?
4. Give marginal cost equation.
5. What is Break-Even Point?
6. Define angle of incidence.
7. What is cash break-even point?
8. Write a note on marginal costing vs. direct costing.
9. Compare marginal costing with absorption costing.
10. Write a brief note on cost-volume-profit analysis.
11. What are the limitations of break-even charts ?
12. Define 'marginal cost' and 'marginal costing'.
13. How variable costs and fixed costs marginal costing.
14. Explain the concept of 'marginal costing'. What are the characteristics and assumptions of marginal costing.
15. What is the main difference between absorption costing and marginal costing? Discuss.  
What do you understand by contribution? How does it help management in solving various problems?
16. Explain the term 'break-even point'. How is it determined and what is its use ?
  - a. Discuss the importance of following terms in relation to marginal costing : Break-even point
  - b. P/V ratio
  - c. Angle of incidence
  - d. Margin of safety. J
17. "The technique of marginal costing can be a valuable aid to management". Discuss.

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## **STANDARD COSTING**

### **MEANING OF STANDARD COST AND STANDARD COSTING**

The word 'standard' means a bench-mark or yardstick. The standard cost is a predetermined cost which determines in advance what each product or service should cost under given circumstances. In the words of Backer and Jacobsen, "Standard cost is the amount the firm thinks a product or the operation of a process for a period of time should cost, based upon certain assumed conditions of efficiency, economic conditions and other factors. "The costing terminology of Chartered Institute of Management Accountants, London defines standard cost as "a predetermined cost which is calculated from managements standards of efficient operation and the relevant necessary expenditures".

The terminology of Cost Accountancy defines standard costing as "The preparation and use of standard costs, their comparison with actual costs, and the analysis of variance to their causes, and points of incidence".

Standard costing is a system of cost accounting which is designed to find out how much should be the cost of a product under the existing conditions. The actual cost can be ascertained only when production is undertaken. The predetermined cost is compared to the actual cost and a variance between the two enables the management to take necessary corrective measures.

### **STEPS INVOLVED IN STANDARD COSTING**

The technique of standard costing involves the determination of cost beforehand. The standards may be divided according to the elements of costs. The standard cost is divided into standards for materials, labour and overheads. The standard cost is compared to the actual cost. The difference between the two costs is known as variance. The variances are calculated element-wise. The management can take corrective measures to set the things right.

Standard costing involves the following steps :

1. The determination of standard cost.
2. The recording of actual cost
3. The comparison between standard cost and actual cost
4. The finding out of variance.
5. The reporting of variance so as to find out inefficiency and take necessary corrective measures.

## **STANDARD COSTING AND BUDGETARY CONTROL**

In budgetary control, budgets are used as a means of planning and control. Standard costing also sets standards and enables to determine efficiency on the basis, of standards set and actual performance.

**CONCEPT:** In budgetary control the budgets are prepared for the concern as a whole whereas in standard costing the standards are set for producing a product or for providing a service. In standard costing, unit concept is used while in budgetary control total concept is used. The whole concern is taken as one unit for budgets. The standard cost is fixed for one product and different standards are used for different products.

**BASIS:** The budgets are fixed on the basis of past records and future expectations. Standard costs are fixed on the basis of technical information. Standard costs are planned costs and these are expected in future.

**SCOPE:** The scope of budgetary control is much wider than the scope of standard costing. Budgets are prepared for incomes, expenditures and other activities, etc. Budgets are prepared for different functional departments such as purchase, sale, production, finance and personnel department. On the other hand standards are set up for expenditures only.

**Emphasis:** In budgetary control, the targets of expenditure are set and these targets cannot be exceeded. In this system the emphasis is on keeping the expenditures within the budgeted figures. In standard costing the standards are set and an attempt is made to achieve these standard.

**Objective:** Budgets are set on the basis of present level of efficiency while standard costs are based on the basis of standards set by the management. The standards are related to what management wants to achieve.

**Relationship:** Budgetary Control is related to financial accounts while standard costing is related to the cost accounts.

**USE:** Budgets are used for forecasting purposes. The forecasts about incomes, expenditures and costs are based on historical figures and expected changes in future. Standard costing control be used for forecasting purposes.



**VARIANCE ANALYSIS:** Budgetary control deals with total variances only. In standard costing variances are calculated for different elements of cost.

**ELEMENTS:** The budgetary control system can be applied partly or wholly. Budgets may be prepared for some departments and may-not be prepared for all the departments. Standard costing cannot be used partially, it will have to be used wholly. The standards will have to be set for all elements of cost.

### **STANDARD COSTS AND ESTIMATED COSTS:**

Both the standard costs and estimated costs are used to determine price in advance. The purpose of both the systems is to control cost.

1. Estimated costs are based on historical accounting. On the other hand standard costs are based on scientific analysis and engineering studies. Standard costing determines what the cost should be.
2. Standard costs are used as a device for measuring efficiency. The standards are predetermined and a comparison of standards with actual costs enables to determine the efficiency of the concern. Estimated costs cannot be used to determine efficiency. It only determines the expected costs.
3. The purpose of determining estimated costs is to find out selling price in advance to take a decision whether to produce or to make and also to prepare financial budgets. Estimated costs do not serve the purpose of cost control. On the other hand standard costs are helpful in cost control. The analysis of variance enables to take corrective measures, if necessary.
4. Standard costs are not easily changed. The standards are set in such a way that small changes in conditions do not require a change in standards. Estimated costs are revised with the change in conditions. They are made more realistic by incorporating changes in prices. Standard costs are more static than estimated costs.
5. Estimated costs are used by the concern using historical costing. Standard costing is used by those concerns which use standard costing system. Standard costing is a part of cost accounting process while estimated costs are statistical in nature and as such they may not become a part of accounting.

## ADVANTAGES OF STANDARD COSTING

- 1. Measuring Efficiency:** Standard costing is a yardstick for measuring efficiency. The comparison of actual costs with standard costs enables the management to evaluate performance of various cost centers.
- 2. Formulation of Production and Price Policy:** Standard costing is helpful in formulating production policies. The standards are set by studying all existing conditions.
- 3. Determination of Variance:** By comparing actual costs with standard costs variances are determined. Management is able to spot out the place of inefficiencies. It can fix responsibility for deviation in performance, it is possible to take corrective measures at the earliest.
- 4. Reduction of Work:** Standard costing reduces clerical work to a considerable extent and management is supplied with useful information.
- 5. Management by Exception:** Management by exception is possible only when targets of work can be fixed. Standard costing enables the determination of targets.
- 6. Facilitates Cost Control:** Every costing system aims at cost control and cost reduction. Standard costing helps in achieving these aims.
- 7. Eliminating Inefficiencies:** The setting of standard for different elements of cost requires a detailed study of different aspects. The standards are differently set for manufacturing, administrative and selling expenses. Improved methods are used for setting these standards.
- 8. Helpful in taking important decisions:** Standard Costing provides useful information to the management in taking important decisions.

## LIMITATIONS OF STANDARD COSTING

Standard costing cannot be used in those concerns where non-standard products are produced. If the production is undertaken according to the customer's specifications then each job will involve different amount of expenditures. Under such circumstances it is not possible to set up standards for every job. Standard costing can be used only in those concerns where standardised products are manufactured.

The process of setting up standards is a difficult task as it requires technical skill.

There are no inset circumstances to be considered for fixing standards. The conditions under which standards are fixed do not remain static. With the change in circumstances the standards are also to be revised. The revision of standard is a costly process. In case the standards are not revised the same become impracticable.

This system is expensive and small concerns may not afford to bear the cost. For small concerns the utility from this system may be less than the cost involved in it.

The fixing of responsibility is not an easy task. The variances are to be classified into controllable and uncontrollable variances. The responsibility can be fixed only for controllable variances.

The industries liable for frequent technological changes will not be suitable for standard costing system. The change in production process will require a revision of standard.

### **PRELIMINARIES FOR ESTABLISHING A SYSTEM OF STANDARD COSTING**

- I. **Determination of Cost Centre:** If the whole factory is engaged in manufacturing a product the factory will be a cost centre. In fact, a cost centre describes the product whose cost is accumulated. Cost centers enable the determination of costs, and fixation of responsibility.
  
- II. **Classification of Accounts:** Classification of accounts is necessary to meet a required purpose *i.e.*, function, asset or revenue item. Codes can be used to have a speedy collection of accounts. A standard is a predetermined measure of material, labour and overheads. It may be expressed in quantity and its monetary measurements in standard costs.
  
- III. **Types of Standards:**  
 The standards are classified into three categories:
  - a) Current Standard
  - b) Ideal Standard
  - c) Expected Standard
  - d) Basic Standard
  - e) Normal Standard
  
- IV. **Current Standard.** A current standard is a standard which is established for use over a short period of time and is related to current condition. It reflects the performance which should be attained during the current period.

- V. **Ideal Standard:** This is the standard which represents a high level of efficiency. Ideal Standard is fixed on the assumption that favourable conditions will prevail and management will be at its best.
- VI. **Expected Standard:** This standard is based on expected conditions. It is the target which can be achieved if expected conditions prevail.
- VII. **Basic Standard:** A basic standard may be defined as a standard which is established for use for an indefinite period which may be a long period. Basic standard is established for a long period and is not adjusted to the present conditions.
- VIII. **Normal Standard:** As per terminology, normal standard has been defined as, a standard which it is anticipated can be attained over a future period of time, preferably long enough to cover one trade cycle.
- IX. **Organisation for Standard Costing:** The success of standard costing system will depend upon the setting up of proper standards. For the purpose of setting standards, a person or a committee should be given this job. In a big concern a standard costing committee is formed for this purpose.
- X. **Setting of Standards:** The standard for direct material, direct labour and overhead expenses are fixed. The standards should be set up in a systematic way so that they are used as a tool for cost control.
  - a) Standard Cost for Direct Material
  - b) Standard Cost for Direct Labour
  - c) Standard Costs of Overheads

## ANALYSIS OF VARIANCES

The object of standard costing is to exercise cost control and cost reduction. The deviations between standard costs, profits or sales and actual costs, profits or sales respectively will be known as variances. The variances may be favourable and unfavourable. If actual cost is less than the standard cost and actual profit and sales are more than the standard profits and sales, the variances will be favourable. On the contrary if actual cost is more than the standard cost and actual profit and sales are less than the standard profits and sales, the variances will be unfavourable. The variances are related to efficiency. If variances are favourable, it will show efficiency and if variances are unfavourable it will show inefficiency.

The variances may be categorised as controllable and uncontrollable. If a variance can be regarded as a responsibility of a particular person it will be known as controllable variance. The excessive use of materials or more labour hours than the standards can be assigned to inefficiency of particular persons. In case the variances are not in the control of persons then these will be called uncontrollable variances.

## CLASSIFICATION OF VARIANCES

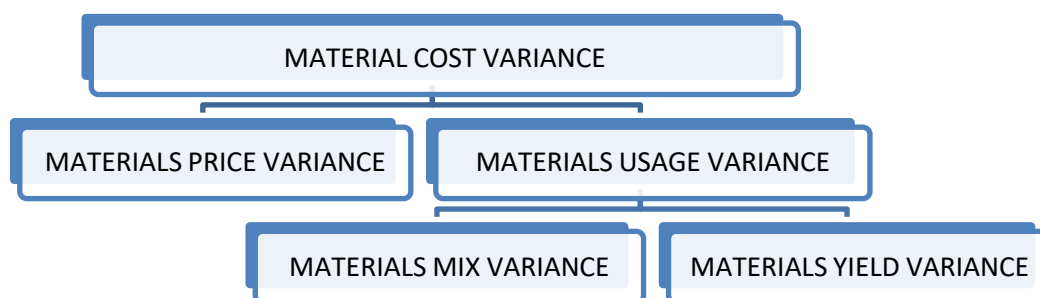
The variances may be classified into following categories :

- a. Direct Materials Variances
- b. Direct Labour Variances
- c. Overheads Cost Variances
- d. Sales or Profit Variances.

**Direct Material Variances:** Direct material variances are also known as material cost variances. The material cost variance is the difference between the standard cost of materials that should have been incurred for manufacturing the actual output and the cost of materials that has been actually incurred.

Yield Variance.

The following chart depicts the divisions and sub-divisions of material variances:



Thus, in all the following may be the material variances:

- a) Material Cost Variance
- b) Material Price Variance
- c) Material Usage Variance
- d) Material Mix Variance
- e) Material Yield Variance.

The following equations may be used for verification of material cost variances.

$$\text{Material Cost Variance} = \text{Material Price Variance} + \text{Material Usage Variance}$$

$$\text{Material Usage Variance} = \text{Material Mix Variance} + \text{Material Yield Variance}$$

$$\text{Material Cost Variance} = \text{Material Price Variance} + \text{Material Mix Variance}$$

$$+ \text{Material Yield Variance}$$

Material

**Materials Cost Variance:** Material cost variance is the difference between standard materials cost and actual materials cost. Material cost variance arises due to change in price of materials and variations in use of quantity of materials. Material cost variance is ascertained as such:

$$\text{Materials Cost Variance} = \text{Standard Material Cost} - \text{Actual Material Cost}$$

Standard Material Cost = Standard Price per unit x Standard quantity of materials

Actual Material Cost = Actual price per unit x Actual quantity of materials

If the standard cost is more than the actual cost, the variance will be favourable, and on the other hand, if the actual cost is more than the standard cost, the variance will be unfavourable or adverse.

**Materials Price Variance:** Materials price variance is that part of material cost variance which is due to the standard price specified and actual price paid. Material price variances may arise due to the following reasons :

- (i) Changes in basic prices of materials.
- (ii) Failure to purchase the quantities anticipated at the time when standards were set.
- (iii) Failure to secure discount on purchases.

$$\text{Materials Price Variance} = \text{Actual Quantity} (\text{Standard price} - \text{Actual price})$$

**Material Usage Variance:** Material usage (or quantity) variance is that part of material cost which arises due\* to the difference in standard quantity specified and actual quantity of materials used.

This variance may arise due to the following reasons :

- a) Negligence in use of materials.
- b) More wastage of materials by untrained workers or defective methods of production.
- c) Loss due to pilferage.

$$\text{Materials Usage Variance} = \text{Standard Price} (\text{Standard Quantity} - \text{Actual Quantity})$$

**Illustration:**

Following is the data of a manufacturing concern. From the figures given below, calculate

- a) Materials Cost Variance
- b) Material Price Variance
- c) Material Usage Variance.

The standard quantity of materials required for producing one ton of output is 40 units. The standard price per unit of materials is Rs. 3. During a particular period 90 tons of output was undertaken. The materials required for actual production were 4,000 units. An amount of Rs, 14,000 was spent on purchasing the materials.

**Solution:**

Standard quantity of material =  $(90 \times 40) = 3600$  units

Standard price per unit = Rs. 3

Actual price per unit =  $(14000 / 4000) = \text{Rs. } 3.50$

**Material Cost Variance** = Standard material cost - Actual material cost

Standard material cost = Standard quantity x Standard Price  
 $= 3,600 \times 3 = \text{Rs. } 10,800$

Material cost variance =  $10,800 - 14,000 = (-) \text{Rs. } 3,200$  unfavourable

**Material Price Variance** = Actual Quantity (Standard Price per unit - Actual price per unit)

$= 4,000(3.00 - 3.50)$   
 $= 4,000 (-0.50) = (-) \text{Rs. } 2,000$  unfavourable

**Material Usage Variance** = Standard Price per unit (Standard Quantity - Actual Quantity)

$= 3 (3,600 - 4,000)$

$$= 3 (-400) = (-) \text{ Rs. } 1,200 \text{ unfavourable}$$

Verification :

Material Cost Variance= Material Price Variance + Material Usage Variance

$$-3,200 = -2,000 - 1,200 \quad -3,200 = -3,200$$

### Illustration:

From the data given below, Calculate:

- Material Cost variance
- Material price variance
- Material usage variance

Products	Standard Quantity (units)	Standard price Rs.	Actual Quantity (units)	Actual price Rs.
A	1050	2.00	1100	2.25
B	1500	3.25	1400	3.50
C	2100	3.50	2000	3.75

### Solution:

<b>Material Cost Variance</b>	= Standard Cost - Actual Cost = (Std. Qty. x Std. Rate) - (Actual Qty. x Actual Rate)	
Material A	= (1,050 x 2) - (1,100 x 2.25) = 2,100—2,475	= -Rs.375
Material B	= (1,500 x 3.25)—(1,400 x 3.50) = 4,875—4,900	= Rs. 25
Material C	= (2,100 x 3.50)—{2,000 x 3.75} = 7,350—7,500	= -Rs. 150
Material Cost Variance	= Rs. 550 Unfavourable	
<b>Material Price Variance</b>	= Actual Quantity (Standard Price - Actual Price)	
Material A	= 1,100 (2.00 - 2.25) = 1,100 (-0.25)	= - Rs. 275
Material B	= 1,400 (3.25-3.50) = 1,400 (-0.25)	= -Rs.350
Material C	= 2,000 (3.50-3.75) = 2,000 (-0.25)	= -Rs. 500
Material Price Variance	= Rs. 1,125 Unfavourable	



<b>Material Usage Variance</b>	= Standard Price (Standard Quantity - Actual Quantity)	
Material A	= 2 (1,050-1,100) = 2 (-50)	= -Rs. 100
Material B	= 3.25 (1,500-1,400) = 3.25 (100)	= + Rs. 325
Material C	= 3.50 (2,100-2,000) = 3.50 (100)	= +Rs. 350
Material Usage Variance =Rs. 575 Favourable		

Material Cost Variance: Material Price Variance + Material Usage Variance

$$-\text{Rs. } 550 = \text{Rs. } 1125 + \text{Rs. } 575$$

$$-\text{Rs. } 550 = \text{Rs. } 550$$

### Material Mix Variance:

Materials mix variance is that part of material variance which arises due to changes in standard and actual composition of mix. It results from a variation in the materials mix used in production. If material mix used in production is of a higher price and larger in quantity than the standard mix, cost of actual material mix will be more. On the other hand, the use of cheaper materials in large proportions will mean lower material cost than the standard.

Materials mix variance is the difference between standard price of standard mix and standard price of actual mix. The standard price is used in calculating this variance. The variance is calculated under two situations:

- a) When actual weight of mix is equal to standard weight of mix.
- b) When actual weight of mix is different from the standard mix.

#### I. When Actual Weight and Standard Weight of Mix are Equal

In this case the formula for calculating mix variance is :

Standard cost of standard mix - Standard cost of actual mix.

(Standard Price x Standard Quantity) - (Standard Price x Actual Quantity)

or Standard Unit Cost (Standard Quantity – Actual Quantity)

In case standard quantity is revised due to shortage of one material, the formula will be:

Standard Unit Cost (Revised Standard Quantity – Actual Quantity)

**Illustration:**

Products	Standard Quantity (units)	Standard price Rs.	Actual Quantity (units)	Actual price Rs.
A	40	10	50	12
B	60	5	50	8

Material Mix Variance = Standard unit cost (Standard Quantity – Actual Quantity)

Material – A = 10 (40 - 50)

= 10 (-10) = Rs. 100 unfavourable

Material – B = 5 (60 - 50)

= 5 (10) = Rs. 50 Favourable

Material Mix Variance = Rs. 50 Unfavourable

When Actual Weight and Standard Weight of Mix are Different:

When quantities of actual material mix and standard material mix are different, the formula will be :

*{Total Weight of Actual mix / Total Weight of Standard mix x Standard Cost of Standard mix} - (Standard Cost of Actual Mix)*

In case the standard is revised due to the shortage of one material then revised standard will be used instead of standard, the formula will become :

*{Total Weight of Actual mix / Total Weight of Revised Standard mix x Standard Cost of Standard mix} - (Standard Cost of Actual Mix)*

**Illustration:** From the following data calculate various material variances:

Products	Standard Quantity (units)	Standard price Rs.	Actual Quantity (units)	Actual price Rs.
A	80	8.00	90	7.50
B	70	3.00	80	4.00
	150		170	

<b>Material Cost Variance</b>	= Standard Cost - Actual Cost = (Std. Qty. x Std. Rate) - (Actual Qty. x Actual Rate)	
Material A	= (80 x 8) - (90 x 7.50) = 640—675	= -Rs.35
Material B	= (70 x 3)—(80 x 4.00) = 210—320	= -Rs. 110
Material Cost Variance	= Rs. 145 Unfavourable	
<b>Material Price Variance</b>	= Actual Quantity (Standard Price - Actual Price)	
Material A	= 90 (8.00 - 7.50) = 90 (0.50)	= - Rs. 45
Material B	= 80 (3.00- 4.00) = 80 (-1.00)	= -Rs. 80
Material Price Variance	= Rs. 35 Unfavourable	
<b>Material Usage Variance</b>	= Standard Price (Standard Quantity - Actual Quantity)	
Material A	= 8 (80-90) = 8 (-10)	= -Rs. 80
Material B	= 3 (70-80) = 3 (-10)	= - Rs. 30
Material Usage Variance	= Rs. 110 Favourable	
Material Mix Variance	= {Total Weight of Actual mix / Total Weight of Standard mix x Standard Cost of Standard mix } - (Standard Cost of Actual Mix)	
	= (170 / 150 x 80+ 70 x 3) - (90x8+80x3)= (170/150 x 850) -960 = 963.3 - 960	= Rs.3.3 Favourable

**Materials Yield Variance:** This is the sub-variance of material usage variance. It results from the difference between actual yield and standard yield. A standard output is expected from the raw materials put in. The actual yield may be more or less than the specified standard. Materials yield variance is defined as "that portion .of the direct materials usage variance which is due to the standard yield specified and the actual yield obtained.

Material yield variance is calculated with the following formula:

$$\text{Standard Rate (Actual yield - Standard yield)}$$

*Standard Rate = Standard Cost of Standard mix / Net standard output i.e., Gross output-Standard loss*

There may be a situation where standard mix may be different from the actual mix. In this case the standard is revised in relation to actual mix and the question is solved with the revised standard and not with the original standard. The standard rate will be calculated as follows:

$$\text{Standard Rate} = \text{Standard Cost of revised standard mix} / \text{Net standard output}$$

### Illustration:

From the following information, calculate material yield variance :

Materials	Quantity (units)	Standard Price per unit Rs.	Quantity (units)	Actual Price per unit Rs.
A	80	5	60	4.50
B	90	9	90	8.00
	150		150	
There is a standard loss of 10%. Actual yield is 125 units.				

Solution :

### Material Yield Variance:

Standard Rate (Actual Yield - Standard Yield)

Standard Rate = Standard Cost of Standard mix / Net Standard Output

Standard Rate =  $(80 \times 5 + 70 \times 9) / 135(150 - 10\%) = 1030 / 135 = \text{Rs. } 7.63$

Material Yield Variance =  $7.63 (125 - 135) = 7.63 (-10) = \text{Rs. } 76.3$  Adverse.

## DIRECT LABOUR VARIANCES

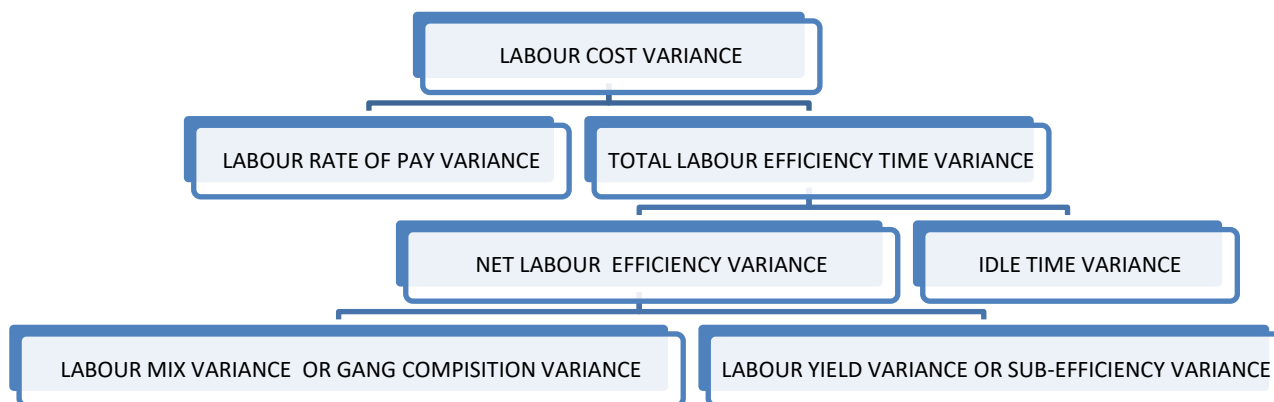
Labour variances can. be discussed as follows :

1. Labour Cost Variance
2. Labour Rate of Pay or Wage Rate Variance
3. Total Labour Efficiency or Labour Time Variance
4. Net Labour Efficiency Variance
5. Idle Time Variance
6. Labour Mix or Gang Composition Variance
7. Labour Yield or Sub-efficiency Variance

**Labour Cost Variance:** Labour cost variance is the difference between the standard direct wages specified for the activity and the actual wages paid. Labour cost variance is the function of labour rate of pay and total labour efficiency or labour time variance. It arises due to a change in either wage rate or in time or both. Labour cost variance is calculated as follows:

$$\begin{aligned} \text{Labour Cost Variance} &= \text{Standard Labour Cost for Actual Output} - \text{Actual Labour Cost} \\ &= (\text{Standard Time for Actual Output} \times \text{Standard Wage Rate}) - (\text{Actual Time} \times \text{Actual Wage Rate}) \end{aligned}$$

The following chart depicts the divisions and sub-divisions of labour cost variance:



**Labour Rate of Pay or Wage Rate Variance:** It is that part of labour cost variance which arises due to a change in specified wage rate. Labour rate variance arises due to the following reasons:

- a) Change in basic wage rate or piece-work rate.
- b) Employing persons of different grades than specified.
- c) Payment of more overtime than fixed earlier.

*Labour Rate of Pay Variance = Actual Time (Standard Labour Rate - Actual Labour Rate)*

The variance will be favourable if actual rate is less, than the standard rate and it will be unfavourable or adverse if actual rate is more than the standard rate.

**Total Labour Efficiency or Labour Time Variance:** It is that part of labour cost variance which arises due to the difference between standard labour hours specified and the actual labour hours paid for including idle time. This variance helps in controlling efficiency of workers. The reasons for this variance are:

- a. Lack of proper supervision
- b. Defective machinery and equipment.
- c. Insufficient training and incorrect instructions.

*Total Labour Efficiency Variance = Standard Wage Rate (Standard Time For Actual Output-Actual Time Paid)*

The actual time, while calculating this variance includes abnormal idle time

If actual time taken for doing a work is more than the specified standard time, the variance will be unfavourable. On the other hand, if actual time taken for a job is less than the standard time, the variance will be favourable.

### Illustration:

Gross wages direct Rs. 28080  
 Standard hours produced Rs. 8640  
 Standard rate per hour Rs. 3  
 Actual hours worked Rs.8200

### Solution:

<b>Labour Cost Variance</b>	= Standard Labour Cost - Actual Labour Cost = (Std. Time x Std. Rate) - (Actual Time x Actual Rate)
	= (8640 x 3) - (8200 x 28080 / 8200) = (25920 - 28080 = Rs. 2160 (Adverse))
<b>Labour Rate of Pay Variance</b>	= Actual Time (Standard Labour Price - Actual Labour Rate)
	= 8200 (3 - 3.42) = Rs. 3444 (Adverse)
<b>Labour Efficiency Variance</b>	Std. Labour Rate (Std. Time - Actual Time)
	= 3 (8640 - 8200) = 1320 (Favourable)

**Net Labour Efficiency Variance:** This variance is that part of total labour efficiency variance which is causal due to the difference between the standard labour hours specified and the actual labour hours worked excluding abnormal idle time. This variance is calculated as follows:

*Net Labour Efficiency Variance = Standard Rate (Standard Time for Actual Output—Actual Time Worked)*

$$= \text{Standard Rate} \times [(\text{St. Time}) - (\text{Actual Time paid} - \text{Idle Time})]$$

**Idle Time Variance:** This variance is a sub-variance of labour efficiency variance. It is the standard cost of actual time paid to workers for which they

have not worked due to abnormal reasons. The Reasons for! idle time may be power failure, defect in machinery, non-supply of materials, etc.

*Idle Time Variance-Idle Hours x Standard Rate*

**Labour Mix or Gang Composition Variance:** This variances arises due to change in the actual gang composition than the standard gang composition. The change in labour composition may be caused by the shortage of one grade of labour necessitating the employment of another grade of labour. This variance shows to the management how much labour cost variance is due to the change in labour composition.

Labour mix variance is like material mix variance and is calculated in the same way.

It may be calculated in two ways :

- a. When standard labour mix is equal to actual labour mix.
  - b. When standard labour mix is different from actual labour mix.
- i. When standard and actual times of the labour mix are same. In this case the variance is calculated as follows

*Labour Mix Variance = Standard cost of revised standard Labour Mix – Standard cost of Actual Labour Mix*

(ii) When standard and actual time of labour mix are different: In this case the variance will be calculated as follows:

*(Total Time of Actual Labour Mix / Total Time Standard Labour Mix x Standard Cost of Standard Labour mix) - (Standard Cost of Actual Labour Mix)*

As in the earlier case, if labour composition is revised because of non-availability of one grade of labour then revised standard mix will be used instead of standard mix and the formula will become:

*(Total Tune of Actual Labour Mix / Total Time Revised Standard Labour Mix x Standard cost of Revised Standard Labour Mix) - (Standard Cost of Actual Labour Mix)*

**Labour Yield or Sub-Efficiency Variance:** The labour yield variance or the labour sub-efficiency, variance arises due to the standard output specified and the actual output obtained. This variance is calculated as follows:

*Labour Yield/Sub-efficiency Variance = Standard Labour Cost per unit of output (Actual Yield—Standard Yield for Actual Time)*

**Illustration:**

In a manufacturing concern, the standard time fixed for a month is 8,000 hours. A standard wage rate of Rs.2.25 P. per hour has been fixed. During one month, 50 workers were employed and average working days in a month are 25. A worker works for 7 hours in a day. Total wage bill of the factory for the month amounts to Rs. 21,875. There was a stoppage of work due to power failure (idle time) for 100 hours. Calculate various labour variances.

**Solution:**

Standard Time = 8000 Hours

Standard Wage Rate = Rs. 2.25 P. per hour,

Actual Time = (50 x 25 x 7) = 8750 hours

Actual Wage Rate = 21875 / 8750 = Rs. 2.50 per hour

**Labour Cost Variance** = Standard Labour Cost - Actual Labour Cost

= (Standard Time x Standard Rate) - (Actual Time x Actual Rate)

= (8000 x 2.25) - (8750 x 2.50) = 18,000-21,875 = Rs.3,875 (Adverse)

**Rate of Pay Variance** = Actual Time (Standard Labour Rate-Actual Labour Rate)

= 8750(2.25 - 2.50) = 8750 (-0.25) = Rs. 2187.50 (Adverse)

**Net Labour Efficiency Variance** = Standard Labour Rate (Standard time - Actual time worked)

= 2.25(8000-8650)

= 2.25 (650) = Rs. 1462.50 P. (Adverse)



Net Labour Efficiency Variance = Std. Labour Rate (Std. Time – Actual time worked)

$$= 2.25 (8000 - 8650) = 2.25 (650) = \text{Rs. } 1462.50 \text{ P (Adverse)}$$

Idle time Variance = Idle Time x Standard Rate = 100 x 2.25

Idle Time Variance = Rs. 225 (Adverse)

### Verification:

*Labour Cost Variance = Labour Rate Variance + Net Labour Efficiency Variance + Idle Time Variance*

$$-3875 = -2187.50 - 1462.50 - 225 = -3875 = -3875$$

### Illustration:

Calculate labour mix variance from the following figures:

Budgeted Labour Force

80 Skilled workers @Rs. 225 per month

160 Semi-skilled workers @Rs. 200 per month.

Actual Labour Force

120 Skilled workers @ Rs. 240 per month

180 Semi-skilled workers @ Rs. 225 per month.

Due to shortage of skilled workers, it was decided to reduce skilled workers by 10% and increase semiskilled workers by 5%.

### Solution:

Revised standard:

$$\text{Skilled} = 80 - 8 (80 \times 10 / 100) = 72$$

$$\text{Semi skilled} = 160 + 8 (160 \times 5 / 100) = 168$$

$$= \mathbf{240}$$

There is difference between revised standard labour mix and actual labour mix so the formula will be

*[Total Time of Actual Labour Mix / Std. time of Rev. Std. Labour Mix x std. cost of Rev. std. Labour Mix] – (Std. cost of Actual Labour Mix)*

$$300 / 240 (72 \times 255 + 168 \times 200) - (120 \times 255 + 180 \times 200)$$

$$300 / 240 (16,200 + 33,600) - (27,000 + 36,000)$$

$$300 / 240 \times 49,800 - 63,000$$

$$62,250 + 63,000 = \text{Rs. } 750 \text{ Adverse}$$

## OVERHEAD VARIANCES

Overhead costs are the operating costs of a business which cannot be identified or allocated but which can be apportioned to, or absorbed by cost centres or cost units. According to the terminology of Cost Accountancy (ICWA, London) overhead is defined as "the aggregate of indirect material cost, indirect wages (indirect labour cost) and indirect expenses". Thus, overhead costs are indirect costs and are important for the management for the purposes of cost control.

*Overhead Cost Variance = Actual cost Output x Standard overhead Rate Per Unit – Actual Overhead Cost*

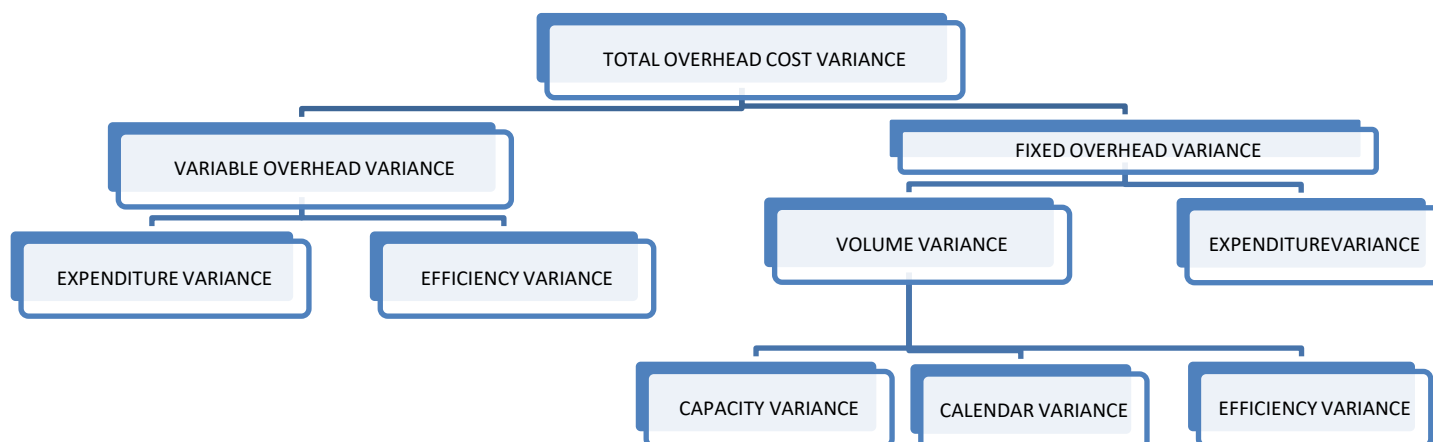
OR

*= standard Hours for Actual Output x Standard Overhead Rate Per Hour – Actual Overhead Cost*

Thus, overhead cost variance can be classified as:

- a) Variable Overhead Variance and
- b) Fixed Overhead Variance

Variable Overhead Variance can further be analysed into (a) Variable Overhead Expenditure or Spending-Variance, and (b) Variable Overhead Efficiency Variance. Similarly, Fixed Overhead Variance may be sub-divided into (a) Fixed Overhead Expenditure Variance, and (b) Fixed Overhead Volume variance. Further, Fixed volume variance can be analysed into capacity, calendar and efficiency variances. The following diagram shows the entire classification of overhead cost variance:



### VARIABLE OVERHEAD VARIANCE:

Variable overheads vary directly with the volume of output and hence, the standard variable overhead rate remains uniform. Therefore, computation of variable overhead variance, also known as variable overhead cost variance parallels the material and labour cost variances. Thus, variable overhead cost variance (VOCV) is the difference between the standard variable overhead cost for actual output and the actual variable overhead cost. It can be calculated as follows:

$$\begin{aligned}
 \text{VOCV} &= (\text{Actual Output} \times \text{Standard Variable Overhead Rate per unit}) - \text{Actual Variable Overheads} \\
 &\text{OR} \\
 &= (\text{Standard Hours for Actual Output} \times \text{Standard Variable Overhead Rate per hour}) - \text{Actual Variable Overheads.}
 \end{aligned}$$

In case information relating to standard hours allowed for actual output and the actual time (hours) taken Ts available, variable overhead cost variance can be further analysed into ;

- a) Variable Overhead Expenditure or Spending Variance, and
- b) Variable Overhead Efficiency Variance.

**Variable Overhead Expenditure or Spending Variance:** This is the difference between the standard variable overheads for the actual hours and the actual variable overheads incurred and can be calculated as:

**Variable Overhead Expenditure Variance**

= (Actual Hours x Standard Variable Overhead Rate per hour)—Actual Variable Overhead

OR

= Actual Hours (Standard Variable Overhead Rate—Actual Variable Overhead Rate)

**Variable Overhead Efficiency Variance:** It represents the difference between the standard hours allowed for actual production and the actual hours taken multiplied with the standard variable overhead rate.

**Symbolically:****Variable Overhead Efficiency Variance**

= Standard Variable Overhead Rate (Standard Hours for Actual Output) — Actual Hours

**Illustration:** Calculate variable overhead variances from the following data:

Budgeted Production for January, 2008 3000 units

Budgeted Variable Overhead Rs. 15,000

Standard Time for One Unit 2 hours

Actual Production for January, 2008 2,500 units

Actual Hours Worked 4500 hours

Actual Variable Overhead Rs. 13,500

**Solution:**

Variable overhead cost variance (VOCV)	= (Actual Output x Standard Variable Overhead Rate per unit) - Actual Variable Overheads
	= (2500 x 5) - 13500 = Rs. 1000 (Adverse)
Standard variable overhead rate	= 15000 / 3000 = Rs. 5 per unit
Variable Overhead Expenditure or Spending Variance (VOSV)	VOSV = (Actual Hours x Standard Variable Overhead Rate)—Actual Variable Overhead
	= Rs. (4500 x 2.50)—13500 = Rs. 11250 -13500 = Rs. 2250 (Adverse)
Variable Overhead Efficiency Variance (VOEV)	VOEV = Standard Variable Overhead Rate (Standard Hours for Actual Output-Actual Hours)
	= Rs. 2.50 (5000 - 4500)= Rs. 1250 (Favourable)

**Verification:**

$$\text{VOCV} = \text{VOSV} + \text{VOEV}$$

$$- 1000 = -2250 + 1250$$

$$\text{or } -1000 = -1000$$

**FIXED OVERHEADS VARIANCE**

This variance is calculated as:

$$\text{Actual Output} \times \text{Standard Fixed Overheads Rate} - \text{Actual Fixed Overheads.}$$

The standard fixed overhead rate is calculated by dividing budgeted fixed overheads by standard output specified.

Fixed overheads variance may be divided into expenditure and volume variances.

**Expenditure Variance:** It is that part of fixed overhead variance which is due to the difference between budgeted expenditure and actual expenditure.

$$\text{Overhead Expenditure Variance} = \text{Budgeted Fixed Overheads} - \text{Actual Fixed Overheads}$$

**Volume Variance:** This variance shows a variation in overhead recovery due to budgeted production being more or less than the actual production. When actual production is more than the standard production, it will show an over-recovery of fixed overheads and the variance will be favourable. On the other hand, if actual production is less than the standard production it will show an under recovery and the variance will be unfavourable.

Volume variance may arise due to change in capacity, variation in efficiency or change in budgeted and actual number of working days. Volume variance is calculated as follows:

$$\text{Volume Variance} = \text{Actual Output} \times \text{Standard Rate} - \text{Budgeted Fixed Overheads}$$

Volume variance is sub-divided into following variances:

**Capacity Variance:** It is that part of volume variance which arises due to over-utilisation or under-utilisation of plant and equipment. The working in the factory is more or less than the standard capacity. This variance arises due to idle time caused by strikes, power failure, non-supply of materials, break down of machinery, absenteeism etc. Capacity variance is calculated as follows:

$$\begin{aligned} \text{Capacity Variance} &= \text{Standard Rate (Revised Budgeted Units- Budgeted Units)} \\ &\text{OR} \\ &\text{Standard Rate (Revised Budgeted Hrs- Budgeted Hrs)}. \end{aligned}$$

**Calendar Variance:** This variance arises due to the difference between actual number of days and the budgeted days. It may arise due to more public holidays announced than anticipated or working for more days because of change in holidays schedule, etc. If actual working days are more than budgeted, the variance will be favourable and it will be unfavourable if actual working days are less than the budgeted number of days Calendar variance can be expressed as follows:

$$\text{Decrease or Increase in number of units produced due to the difference of budgeted and actual days} \times \text{standard rate per unit.}$$

**Efficiency variance:**

This is that portion of the volume variance which arises due to increased or reduced output because of more or less efficiency than expected. It signifies deviation of standard quantity from the actual quantity produced. This variance is related to the efficiency variance of labour. Efficiency variance is calculated as:

$$\begin{aligned} &\text{Standard Rate (Actual Quantity - Standard Quantity)} \\ &\text{Or} \\ &\text{Standard Rate per hour (Standard Hours Produced - Actual Hours)} \end{aligned}$$

If Actual quantity is more than the budgeted quantity, the variance will be favourable and it will be vice versa if actual quantity is less than the budgeted quantity.

**Illustration:** From the following information compute:

- i. Fixed Overheads Variance
- ii. Expenditure Variance
- iii. Volume Variance
- iv. Capacity Variance
- v. Efficiency Variance.

	<b>Budget</b>	<b>Actual</b>
Fixed Overheads for November	Rs. 20,000	20,400
Units of Production in November	10,000	10,400
Standard time for 1 Unit	2 hours	----
Actual Hours Worked	----	20,100 hours

**Solution:**

Standard time	= 10,000 x 2 = 20,000 hours
Fixed Overheads Rate	20,000 / 20,000 = Re. 1
Fixed overheads variance	= Actual Hours x Fixed Overheads Rate - Actual Fixed Overheads
	= 20,100 x 1 - 20,400 = 20,100 - 20,400 = Rs. 300 Unfavourable
Expenditure Variance	= Budgeted Fixed Overheads - Actual Fixed Overheads
	= 20,000 - 20,400 = Rs. 400 Unfavourable.
Volume Variance	= Actual Hours Worked x Fixed Overheads Rate - Budgeted Fixed Overheads
	20100 x 1 - 20000 = Rs. 100 Favourable.
Capacity Variance	= Fixed Overheads Rate (Revised Budgeted Hours - Budgeted Hours)
Revised Budgeted Hours	= 20000 / 10000 x 10400 = 20,800 hours
Capacity Variance	= 1 (20,800 - 20,000) = Rs. 800 Favourable.
Efficiency Variance	= Fixed Overheads Rate (Actual Hours - Revised Standard Hours)
Capacity variance	1 (20,100 - 20,800) = Rs. 700 Unfavourable.

**Verification:**

- i) Fixed Overheads Variance = Expenditure + Volume Variance  
 $-300 = -400 + 100$   
 $-300 = -300$
- (ii) Volume Variance = Capacity Variance + Efficiency Variance  
 $+ 100 = +800 - 700$   
 $+ 100 = +100.$

**Illustration:**

Following figures are taken out from the records of a factory :

	Budgeted	Actual
Number of Working days	22	25
Man Hours per day	4,000	4,500
Output per Man hour in units	2.5	3
Overheads (Rs.)	55,000	65,000

Calculate overhead variances.

**Solution:**

<b>Standard Rate</b>	Budgeted Overheads / Standard Output
	= 55 000 / 2,20,000 = (22x4,000x2.5)=2,20,000 units
<b>Overheads Cost Variance</b>	= Actual Output x Standard Rate - Actual Overheads
	37500 x 0.25 - 65,000
	(Actual Output = 25 x 4500 x 3 = 337500 units)
	84,375-65,000 = Rs. 19,375 Favourable.
<b>Expenditure Variance</b>	=Budgeted Overheads - Actual Overheads
	55,000-65,000 = Rs. 10,000 Adverse.
<b>Volume Variance</b>	=Actual Output x Standard Rate - Budgeted Overheads
	= 3,37,500x0.25-55,000
	= 84,375 - 55,000 = Rs. 29,375 Favourable.
<b>Capacity Variance</b>	= Standard Rate (Revised Budgeted Units - Budgeted Units)
<b>Revised Budgeted Units</b>	
Actual Man Hours per day are 4,500 instead of 4,000 so revised budgeted units will be:	
Standard working days	= 22
Revised man hours per day	= 4,500
Output per man hour in units	= 2.5
Revised budgeted units	= 22x4,500x2.5 = 2,47,500
Capacity Variance	= 0.25 (2,47,500-2,20,000)
	= 0.25 (27,500) = Rs. 6,875 Favourable.
<b>Calendar Variance :</b>	
Revised budgeted units for 22 days	= 2,47,500
In increased 3 days, production will increase	= 2,47,500 / 22 x 3 = 33750 units
Calendar Variance =	Standard Rate x Increase in units in 3 days
	0.25 x 33750 = Rs. 8437.50 Favourable
<b>Efficiency Variance</b>	Standard Rate (Actual production - Standard Production)
<b>Standard Production:</b>	
Budgeted Production	= 2,20,000
Increase of unite with the change in capacity	= 27,500
Increase in production due to calendar variance	= 33.750
	= 2.81.250
Efficiency Variance	= 0.25(3,37,500-2,81,250)
	= 0.25 (56,250) = Rs. 14,062.50 Favourable.



<b>Verification:</b>	
Fixed Overheads Variance	Expenditure Variance + Volume Variance
	19,375(Fav.) = 10,000(Adv.) + 29,375 (Fav.)
	19,375=19375

## SALES VARIANCES

The variances discussed in earlier pages related to the cost of goods manufactured. The impact of different variances, favourable and unfavourable, on cost from materials, labour and overheads side has been studied. In addition, the study of sales variance is also important. The analysis of sales variances is important to study profit variances.

A sales value variance reveals the difference between actual sales and budgeted sales. This variance may arise due to change in sales price, sales volume or sales mix. Sales variances may be classified as follows:

- i. Sales Value Variance
- ii. Sales Price Variance
- iii. Sales Volume Variance
- iv. Sales Mix Variance.

**Sales Value Variance:** A Sales Value Variance is the difference between budgeted sales and actual sales. It is calculated as:

$$\text{Sales Value Variance} = \text{Actual Value of Sales} - \text{Budgeted Value of Sales.}$$

If actual sales are more than the budgeted sales, the variance will be favourable and on the other hand, the variance will be unfavourable if actual sales are less than the budgeted sales.

**Sales Price Variance:** A sales price variance is that portion of sales value variance which arises due to the difference between the standard price specified and the actual price charged. It is calculated as:

$$\text{Sales Price Variance} = \text{Actual Quantity} (\text{Actual Price} - \text{Standard Price}).$$

**Sales Volume Variance:** It is that part of sales value variance which is due to the difference between actual quantity of sales and budgeted quantity of sales. It is calculated as:

$$\text{Sales Volume Variance} = \text{Standard Price} (\text{Actual Quantity of Sales} - \text{Standard Quantity of Sales}).$$

**Sales Mix Variance:** It is a sub-variance of sales volume variance. The proportion in which different quantities were budgeted may be different from the proportion of actual quantities sold. It is the difference of standard value of revised mix and standard value of actual mix.

**Illustration:** The budget and actual sales for a period in respect of two products are as follows :

Product	Budgeted			Actual		
	Quantity (Units)	Price (Rs.)	Value (Rs.)	Quantity (Units)	Price (Rs.)	Value (Rs.)
X	600	3	1800	800	4	3200
Y	800	4	3200	600	3	1800

**Solution:**

<b>Sale Value Variance</b>	= Actual value of sales – Standard value of sales
Total actual value	3200 + 1800 = Rs. 5000
Total standard value	1800 + 3200 = Rs. 5000
Sales value variance	5000 – 5000 = Nil
<b>Sale Price variance</b>	= Actual Quantity sold (Actual Price – Standard Price)
Product X	800 (4 - 3) = Rs. 800 Favourable
Product Y	600 (3 - 4) = Rs. 600 Unfavourable
Sales Price Variance	= Rs. 200 Favourable
<b>Sales Volume Variance</b>	= Standard Price (Actual units – Standard units)
Product X	3 (800 - 600) = Rs. 600 Favourable
Product Y	4 (600 - 800) = Rs. 800 Unfavourable
Sales Volume Variance	= Rs. 200 Unfavourable

**Verification:**

**Sales Value Variance = Sales Price Variance + Sales Volume Variance**

$$0 = 200 + (-200)$$

$$0 = 0$$

**Illustration:**

The information regarding budgeted and actual sales of two products has been given:

Product	Budgeted		Actual	
	Quantity (Units)	Sales Price (Rs.)	Quantity (Units)	Sales Price (Rs.)
X	800	10	1000	12
Y	1200	6	1400	5

Find out variance.

**Solution:**

<b>Sale Value Variance</b>	= Actual value of sales – Standard value of sales
<b>Actual Value of Sales:</b>	
Product A	1000 x 12 = 12000
Product B	1400 x 5 = 7000
<b>Total</b>	<b>Rs. 19000</b>
<b>Standard Value of Sales:</b>	
Product A	800 x 10 = 8000
Product B	1200 x 6 = 7200
<b>Total</b>	<b>Rs. 15200</b>
Sales Value Variance	= 19000 – 15200 = Rs. 3800 Favourable
<b>Sale Price variance</b>	= Actual Quantity sold (Actual Price – Standard Price)
Product A	1000 (12 - 10) = Rs. 2000 Favourable
Product B	1400 (5 - 6) = Rs. 1400 Unfavourable
Sales Price Variance	= Rs. 600 Favourable
<b>Sales Volume Variance</b>	= Standard Price (Actual units – Standard units)
Product A	= 10 (1000 – 800) = Rs. 2000 Favourable
Product B	= 6 (1400 – 1200) = Rs. 1200 Favourable
Sales Volume Variance	Rs. 3200 Favourable

<b>Sales Mix Variance:</b>	
There is a difference between standard quantity and actual quantity, so the standard will be revised in proportion to actual quantity of sales.	
<b>Revised Standard:</b>	
Product A	= $800 / 2000 \times 2400 = 960$ Units
Product B	= $1200 / 2000 \times 2400 = 1440$ Units
Sales Mix Variance	= Standard Value of Actual Mix - Standard Value of Revised Standard Mix
<b>Standard Value of Actual Mix:</b>	
Product A	= $10 \times 1000 = 10000$
Product B	= $6 \times 1440 = 8400$
Total	Rs. 18400
<b>Standard Value of Revised Standard Mix:</b>	
Product A	= $10 \times 960$ Rs. 9600
Product B	= $6 \times 1,440$ Rs. 8640
Total	Rs. 18240
Sales Mix Variance	= $18,400 - 18,240$ Rs 160 Favourable.

## SOLVED PROBLEMS

### COST SHEET

#### Problem:

Mr. Moorthy furnished the following data relating the manufacture of X Standard product during the month of April 2015.

Raw material consumed Rs. 30,000

Direct Labour charges Rs. 15,000

Machine hours worked 1500 hours.

Machine hour rate Rs.8.

Administrative overhead 30% on works cost

Selling overhead 75 paise per unit

Units produced 15000

Units sold 12000 of Rs.10 per unit

You are required to prepare a cost sheet from the above-showing a) Cost per unit b) Profit per unit sold and profit for the period.

#### Solution: Cost Sheet For the Period 2015 (Units produced=15000)

	Total Cost	Cost per unit
Raw material consumed	30000	2.00
Direct Labour charges Rs. 30,000/15,000=Rs.2.00	15000	1.00
<b>Prime Cost</b>	<b>45000</b>	<b>3.00</b>
<b>Add:</b> Works overhead		
(1500 hours x Rs.8)	12000	0.80
<b>Works cost</b>	<b>57000</b>	<b>3.80</b>
<b>Add:</b> Office & Administrative overhead:		
30% on works cost 57,000 x 30 /100	17100	1.14
<b>Cost of production</b>	<b>74100</b>	<b>4.94</b>
Less: Closing stock 3000 units x Rs.4.94 15000 units produced -12000 sold = 3,000 units closing stock	14820	---
Cost of goods sold for 12000 units	59280	4.94
Add: Selling overheads 75 paise per unit 12,000 units x 75 paise	9000	0.75
<b>Total cost</b>	<b>68280</b>	<b>5.69</b>
Profit for the period	51,720	4.31
<b>Sales (12000 x 10)</b>	<b>120000</b>	<b>10.00</b>

Per unit = Total Cost / Number of units

$$= 51720 / 12000 \text{ units} = \text{Rs. } 4.31$$

**Problem:**

The following data relate to the manufacture of a standard product during the month of April 2016.

a) Raw materials consumed	Rs.20,000
b) Direct wages	Rs.12,000
c) Machine hours worked	950
d) Machine hour rate	Rs.2
e) Office overhead	15% on works cost
f) Selling overhead	37 paise per unit
g) Units produced	20000
h) Units sold	18000 at Rs 2.50 each

You are required to prepare a cost sheet in respect of the a showing a) the cost per unit b) profit for the period.

**Solution:****Cost sheet - April 2001 (Units produced 20000)**

	Amount	Cost Per Unit
Raw materials consumed Rs.20000 / 20000 units = 1	20000	1.00
Direct wages Rs. 12000 / 20000 = 0.60 p	12000	0.60
<b>Prime cost</b>	<b>32000</b>	<b>1.60</b>
Add: Factory overhead		
Machine hours (950 hours x Rs.2)	1800	0.09
<b>Factory cost</b>	<b>33800</b>	<b>1.69</b>
Add: Office overhead		
15% on works cost 33800x 15/100	5070	0.25
<b>Cost of production for 20000 units</b>	<b>38870</b>	<b>1.94</b>
Less: Closing stock		
2000 unite of Rs. 1.94 (2000x1.94)	3887	---
<b>Cost of production for 18000 units</b>	<b>34983</b>	<b>1.94</b>
Add: Selling overheads		
37 paise per unit (18,000 units x 0.37 p)	6660	0.37
<b>Total cost</b>	<b>41643</b>	<b>2.31</b>
Profit (b.f)	3357	0.19
<b>Sales (18000 x 2.50)</b>	<b>45,000</b>	<b>2.50</b>

**Problem:**

The following data relate to the manufacture of a product during the month of January 2016.

Raw material Consumed Rs. 30,000

Direct wages Rs. 19,600

Machine hours worked 2300 hours

Machine hours rate Re. 1.00

Office on cost 10 % of works cost

Selling on cost Re.0.20 per unit

Units produced 19030 Units sold 11418 @ as 4 each.

You are required to prepare a cost sheet in respect of above showing the cost of production per unit.

**Solution:****Cost Sheet (Units produced 19030)**

	Total cost	Per unit
Raw material consumed	30000	1.57 (Rs. 30000 / 19030)
Direct wages	19600	1.03
<b>Prime cost</b>	<b>49600</b>	<b>2.60</b>
Add: works overhead (2300 hours x Re.1)	2300	0.13(2300 / 19030)
<b>Work cost</b>	<b>51900</b>	<b>2.73</b>
Add: Office & Administration overhead (10% on work cost) (51000 x 10 /100)	5100	0.27
<b>Cost of production</b>	<b>57000</b>	<b>3.00</b>
Less: Closing stock of finished goods		
Unit produced 19030		
Units sold 11418		
Closing stock 7612		
Per unit = 57090 / 19030 = Rs. 3		
7612 x Rs. 3= 22836	22836	---
<b>Cost of goods sold</b>	<b>34254</b>	<b>3.00</b>
Add: Selling & Distribution overhead (11418 units x 0.20 paise)	2284	0.20
<b>Total cost</b>	<b>36538</b>	<b>3.20</b>
Profit	9134	0.80
<b>Sales (11418 x 4)</b>	<b>45672</b>	<b>4.00</b>





	10,750 x 75/100 = 8063	8,063
	Cost of production	61,813
<b>Add</b>	Opening stock of finished stock	10,000
		71,813
<b>Less :</b>	Closing stock of finished stock	2,000
	Cost of goods sold	69,813
	Profit (b.f)	15,187
	Selling price	85,000

b) **To find out financial profit :**

**Trading and profit and loss account**

To <b>Opening stock :</b>		By Sales	85,000
Rawmaterial	6,000	By <b>closing stock</b>	
Finished goods	10,000	Rawmaterial	9,000
To Purchases	36,000	Finished goods	2,000
To Wages	10,000		
To Works expenses	10,000		
To Office expenses	8,000		
To Net Profit (b.f)	16,000*		
	96,000		96,000

c) **Reconciliation statement**

	Profit as per cost accounts	15,187
<b>Add</b>	Factory overhead over recovered in costs (10750 - 10000)	750
	Office overhead over recovered in costs (8063 - 8000)	63
	Profit as per financial Accounts	*16,000
		813

**Problem :** Ascertain the figures (Profit) in the Profit and Loss Account by preparing Reconciliation Statement :

	Rs.
i. Profit as per cost records	1, 50, 300
ii. Factory overhead under recovered in cost books	4, 000
iii. Office overhead under recovered in financial books	1, 500
iv. Depreciation shown excess in cost books	950
v. Interest on investments	890
vi. Receipt of Income from share transfer	350
vii. Provision for income - tax made	24,000

**Solution :** **Reconciliation Statement**

Profit as per Cost records	1,50,300
Add i) Office overhead under recovered in financial books	1,500
ii) Depreciation in excess of cost books	950
iii) Interest on investments	890
iv) Receipt of income from share transfer	350
	3,690
	1,53,990
Less Factory overhead under recovered in cost books	4,000
Provision for tax	24,000
profit as per financial records	1,25,990

**Problem :**

Ascertain the profit as per P&L accounts by preparing a Memorandum Reconciliation Account

- Profit as per costing records Rs. 1,45,000
- Factory overheads under recovered in cost books Rs. 3,500
- Office overheads under recovered in Financial books Rs.1,500

- d) Depreciation shows excess in costing books Rs.950  
 e) Interest on Investments Rs.495  
 f) Receipts of income from share transfer Rs.200  
 g) Provision made for Income tax Rs.48500

**Solution : Reconciliation Statement**

Profit as per cost accounts		1,45,000
Add :		
i) Excess depreciation in cost books	950	
ii) Interest on investments in financial books	495	
iii) Share transfer fee in financial books	200	1,645
		1,46,645
Less :		
i) Factory overhead under recovered	3500	
ii) Office overhead under recovered	1500	
iii) Income tax provided in financial books	48500	53,500
Profit as per financial books		93,145

**Problem:** The Net profit of Aarthy Co., Ltd., appeared at Rs.82000 as per financial records for the year ending 31st March 2003. The cost books should showed a Net profit of Rs.90,000 for the same period. A scrutiny of the figures from both the sets of accounts showed the following facts.

- |   |        |
|---|--------|
| i) Factory overhead under recovered in costs                  | 2,000  |
| ii) Administrative overhead over recovered in costs           | 1,000  |
| iii) Depreciation charged in financial books                  | 4,500  |
| iv) Depreciation recovered in Costs                           | 7,000  |
| v) Interest on investments not included in costs              | 3,000  |
| vi) Goodwill written off in financial books                   | 6,000  |
| vii) Preliminary expenses written off in financial books      | 5,000  |
| viii) Income tax provided in financial books                  | 10,000 |
| ix) Loss due to obsolescence charged in financial books       | 3,500  |
| x) Bank interest and transfer fee credited in financial books | 9,000  |
| xi) Stores Adjustments credited in financial books            | 9,000  |

**xii) Value of opening stock :**

Cost a/c	7000
Financial a/c	9000

**xiii) Value of closing stock :**

Cost a/c	12000
Financial a/c	8000

- |                                   |      |
|-----------------------------------|------|
| xiv) Interest charged in cost a/c | 6000 |
| xv) Loss on sale of furniture     | 1000 |

Prepare a statement showing the reconciliation between the figure of net profit as per cost a/cs and figure of net profit as shown in the financial books.

**Solution :** **Reconciliation Statement**

	Rs.	Rs.
Profit as per cost Accounts		90,000
Add 1) Administrative overhead charged in cost a/cs	1000	
<b>2) Excess of Depreciation charged in cost a/cs</b>		
Cost a/c	7000	
Financial a/c	4500	2500
<b>3) Income in financial books :</b>		
a) Interest on investment	3000	
b) Bank interest & transfer fee	9000	

c) Stores Adjustments	4000		
4) <b>Expenses charged in cost a/c :</b>			
Interest charged in cost a/c	6000	25,000	
	1,15,000		
<b>Less : Expenses and losses in Financial books but not shown in cost books</b>			
a) Goodwill written off	6000		
b) preliminary expenses written off	5000		
c) Income tax provided	10000		
d) Loss due to abolescence	3500		
e) Loss on sale on furniture	1000		
2) Factory overhead under recovered in cost	2000		
3) <b>Under valuation of opening stock in cost a/c</b>			
Financial a/c	9000		
Cost a/c	7000	2000	
4) <b>Overvaluation of closing stock in cost a/c :</b>			
Cost a/c	12000		
Financial a/c	8000	4000	33500
Profit as per financial Accounts			82000

**Problem :** The Net profit shown by Financial a/cs of a company amounted to Rs.2,85,500 while profit as per cost accounts for that period was Rs. 388600 on reconciliation. The following differences were noticed.

a) The following items were included in the Financial books

Director fees (Dr)	6500
Bank interest (Cr)	300
Income tax (Dr)	83000

b) Bad and doubtful debts for Rs.5700 were written off in financial books.

c) Overhead in cost accounts absorbed were Rs.85000 with the actuals were Rs.83200.

d) A net loss of Rs.10,000 on sale of old machinery was dealt with in the Financial books.

Reconcile the profits between the cost and financial accounts.

**Solution :**                      **Reconciliation Statement**

	Rs.	Rs.
Profit as per cost accounts		3,88,600
<b>Add : Income credited in Financial a/cs :-</b>		
a) Bank interest		300
b) Overabsorption of overhead in cost accounts (85000-83200)	1800	2,100
		3,90,700
<b>Less : Expenses and Loss debited in financial books</b>		
Director Fee	6500	
Income tax	83000	
Bad and doubtful debts	5700	
Loss on sale of Machinery	10000	1,05,200
Profit as per Financial accounts		2,85,500

**Illustration :**

From the following figures prepare a Reconciliation Statement

	Rs.
Not profit as per financial records	1,36,405
Net profit as per costing records	1,80,000
Works overheads under recovered in cost	4,120
Administration overhead recovered in excess	2,000
Depreciation charged in financial records	11,200

Depreciation recovered in costing	13,000	
Interest received but not included in costing	8,000	
Obsolescence loss charged in financial records	5,700	
Income-tax provided in financial books	40,300	
Bank interest credited in financial books		1,000
Stores adjustments (credit in financial books)	475	
Depreciation of stock charged in financial books	6,750	

**Solution****Reconciliation Statement**

	Rs.	Amount Rs.
Net profit as per costing records		1,80,000
Add : Excess depreciation charged (Rs.13,000 - Rs. 11,200)	1,800	
Excess administration overhead	2,000	
Interest received not included	8,000	
Bank interest	1,000	
Stores adjustments	475	13,275
		1,93,275
Less : Works overhead under-recovered	4,120	
Obsolescence loss not charged	5,700	
Income-tax not provided	40,300	
Depreciation is stock value	6,750	56,870
Net profit as per financial records		1,36,405

**Exercise:** Ascertain the figures (amount) in the Profit and Loss account by preparing Reconciliation Statement :

	Rs.	
(i) Profit as per cost Records	1,50,300	
(ii) Factory overhead under recovered in cost books	4,000	
(iii) Office overhead under recovered in financial books	1,500	
(iv) Depreciation shown excess in cost books	950	
(v) Interest on investments	495	(vi) Receipt of income from
share transfer	120	
(vii) Provision for Income - tax made	48,500	

**Exercise:** A company's Profit and Loss a/c was as follows :

	Rs.		Rs.
To purchases	2,52,100	By Sale - 50,000 units	
To wages	1,05,000	at Rs.15 per unit	7,50,000
To Work Expenses	1,21,300	By Discount received	2,600
To Selling Expenses	71,000	By Profit on Sale of Land	23,400
To Admn. Expenses	53,400	By Closing stock	40,800
Depreciation	11,000		
Net profit	2,03,000		
	8,16,800		8,16,800

The cost profit was only Rs.1,97,700.

Reconcile them using the following information :

- Cost accounts valued closing stock as Rs.42,800.
- The works expenses in the cost accounts were taken at 100% direct wages. iii) Selling and Administration Expenses were charged in the cost accounts at 10% of sales and Re.1 per unit respectively.
- Depreciation in Cost Accounts was Rs.8,000.

**Exercise:** The net profit of A Co Ltd, appeared at Rs. 60,652 as per financial records for the year ending 31st March 2003. The cost books, however, showed a net profit of Rs. 86,200 for the same period .

A scrutiny of the figures from both the sets of accounts revealed the

following facts :

	Rs.	
Works overhead under recovered in costs	1,560	
Administrative overheads over – recovered in costs	850	
Depreciation charged in Financial accounts	5,600	
Depreciation recovered in costs		6,250
Interest on investments not included in costs	4,000	
Loss due to obsolescence charged in Financial A/c	2,850	
Income – tax provided in financial accounts	20,150	
Bank interest and transfer fee in financial books	375	
Stores adjustment ( credit in financial books )	237	

**Value of opening stock in :**

Cost Accounts	24,800
Financial Accounts	26,300

**Value of closing stock in :**

Cost Accounts	25,000
Financial Accounts	23,000
Interest charged in Cost Accounts	2,000
Goodwill written off	5,000
Loss on sale of furniture	600

Prepare a statement showing the reconciliation between the figures of net profit as per cost accounts and the figures of net profits as shown in the financial books.

## MATERIALS

**Problem:** From the following information prepare the stores ledger under Weighted Average price method;

Date	Receipts	Date	Issues
Jan. 1	200 units @ Rs. 2 per unit	Jan. 4	125 units
Jan. 12	130 units @ Rs. 3 per unit	Jan. 14	175 units
Jan.16	250 units @ Rs. 2.50 per unit	Jan. 18	90 units

**Solution:**

### Stores Ledger Account (Weighted Average method)

Date	Reference	Receipts			Issues			Balance	
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Amount
2016									
Jan. 1	GRN. No.	200	2	400	---	---	---	200	400
Jan. 4	R.S.No.	---	---	---	125	2	250	75	150
Jan. 12	GRN. No.	130	3	390	---	---	---	205	540
Jan. 14	R.S.No.	---	---	---	175	2.63	460	30	80
Jan. 16	GRN. No.	250	2.50	625	---	---	---	280	705
Jan. 18	R.S.No.	---	---	---	90	2.52	227	190	478

**Answer:** Closing stock of 190 units of Rs.478

**Workings:**

- i. Issue price Jan.4 = Rs.400 / 200 units = Rs.2
- ii. Issue Price Jan. 14 = Rs.540 / 205 units = Rs.2.63
- iii. Issue Price Jan. 18 = Rs.705 / 280units = Rs. 2.52

**Problem:**

Normal usage : 50 units per week

Minimum usage: 25 unite per week

Maximum usage: 75 units per week

Reorder quantity: 300 units,

Reorder period = 4 to 6 weeks.

Calculate : Minimum level, Maximum, level

**Solution:**

- a) Reorder level = Maximum consumption x Maximum Reorder period  
 $75 \text{ units} \times 6 \text{ weeks} = 450 \text{ units}$
- b) Minimum stock level = Reorder level - ( Normal consumption x Normal Reorder period)  
 $450 \text{ units} - (50 \text{ unite} \times 5 \text{ weeks})$   
 $450 \text{ units} - 250 \text{ units} = 200 \text{ units}$
- c) Maximum Stock level = (Reorder level + Reorder Quantity) - Minimum consumption x Minimum Reorder period  
 $(450\text{units} + 300 \text{ Units}) - (25 \text{ units} \times 4 \text{ weeks})$   
 $750 \text{ units} - 100 \text{ units} = 650 \text{ units.}$
- d) Average Stock Level = Minimum stock Level +1/2 Reorder Quantity  
 $200 \text{ units} + 150(300/2)= 350 \text{ Units.}$

*OR*

Minimum level + Maximum Level / 2 =  $200+650 / 2= 425 \text{ units.}$

**Problem:**

From the following particulars prepare stores Ledger adjustment account under FIFO and LIFO method

Date	Particulars
2.3.2016	Purchases 200 Units @ Rs. 200
4.3.2016	Issued 150 Units
6.3.2016	Purchases 210 Units @ Rs. 220
10.3.2016	Issued 110 Units
17.3.2016	Purchases 200 Units @ Rs. 210
18.3.2016	Issued 220 Units
24.3.2016	Purchases 150 Units @ Rs. 230
28.3.2016	Issued 220 Units.

**Solution:****STORES LEDGER ACCOUNT – FIRST IN FIRST OUT METHOD (FIFO)**

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
2016									
2.3.2016	200	200	40000	---	---	---	200	200	40000
4.3.2016	---	---	---	150	200	30000	50	200	10000
6.3.2016	210	220	46200	---	---	---	50	200	10000
							210	220	46200
10.3.2016	---	---	---	50	200	10000	150	220	33000
				60	220	13200			
17.3.2016	200	210	42000	---	---	---	150	220	33000
							200	210	42000
18.3.2016	---	---	---	150	220	33000	130	210	27300
				70	210	14700			
24.3.2016	150	230	34500	---	---	---	130	210	27300
							150	230	34500
28.3.2016	---	---	---	130	210	27300	60	230	13800
				90	230	20700			

**Answer:** Closing stock of 60 units of Rs. 13800

**STORES LEDGER ACCOUNT – LAST IN FIRST OUT METHOD (LIFO)**

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
2016									
2.3.2016	200	200	40000	---	---	---	200	200	40000
4.3.2016	---	---	---	150	200	30000	50	200	10000
6.3.2016	210	220	46200	---	---	---	50	200	10000
							210	220	46200
10.3.2016	---	---	---	110	220	24200	50	200	10000
							100	220	22000
17.3.2016	200	210	42000	---	---	---	50	200	10000
							100	220	22000
							200	210	42000
18.3.2016	---	---	---	200	210	42000	50	200	10000
				20	220	4400	80	220	17600
24.3.2016	150	230	34500	---	---	---	50	200	10000
							80	220	17600
							150	230	34500
28.3.2016	---	---	---	150	230	34500	50	200	10000
				70	220	15400	10	220	2200

**Answer:** Closing stock of 60 units of Rs. 12200

**Problem:**

Prepare “Stores ledger” and enter the following transactions adopting the FIFO methods of pricing out issues. 2016

Jan 1 Opening Balance - 50 Units @ Rs 30 per unit

Jan 5 Issued - 5 Units

Jan 7. purchased-48 Unite @ Rs.40 per unit

Jan 29 issued - 30 Units



**Solution:**

**Stores Ledger (FIFO Method)**

Date	Receipts			Issues			Balance		
	Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
2016 Jan. 1	50	30	1500	---	---	---	50	30	1500
Jan. 5	---	---	---	5	30	150	45	30	1350
Jan. 7	48	40	1920	---	---	---	45 48	30 40	1350 1920
Jan. 29	---	---	---	30	30	900	15 48	30 40	450 1920

**Answer:** Closing stock – 63 units Rs. 2370

## LABOUR

Calculate the earnings of worker from the following information under a) Halsey and b) Rowan plans.

Standard time = 10 hours taken

Time taken = 8 hours

Wages rate per hour = Rs. 6

**Solution:**

Time saved = Standard time – Actual time  
= 10 hours – 8 hours = 2 hours

*Earning under Halsey plan:*

Wages = 8 hours x Rs. 6 = Rs. 48

Bonus = 50% of time saved x Rate per hour  
= 2 hours / 2 = 1 hour x Rs. 6 = Rs. 6  
= Rs.48 + Rs.6 = Rs. 54

*Earnings under Rowan plan:*

Wages = 8 hours x Rs. 6 = Rs. 48

Bonus = Time saved / standard time x actual time x rate per hour  
= 2 hours / 10 hours x 8 hours x Rs. 6 = Rs. 9.60

Earning = Rs. 48 + Rs.9.60 = Rs. 57.60

**Problem:** A worker takes 18 hours to complete a job on daily wages and 12 hours on a scheme of payment by results. His rate of pay is 1:50 per hour; The material cost of product is 6 and overheads are covered at 150% of total direct wages. Calculate factory cost-of the product under: a) Piece work plan. b).Halsey plan c) Rowan plan.

**Solution:**

- a) Wages under piece work plan . 12 hours @ 1.50 = Rs. 18  
 b) Wages under Halsey plan 12 hours @ 1.50 = Rs. 18  
 Add Bonus :  
 50% time saved 18 hours -12 hours = 6 hours / 2;  
 3hours x Rs. 1. 50 = Rs. 4.50  
**Wages = Rs.22.50**

- c) Wages under Rowan Plan 12 hours @ 1.50 = Rs. 18  
 Add: Bonus=6 hours/18 hoursx12 hoursxRs. 1.50 = Rs. 6  
**Wages = Rs. 24**

**STATEMENT OF FACTORY COST**

	<b>Piece Work</b>	<b>Halsey</b>	<b>Rowan</b>
Materials	6.00	6.00	6.00
Wages	18.00	22.50	24.00
<b>Prime Cost</b>	24.00	28.50	30.00
<b>Add:</b> Factory overhead			
150% of wages	27.00	33.75	36.00
<b>Factory Cost</b>	51.00	62.25	66.00

**Problem:**

Calculate Labour Cost per hour under Halsey plan, Time allowed = 48 hours; Time Taken = 40 hours. Rate per hour - Re 1.

**Solution:**

Time saved = Standard Time - Actual time.

$$8 \text{ hours} = 48 \text{ hours} - 40 \text{ hours}$$

$$\text{Bonus} = 50 \% \text{ Time Saved} \times \text{Rate per hour}$$

$$= 8 \text{ hours} / 2 \times \text{Re.}1 = \text{Rs.} 4$$

$$\text{Actual wages} = \text{time taken} \times \text{Rate per hour}$$

$$40 \text{ hours} \times \text{Re.} 1 = \text{Rs.}40$$

$$\text{Total Earnings} = \text{Actual wages} + \text{Bonus}$$

$$\text{Rs.} 44 = \text{Rs.}40 + \text{Rs.} 4$$

$$\text{Labour Cost per hour} = \text{Rs.}44 / 40\text{hrs} = \text{Rs.} 1.10$$

**Problem:**

Compute the Earnings of worker under:

- a) Time rate method                      b) piece rate method              c) Halsey method  
d) Rowan plan

$$\text{Wages rate} = \text{Rs.} 2 \text{ per hour}$$

$$\text{Dearness allowance} = \text{Re.} 1 \text{ per hour}$$

$$\text{Standard hours} = 10$$

$$\text{Actual hours} = 8$$

**Solution:**

**a) Time Rate Method:**

Wages = 8 Hours x Rs. 2	= Rs. 16.00
Add: Dearness Allowance (D.A)	= Rs. 8.00
Earnings	<b>= Rs. 24.00</b>

**b) Piece Rate Method:**

Wages = 10 hours x Rs.2	= Rs. 20.00
Add: D. A.	= Rs. 8.00
Earnings	<b>= Rs. 28.00</b>

**c) Halsey Method:**

Wages = 8 hours x Rs.2.	= Rs. 16.00
Add: D. A.	= Rs. 8.00

Bonus 50% time saved 2 hours / 2	
1 hours x Rs. 2	= Rs. 2.00
Earnings	= <b>Rs. 26.00</b>

d) Rowan Method:

Wages = 8 hours x Rs.2.	= Rs. 16.00
Add: D. A.	= Rs. 8.00
Bonus $2 / 10 \times 8 \times 2$	= Rs. 3.20
Earnings	= <b>Rs. 27.20</b>

***Problem:***

From the following Particulars calculating the earnings of the workers A and B under Taylor's differential Piece rate system: Standard time allowed -10 units per hour Normal time rate per hour - Rs. 2 per hour.

Differentials to be applied:

80 % of piece rate when below standard

120 % of piece rate when above standard.

In a certain day of 8 hours.

A Produced-75 Units.

B Produced -100 Units.

**Solution:**

Standard Rate Per unit

10 units = Rs.2 .

1 Unit = Rs.2 / 10 = 0.20 paise

**Standard output Per day:**

1 hour= 10 Units

8 hours =  $8 \times 10$  units = 80 Units.

A Produced -75 Units which is below standard output

B Produced - 100 Units which is above standard output

Normal piece rate = 0.20 paise per unit

80% piece rate =  $0.20 \times 80 / 100 = 0.16$  paise

120 % piece rate =  $0.20 \times 120/100 = 0.24$  paise

**Total Earnings:**

A = 75 Unite x 0.16 paise = Rs 12

B = 100 Units x 0.24 paise = Rs. 24

**Problem:**

From the particulars given below prepare labour cost per man day of 8 hours:

- 1) Basic Salary Rs. 4 per day.
- 2) Dearness allowance -25 paise per every point over 100 cost of living index for working class. Current cost of living index is 700 units.
- 3) Leave Salary - 10% of (i) and (ii)
- 4) Employer Contribution to Provident fund 8% of (i) (ii) and (iii)
- 5) Employer's Contribution to State Insurance - 2.5% of (i) (ii) and (iii)
- 6) Expenditure on amenities to labour - Rs.20 per head per mensem.
- 7) Number of working days in a month - 25 days of 8 hours each.

**Solution:**

**Labour Cost per man per day of 8 hours**

	Per month (25 days) Rs.
Basic Salary (4x25 days)	100
Dearness allowance 600 points (700- 100 points) x 0.25 paise	150
Leave Salary 10% of(i)& (ii) $100+150=250 \times 10/100=25$	25
Employer's Contribution to Provident fund 8 % of (i) (ii) and (iii) $100+150 +25 =275 \times 8/100$	22
Employer Contribution to State Insurance 2.5 % of (i), (ii) and (iu) $275 \times 2.5 /100$	6.88
Amenities	20.00
25 days Labour Cost	<b>323.88</b>
Per day = $323.88 / 25$ days = Rs. 12.95	

**Problem:**

From the following particulars calculate the wages under Rowan Plan

Standard time = 10 hours

Tune Rate = Re. 1 per hour

Time taken = 8 hours.

**Solution:**

Bonus = Time Saved / Standard time X Time taken x Rate per hour

$$2 \text{ hours} / 10 \text{ hours} \times 8 \text{ hours} \times \text{Re. } 1$$

$$\text{Bonus} = \text{Rs. } 16 / 10 \text{ hrs.} = \text{Rs. } 1.60$$

Actual wages = 8 hours x Re. 1 = Rs. 8

Total Earnings = Rs. 8 + 1.60 = Rs. 9.60

**OVERHEADS****Problem:**

In a factory there are three production departments A, B and C two service Departments P and Q. for April 2016 the Department expenses were:

A - Rs. 130000 B - Rs. 120000 C - Rs. 100000

P - Rs. 24000 Q - Rs. 20000

The service department expenses are apportioned on percentage basis as given below.

**Departments**

	A	B	C	P	Q
P	30%	40%	15%	---	15%
Q	40%	30%	25%	5%	---

Prepare a statement showing the distribution of service Departments overhead to production departments under repeated distribution method.

**Solution:**

**Secondary Distribution under Repeated Distribution Method**

	Production Dept.			Service Dept.	
	A	B	C	P	Q
As per primary Distribution summary	130000	120000	100000	24000	20000
Service Dept :P Rs. 24000 A:B:C:Q 3:4:1.5:1.5	7200	9600	3600	(-) 24000	3600
Service Dept: Q Rs.23600 A:B:C:P 4:3:2.5:0.5	9440	7080	5900	1180	(-) 23600
Service Dept :P Rs. 1180 A:B:C:Q 3:4:1.5:1.5	354	472	177	(-) 1180	177
Service Dept: Q Rs. 177 A:B:C:P 4:3:2.5:0.5	71	53	44	9	(-) 177
Service Dept :P Rs. 9 A:B:C:Q 3:4:1.5:1.5	3	4	2	(-) 9	-
Total	147068	137209	109723	---	---

**Problem:**

From the following data, Calculate the overhead to be charged on the basis of the direct labour hour rate of job No: 501 and determine the total cost

Materials used (for job No: 501)	= Rs. 210
Direct wages (for J.N.501)	= Rs, 280
Direct labour hours (for J.N.501)	= Rs.70
Estimated factory overhead for die year	= Rs. 1,05,000
Estimated labour Hours for the year	= 2,10,000

**Solution:**

Estimated factory overhead = Rs. 1,05,000

Estimated Labour hours=2,10,000

Factory overhead rate = Rs. 1,05,000 /2,10,000 hours = Re. 0.50

**Calculation of Total cost:**

Materials	=210
Direct wages	=280
<b>Prime cost</b>	<b>=490</b>
Add Factory overhead 70 hours x 0.50	= 35
<b>Total Cost/Factory Cost</b>	<b>=525</b>

**Problem:**

Workout the Machine hour rate for the following Machine, whose scrap value is Nil:

Cost of the Machine: Rs. 90,000  
 Freight and installation charges: Rs.10,000  
 Working life = 10 years.  
 Working hours = 2000 per year  
 Repair Charges - 50 % of the depreciation  
 Power -10 units per hour @ 10 paise per unit.  
 Lubricating Oil @Rs-. 2 per day of 8 hours.  
 Consumable Stores @ Rs. 10 per day of 8 hours.  
 Wages of Operator @ Rs. 4 per day.



**Solution:****Machine Hour Rate (per day = 8 hours)**

	Per Hour (Rs.)
<b>Standing Charges:</b>	
Lubricating Oil      2	
Consumable Stores    10	
Operator wages        4	
8 hours                    16	
1 hour = Rs. 16 / 8 = Rs. 2	2.00
<b>Variable charges:</b>	
Power (10 Units x-10 paise)	1.00
Depreciation = $90000+10000 / 10 = \text{Rs. } 10000$	
Depreciation per hour Rs. 10,000 / 2000 hrs. = Rs.5	5.00
Repair Charges (50 % Depreciation) = Rs..5x 50 =2.50	2.50
<b>Machine Hour rate</b>	<b>10.50</b>

**Problem:**

There are two production departments A and B and two Service departments C and D. The Cost of departments A, B, C and D are respectively Rs. 4,000, Rs. 9,000, Rs. 2,000 and Rs. 3,500. The cost of Service department C to be allocated as to A 40 % B 30 % and D 30 %. The Cost of department D to be allocated as to A 50 % B 30 % and C 20 %. Ascertain the Production cost departments A and B including the cost of Service department.

**Solution:****Overhead Distribution Summary**

Particulars	Total	A	B	C	D
As per primary distribution	18500	4000	9000	2000	3500
Service Dept. C Rs. 2000 (40:30:30)		800	600	-2000	600
Service Dept. D Rs. 4100 (50:30:20)		2050	1230	820	4100
Service Dept. C Rs. 820 (40:30:30)		328	246	-820	246
Service Dept. D Rs. 246 (50:30:20)		123	74	49	-246
Service Dept. C Rs. 49 (40:30:30)		20	15	-49	14
Service Dept. D Rs. 14 (50:30:20)		7	4	3	-14
Service Dept. C Rs. 3 (40:30:30)		2	1	-3	---

**Problem:**

Calculate machine Hour Rate from the following:

- i. Cost of Machine-Rs. 200000
- ii. Estimated scrap - Rs. 2,000
- iii. Average Repairs - Rs. 150 per month.
- iv. Standing charges allocated - Rs. 50 per month.
- v. Effective working life - 166 hours per month,
- vi. Power = 5 hours per hour @ 19 paise per unit

**Solution:**

Machine Hour Rate	Month Rs.	Per Hour
Standing charges (fixed cost) Rs. 50 /166 hours = 0.30 p	50	0.30
Variable charges :		
Depreciation = cost of Machine – scrap / Effective working life. $20000 - 2000 / 10000 = 18000/ 10000 = 1.80$		1.80
Repairs = Rs. 150 / 166 hours	150	0.90
Power = 5 units x 0.19 paise		0.95
Machine hour Rate		3.95

## PROCESS COSTING

### **Problem:**

Product "Lotus" is obtained after it passes three distinct process. The following information is obtained from the accounts for the month ending December 31, 2002

Items	Total Rs.	<i>Process</i>		
		I Rs.	II Rs.	III Rs.
Direct Material	5829	2650	1916	763
Direct wages	10000	3500	4000	2500
Production overhead	12000	----	-----	----

1000 units at Rs. 5 each were introduced to process I. There was no stock of material or work in progress at the beginning or end of the period. The output of each process direct to the next process and finally to finished stores production overhead is recovered of 100 percent of direct wages. The following additional data are obtained.

Process	Output during the month	Percentage of Normal loss to input	Value of per unit
I	940	5%	Rs. 3
II.	850	10%	Rs. 4
III.	755	10%	Rs. 5

Prepare process accounts and Normal loss accounts Abnormal loss accounts.

<i>Process Accounts</i>					
Particulars	units	Amounts	Particulars	units	Amounts
To Inputs	1000	5000	By Normal Loss	50	150*
			(1000 x 5/100)	(50 x Rs.3)	To Material
2650	Abnormal	10	160**		
To Wages		3500	Loss		
Production		4200	Process II	940	15040
	a/c transferred				Overheads
(12000 x 7/20)					
Total	1000	15350	Total	1000	15350

### **I. Calculation of Abnormal Loss**

		<i>Units</i>	<i>Amount</i>
	Input	1000	15350
<b>Less</b>	Normal Loss	50	150 (scrap)
	Normal Output	950	15200 (Normal cost)
<b>Less</b>	Actual output	940	-----
	Abnormal Loss	10	----

Normal output \*❖ Actual output

Unit Abnormal Loss (950 - 940 = 10 units)

#### **Value of Abnormal Loss :**

Normal cost x Unit of Abnormal loss = 15200 / 950 x 10 = Rs.160\*\*  
= Normal output

#### **Normal Loss :**

Input 1000 x 5 / 100 = 50 units.

Normal Loss Value = 50 Units x Rs.3 = Rs. 150\*

<i>Process II Accounts</i>					
Particulars	Units	Amount	Particulars	Units	Amount
			By Normal		

			Loss	94	376*
To process			Process		
No.1 a/c	940	15040	No.III a/c		
To Material		1916	transferred	850	25500
To Wages		4000			
To Production					
Overhead		4800			
(12000 x 8/20)					
Abnormal gain	4	120**			
	944	25876		944	25876

**Calculation of Normal Loss :**

Input 940 units : Normal loss to input 10%

$$940 \times 10/100 = 94 \text{ Units.}$$

Value of Normal loss (scrap) = 94 x Rs.4 = 376\*

**Calculation of Abnormal Gain :**

	Units	Amount
Input	940	25756
Less Normal Loss	94	376*
Normal output	846	25380
Less Actual output	850	—
Abnormal gain	4	—

**Value of Abnormal Gain :**

= Normal cost x Unit of Abnormal gain

Normal output

$$= 25380 \times 4 = \text{Rs. } 120**$$

846

Dr.	Process III Accounts			Cr	Particulars	Units
Amount	Particulars	Units	Amount			
To process II	850	25500	By Normal			
			Loss	85	425	
To Material		763	Abnormal loss	10	410*	
To wages		2500	Finished stock	755	30928	
To production						
overhead						
12000 x 5 /20		3000				
	850	31763		850	31763	

**Calculation of Abnormal Loss**

	Units	Amount
Input	850	31763
Less Normal Loss	85	425
Normal Output		765 31338
Less Actual output	755	—
Abnormal loss	10	—

**Value of Abnormal Loss :**

$$31338 / 765 \times 10 = 410*$$

Dr.	Abnormal Loss Account			Cr	Particulars	Units
Amount	Particulars	Units	Amount			
To process I	10	160	By cash			
(10 x 3)			10 x 3 = 30	10	30	
			10 x 5 = 50	10	50	
To process III	10	410	Costing P&L a/c	---	490	
	20	570		20	570	

Dr.	Abnormal Gain Account				Cr	Particulars
	Units	Amount	Particulars	Units	Amount	
To Normal Loss (4 x Rs.4)	4	16	By Process II a/c	4	120	
To Costing P & L						
To process III	---	104				
	4	120		4	120	
Journal : 1) Abnormal Gain a/c Dr				16		
To Normal Loss a/c					16	
(4 units x Rs. 4)						

<i>Normal Loss Account</i>					
Particulars	Units	Amount	Particulars	Units	Amount
To Process I	50	150	By Abnormal gain	4	16
To Process II	94	376	By cash	225	935
To Process III	85	425	(b.f)		
	229	951		229	951

**Problem.:** In process "B" 75 units of a commodity were transferred from process "A" at a cost of Rs.1310. The additional expenses incurred by the process were Rs.190. 20% of the units entered are normally lost and sold at Rs.4 per unit. The output of the process was 70 units. Prepare process "B" Account.

<i>Process B account</i>					
Particulars	Units	Amount	Particulars	Units	Amount
To process A a/c transferred	75	1310	By Normal loss	15	60
			75 x 20/100		
			(15 units x Rs.4)		
To additional 190 transferred to			By output	70	1680
To Abnormal gain	10	240	expenses		---
	85	1740	process C (b.f)		
				85	1740

**Calculation of Abnormal gain Amount :**

	Units	Amount	
Input	75	1500	
Less Normal Loss	15	60	
Normal output	60	1440	Normal cost
Less Actual output	70	-	
Abnormal gain	10	-	
Value of Abnormal gain = Normal cost x Unit of abnormal gain			
Normal output			
= 1440 / 60 x 10 = Rs. 240*			

**Problem:** A product passes through three process, I, II, and III. From the following information, Prepare the processes accounts, assuming that there were no opening or closing stocks.

	Process I	Process II	Process III
	Rs.	Rs.	Rs.
Materials	1000	1500	500
Labour	5000	8000	6500
Overheads	1050	1188	2009
Actual output (units)	9500	9100	8100
Normal Loss	3 %	5 %	8 %

The wastage of process I was sold at 25 paise per unit, that of process II at 50 paise per unit and that of process III at Re 1 per unit 10000 units were issued to the process I in the beginning at a cost of Re 1 per unit.

Solution :

**Process I Account**

	Unit	Amount		Unit	Amount
To Input	10000	10,000	By Normal loss	300	75 (10000x Re1)
	(10000 x 3/100)				
To Material		1,000	(300 x 0.25 p)		
			By Abnormal loss	200	350*
To Labour		5,000	By output transfer		
To Overhead		1,050	red to process II	9500	16625
		10000	17,050	10000	17050

**Process II Account**

	Unit	Amount		Unit	Amount
To Process I a/c	9500	16,625	By Normal loss	475	238
			(9,500 x 5/100 = 475)		
			(475 x 0.50)		
To Material		1,500			
To Labour		8,000	By output transfer		
To Overhead		1,188	red to process III	9100	27300
To Abnormal gain*	75	225			
		9575	27,538	9575	27538

**Process III Account**

	Unit	Amount		Unit	Amount
To Process II a/c	9100	27,300	By Normal loss	728	728
To Material		500	(9100 x 8/100 = 728)		
			(728 x Re.1)		
			By Abnormal loss	272	1156 To Labour
6,500 By finished					
To Overhead		2,009	Stock	8100	34425
	9100	36,309		9100	36309

**Abnormal Loss Account**

	Unit	Amount		Unit	Amount
To Process I a/c	200	350	By cash	200	50
			(200 x 0.25)		
To Process III a/c	272	1,156	By cash		
			(272 x 1 )	272	272
			By Costing		
			Profit & Loss a/c	–	1184
	472	1,506		472	1506

**Abnormal gain Account**

	Unit	Amount		Unit	Amount
To Normal loss	75	38	By Process II	75	225
75 units x 0.50					
To costing Profit & Loss a/c		187			
	75		225	75	225

**Normal Loss Account**

	Unit	Amount		Unit	Amount
To Process I	300	75	By Abnormal gain	75	38
To Process II	475	238	By cash (b.f)	1428	1003
To Process III		728	728		
	1503	1041		1503	1041

**Workings Notes :****1. Calculation of Abnormal Loss - Process I**

Units                      Amount

Input	10000	17050
Less Normal Loss	300	75
Normal output	9700	16975 Normal cost
Actual output	9500	—
Abnormal Loss	200	—
Value of Abnormal Loss	= 16975 / 9700	x 200 = Rs.350 *

**2. Calculation of Abnormal Gain : – Process II**

	Units	Amount
Input	9500	27313
Less Normal Loss	475	238
Normal output	9025	27075 Normal cost
Actual output	9100	—
Abnormal gain	75	—
Value of Abnormal gain	= 27075 / 9025 x 75	= Rs.225

**3. Calculation of Abnormal Loss - Process III a/c**

	Units	Amount
Input	9100	36309
Less Normal Loss	728	728
Normal output	8372	35581
Actual output	8100	—
Abnormal Loss	272	—
Value of Abnormal Loss	= 35581 / 8372 x 272	= Rs.1156

**Problem:** In process “B” 75 units of a commodity were transferred from process “A” at a cost of Rs.1310. The additional expenses incurred by the process were Rs.190. 20% of the units entered are normally lost and sold at Rs.4 per unit. The output of the process was 70 units. Prepare process “B” Account.

<b>Process B account</b>					
Particulars	units	Amount	Particulars	Units	Amount
To process A a/c transferred	75	1310	By Normal loss	15	60
			75 x 20/100		
			(15 units x Rs.4)		
To additional 190 transferred to			By output	70	1680 expenses
To Abnormal gain	10	240	process C (b.f)		
	85	1740		85	1740

**Calculation of Abnormal gain Amount :**

	Units	Amount
Input	75	1500
Less Normal Loss	15	60
Normal output	60	1440 Normal cost
Less Actual output	70	-
Abnormal gain	10	-
Value of abnormal gain = Normal cost		x Unit of abnormal gain
	Normal output	
	= 1440 / 60 x 10	= Rs. 240*

**Problem :** A product passes through three process, I, II, and III. From the following information, Prepare the processes accounts, assuming that there were no opening or closing stocks.

	Process I	Process II	Process III
	Rs.	Rs.	Rs.
Materials	1000	1500	500
Labour	5000	8000	6500
Overheads	1050	1188	2009
Actual output (units)	9500	9100	8100
Normal Loss	3 %	5 %	8 %

The wastage of process I was sold at 25 paise per unit, that of process II at 50 paise per unit and that of process III at Re 1 per unit 10000 units were issued to the process I in the beginning at a cost of Re 1 per unit.

**Solution :****Process I Account**

	Unit	Amount		Unit	Amount
To Input	10000	10,000	By Normal loss	300	75 (10000x Re1)
	(10000 x 3/100)				
To Material		1,000	(300 x 0.25 p)		
			By Abnormal loss	200	350*
To Labour		5,000	By output transfer		
To Overhead		1,050	red to process II	9500	16625
		10000	17,050		10000 17050

**Process II Account**

	Unit	Amount		Unit	Amount
To Process I a/c	9500	16,625	By Normal loss	475	238
			(9,500 x 5/100 = 475)		
			(475 x 0.50)		
To Material		1,500			
To Labour		8,000	By output transfer		
To Overhead		1,188	red to process III	9100	27300
To Abnormal gain*	75	225			
		9575	27,538		9575 27538

**Process III Account**

	Unit	Amount		Unit	Amount
To Process II a/c	9100	27,300	By Normal loss	728	728
To Material		500	(9100 x 8/100 = 728)		
			(728 x Re.1)		
			By Abnormal loss	272	1156 To Labour
6,500 By finished					
To Overhead		2,009	Stock	8100	34425
	9100	36,309		9100	36309

**Abnormal Loss Account**

	Unit	Amount		Unit	Amount
To Process I a/c	200	350	By cash	200	50
			(200 x 0.25)		
To Process III a/c	272	1,156	By cash		
			(272 x 1)	272	272
			By Costing		
			Profit & Loss a/c	—	1184
	472	1,506		472	1506

**Abnormal gain Account**

	Unit	Amount		Unit	Amount
To Normal loss	75	38	By Process II	75	225
75 units x 0.50					
To costing Profit & Loss a/c		187			



	75		225		75	225
	<b>Normal Loss Account</b>					
	Unit	Amount		Unit	Amount	
To Process I	300	75	By Abnormal gain	75	38	
To Process II	475	238	By cash (b.f)	1428	1003	
To Process III		728				
	1503	1041		1503	1041	

**Workings Notes :****1. Calculation of Abnormal Loss - Process I**

	Units	Amount
Input	10000	17050
Less Normal Loss	300	75
Normal output	9700	16975 Normal cost
Actual output	9500	—
Abnormal Loss	200	—
Value of Abnormal Loss	$= 16975 / 9700 \times 200$	$= \text{Rs.}350 *$

**2. Calculation of Abnormal Gain : – Process II**

	Units	Amount
Input	9500	27313
Less Normal Loss	475	238
Normal output	9025	27075 Normal cost
Actual output	9100	—
Abnormal gain	75	—
Value of Abnormal gain	$= 27075 / 9025 \times 75$	$= \text{Rs.}225$

**3. Calculation of Abnormal Loss - Process III a/c**

	Units	Amount
Input	9100	36309
Less Normal Loss	728	728
Normal output	8372	35581
Actual output	8100	—
Abnormal Loss	272	—
Value of Abnormal Loss	$= 35581 / 8372 \times 272$	$= \text{Rs.}1156$

**Illustration :**

Hanumann Industries produces a Detergent washing product through three distinct processors.

The following information has been obtained from the cost ending 31st December, 2002 :

<b>Items</b>	<b>Total</b>	<b>Process</b>		
		I	II	II
	Amount	Rs.	Rs.	Rs.
Direct Materials	8,252	2,800	2,490	2,962
Direct Wages	9,000	2,000	3,000	4,000
Production Overheads	9,000			

1,000 units at Rs.4 each were introduced in Process I. There was no stock of materials, work-in-progress and finished goods at the beginning or at the end of the period. The output of each process passes direct to the next process and finally to Finished Stock. Production overheads are recovered at 100 per cent of direct wages.

“Washolux” after passed accounts for the month

**The following additional data are obtained :**

	Output during the month	normal loss to	Percentage of scrap input	Value of per unit Rs.	Process
Process I	950		5%	2	
Process II	840		10%	4	
Process III	750		15%	5	

Prepare process cost accounts.

**Solution :**

**Process I A/c**

	Units	Rs.		Units	Rs.
To Units introduced	1,000	4,000	By Normal loss	50	100
To Direct material		2,800	By Process II A/c	950	10,700
To Direct wages		2,000	transfer @ Rs.10		
To Production			of per unit)		
overhead		2,000			
(100% on direct					
wages)					
	1,000	10,800		1,000	10,800

**Process II A/c**

	Units	Rs.		Units	Rs.
To Transfer from			By Normal loss	95	380
process I	950	10,700	By Abnormal loss	15	330*
2,490			(transfer)		
By Process III					
To Direct wages		3,000			
To Production over-				840	18,480
3,000					
				950	19,190

**Process III A/c**

	Units	Rs.		Units	Rs.
To Process II A/c	840	18,480	By Normal wastage	126	630
To Direct materials		2,962	By Finished goods		
To Direct wages		4,000	stock A/c	750	30265
To Production over-					
head		4,000			
To Abnormal gain	36	1,453			
	876	30,895		876	30,895

**Notes : Calculation of Process II - Value of abnormal loss**

$$\begin{aligned} & \text{Rs. } 19,190 - 380 \quad 18810 \\ & = \frac{\text{Units } 950 - 95}{855} \times 15 = \frac{\text{Units } 855}{855} \times 15 = 330* \end{aligned}$$

**Process III Value of abnormal gain**

$$\begin{aligned} & \text{Rs. } 29,442 - 630 \quad 28812 \\ & = \frac{840 - 126}{714} \times 36 = \frac{714}{714} \times 36 = \text{Rs. } 1,453 \text{ Units} \end{aligned}$$

**Exercise :**

The finished product of a factory has to pass through three processes A, B and C. The normal wastage of each process is 2% in A, 5% in B and 10% in C. The percentage of waste is computed on the number of units entering each process.

The scrap value of wastage of process A, B and C are Rs.10 Rs.40 and Rs.20 per 100 units respectively.

The output of each process is transferred to the next process and the finished products are transferred from process C in to stock. The following further information is obtained :

	ProcessA	ProcessB	ProcessC
	Rs.	Rs.	Rs.
Materials consumed	12,000	4,000	4,000
Direct Labour	8,000	6,000	6,000
Manufacturing expenses	2,000	4,000	2,000

20,000 units were put into process A at a cost of Rs. 16,000. The output of each process has been:

A – 19,600 units B – 18,400 units C – 16,700 units.

There was no stock of work –in–progress in any process.

2. A product is obtained through three processes. From the following particulars, prepare process accounts, abnormal profit and loss accounts.

	Processes		
	I	II	III
Materials	Rs. 2,600	Rs.1,980	Rs. 2,962
Direct wages	Rs. 2,000	Rs.3,000	Rs. 4,000
Output (in units)	950	840	750
Normal loss	5%	10%	15%
Sale of scrap (per unit)	Rs. 2	Rs. 4 %	Rs. 5
General Expenses	Rs.9,000, 1,000 units at Rs. 3 each were introduced in Process I.		

**Journal entry :-**

Process a/c Dr	x x
To Abnormal gain a/c	x x

**Transfer :-**

Abnormal gain a/c Dr	x x
To costing Profit & Loss a/c	x x

**Calculation of Abnormal gain :-**

$$= \frac{\text{Normal Cost} \times \text{Unit of Abnormal gain}}{\text{Normal output}}$$

**Ex No.** A product passes through three distinct processes A, B and C. The normal loss in units in each process is - Process A - 5%, Process B - 10%, Process C - 15% which is sold at Rs.2, Rs.4 and Rs.5 respectively. Expenses for the month of September 2003 are as follows :

	Process		
	A	B	C
	Rs.	Rs.	Rs.
Sundry materials	5,200	3,960	5,924
Wages	4,000	6,000	8,000
Actual output (in units)		1,900	1,680 1,500

2,000 units at Rs.3 per unit were put in Process A. There were no opening and closing stocks. The total overheads are Rs.18,000 which are to be recovered at 100% of wages. Prepare the necessary accounts.

4) In process A 100 units of raw materials were introduced at Rs.10 each. Other process expenses Rs.602 of the units introduced 10% is normally lost. Their scrap value is Rs.3 per unit. Output in process A is 75 units.

Prepare process A account ?

5. 600 units were introduced in a process at Rs.20 per unit. 500 units was completed and transferred to the finished goods stores. The normal process loss was 20% of the input and the scrap in normally sold of Rs.3 each. The labour and overhead expenditure incurred in the process amounted to Rs.600. Show the process account and abnormal gain account.

6) A product passes through three processes is produced. During the month of January, 600 units have been produced. The data available from cost records are :

	Process I	Process II	Process III		
(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Raw materials	4,000	2,000	1,500		
Wages	3,000	2,500	2,500		
Direct expenses		600	200	500	
Glass jars	----	2,030	----		
Packages	----	----	325		

Indirect expenses are Rs.1,600. By products from Process II are sold for Rs.240. Scrap from Process III is sold for Rs. 125.

Prepare process account.

### Illustration

The product of a company passes through three distinct processes to completion. From the past experience it is ascertained that wastage is incurred in each process as under : Process A 2% ; Process B 5% ; Process C 10%

The wastage of Processes A and B is sold at Rs.10 per 100 units and that of Process C at Rs.80 per 100 unit.

Following is the information regarding the production of March 1979 :

	Process A	Process B	Process C
	Rs.	Rs.	Rs. Materials
12,000	8,000	4,000	
Direct Labour	16,000	12,000	6,000
Machine expenses	2,000	2,000	3,000
Other Factory expenses	3,500	3,800	4,200

20,000 units have been issued to Process A at a cost of Rs.20,000.

The output of each process has been as under :

Process A 19,500 Units

Process B 18,800 Units

Process C 16,000 Units

There was no stock or work-in-progress in any process in the beginning and in the end of March.

Prepare Process Accounts.

### Solution :

		<b>Process Account</b>			
	<b>Units</b>	<b>Rs.</b>		<b>Units</b>	<b>Rs.</b>
20,000	By Normal Wastage				
	To Materials	12,000	(2% of 20,000 @		
16,000	Rs.10 per 100 Units)	400	40		
	Labour		To Abnormal		
	To Machine	2,000	Wastage	100	273
	expenses		To Process B a/c		
	To Other Factory		(output transferred)	19,500	53,187
	expenses	3,500			
		20,000		20,000	53,500
		53,500			

				<b>Process B Account</b>			
	Units	Rs.		Units	Rs.		
53,187	B/y Normal					To Process A A/c	19,500
To Materials		8,000	Wastage (5%			To Direct Labour	
12,000 of 19,500 @		975	Rs.10 per 100				
To Machine Expenses		2,000	units)				
To Other Factoring Expenses		3,800	By Process C a/c	18,800	80,060.60		
To Abnormal Gain	275	1,171	(Output transferred)				
	19,775	80,158		19,775	80,158		

				<b>Process C Account</b>			
	Unit	Rs.		Unit	Rs.		
	By Normal					To Process B	
a/c (Output received)	18,000	80,060.50	Wastage (10% of 18,800	1,880	1,504	To Materials	
4,000 @ Rs.80 per 100)			By Abnormal				
To Direct Labour		6,000	Wastage		920	5,207	
To Machine expenses		3,000	By Finished Stock	16,000	90,549.50		
To Other Factory Expenditure		4,200					
	18,000	97,260.50		18,000	97,260.50		

Working Notes :

Process A : Cost of abnormal wastage =

Process B : Cost of abnormal gain =

Process C : Cost of abnormal wastage = =Rs.5,207

## Marginal costing

### Illustration :

The fixed costs for the year are Rs.40,000. Variable cost per unit is Rs.2

Estimated sales for the period are valued at Rs.1,00,000. Each unit sells at Rs.10.

You are required to calculate the break-even point.

### Solution :

$$\begin{aligned} \text{Contribution} &= \text{Selling price} - \text{Variable cost} \\ &= \text{Rs. } 10 - \text{Rs. } 2 \\ &= \text{Rs. } 8 \end{aligned}$$

$$\begin{aligned} \text{Break-even point (in units)} &= \\ &= 5,000 \text{ units.} \end{aligned}$$

$$\begin{aligned} \text{Break-even point (in Rs.)} &= 5,000 \text{ units} \times \text{Rs. } 10 \\ &= \text{Rs. } 50,000 \end{aligned}$$

Application of the other formula is also shown as under :

$$\text{Break-even point (in Rs.)} =$$

$$\text{P/V ratio} = \times 100$$

=

B.E. Point =

These calculation may be checked as follows :

	Rs.
Fixed Cost	40,000
Variable Cost at B.E. Point (5,000 units x Rs.2)	10,000
Break-even Point	50,000

Illustration :

It is found that Rs. 80,000 will be the likely sales turnover for the next year. The cost and selling price remain the same.

What will be the estimated contribution and profit ?

Solution :

$$\begin{aligned} \text{Contribution} &= \text{Sales} \times \text{P/V ratio} \\ &= 80,000 \times 80\% \\ &= \text{Rs. } 64,000 \end{aligned}$$

$$\begin{aligned} \text{Or Contribution} &= \text{Fixed Cost} + \text{Profit} \\ \text{Or Profit} &= \text{Sales} - \text{Variable Cost} \\ &= \text{Contribution} - \text{Fixed Cost} \\ &= 64,000 - 40,000 \\ &= \text{Rs. } 24,000 \end{aligned}$$

Thus, when sales are Rs.80,000 profit will be Rs. 24,000

Illustration :

Taking figures of illustration 5, if it is desired to earn a profit of Rs.30,000, when will be the amount of sales.

**Solution :**

A formula for determining the sales necessary to earn a stated profit is shown below :

Sales for desired profit =

Using this formula, the sales required is as follows :

=

**Illustration :**

The following data is given :

Fixed expenses Rs. 1,00,000, variable expenses Rs.10 per unit, selling price Rs.15 per unit.

a) Indicate the number of units to be manufactured and sold (i) to break-even ; (ii) to earn a profit of Rs.10,000.

b) What additional units would be necessary to increase the above profit by Rs.5,000.

**Solution :**

a) Breakeven point =

$$\begin{aligned} \text{Contribution} &= \text{Selling price} - \text{Variable cost} \\ &= 15 - 10 \\ &= \text{Rs. } 5. \end{aligned}$$

i) B.E. Point = = 20,000 units.

$$\text{Or } = 20,000 \times \text{Rs. } 15 = \text{Rs. } 3,00,000.$$

ii) Sales to earn a profit of Rs.10,000

$$\begin{aligned} &= \\ &= 22,000 \text{ units} \\ \text{or } &= 22,000 \times 15 = \text{Rs. } 3,30,000 \end{aligned}$$

b) Sales to earn an additional profit of Rs.5,000

$$= = 23,000 \text{ units.}$$

Thus, in order to increase the profit of Rs.10,000 by Rs.5,000, additional sales of 1,000 units (i.e.23,000 - 22,000) is required.

**Illustration :**

Break-even point = 1,000 units

Sales = 1,500 units at Rs.6 each

Fixed cost = Rs. 2,000

Find out the variable cost per unit and profit.

**Solution :**

Break-even point (units) =

$$1,000 =$$

Contribution per unit = Rs. 2.

And since selling price is Rs.6, the variable cost per unit must be  $6 - 2 = \text{Rs.}4$

And total contribution must be  $1,500 \times 2 = \text{Rs.} 3,000$

Profit = Contribution - Fixed Cost

$$= 3,000 - 2,000$$

$$= \text{Rs.}1,000$$

**Illustration :**

Fixed cost = Rs. 4,000

Profit = Rs. 1,000

Break-even point = Rs.20,000

Find out sales and variable cost.

**Solution :**

Contribution - Fixed cost + Profit

$$= 4,000 + 1,000$$

Contribution = Rs.5,000

Break-even point =

$$20,000 =$$

$$= x \text{ Sales}$$

Sales =  $x 20,000$

$$= \text{Rs.} 25,000$$

P/V ratio =

$$= x 100$$

$$= 20\%$$

Variable cost is 80% of sales

Variable cost =  $25,000 \times 80\% = \text{Rs.}20,000$ .

**Illustration :**

Calculate break-even point from the following figures :

	Rs.
Sales	3,00,000
Fixed expenses	75,000
Direct material	1,00,000
Direct labour	60,000
Variable expenses	40,000

**Solution :**

Total Variable Cost = Direct material + Direct labour

+ Variable expenses

$$= 1,00,000 + 60,000 + 40,000$$

$$= \text{Rs.}2,00,000$$

Contribution =  $3,00,000 - 2,00,000$

$$= \text{Rs.}1,00,000$$

Break-even point =

$$=$$

$$= \text{Rs.} 2,25,000$$

**Illustration :**

You are given the following data of a factory for the year 1977 :

Output 80,000 units

Fixed cost Rs.4,00,000

Variable cost per unit	Rs.	10
Selling price per unit	Rs.	20

Find out the break-even point. If the selling price is reduced to Rs.18, what will be the new break-even point ?

**Solution :**

$$\begin{aligned} \text{Break-even point} &= \\ \text{Contribution} &= 20 - 10 \\ &= \text{Rs. } 10. \end{aligned}$$

$$\begin{aligned} \text{B.E. Point} &= x \ 20 \\ &= \text{Rs. } 8,00,000 \end{aligned}$$

New selling price = Rs.18 per unit

$$\begin{aligned} \text{Now contribution} &= 18 - 10 \\ &= \text{Rs. } 8 \end{aligned}$$

$$\begin{aligned} \text{New break-even point} &= x \ 20 \\ &= \text{Rs. } 10,00,000 \end{aligned}$$

*Illustration :*

From the following data, calculate

i) P/V ratio

ii) Profit when sales are Rs.20,000

iii) New break-even point if selling price is reduced by 20%

Fixed Expenses	Rs. 4,000
Break-even point	Rs. 10,000

**Solution :**

At break even point - Total Cost = Revenue

Thus, Rs.10,000 (BE Point) is also the total cost.

$$\begin{aligned} \text{Variable cost} &= \text{B.E. Point} - \text{Fixed Cost} \\ &= 10,000 - 4,000 \\ &= 6,000 \end{aligned}$$

$$\begin{aligned} \text{Contribution} &= 10,000 - 6,000 \\ &= \text{Rs. } 4,000 \end{aligned}$$

i) P/V ratio =  $\frac{4,000}{10,000} = 40\%$

ii) When sales are Rs.20,000, contribution will be  $20,000 \times 40\%$   
= 8,000

$$\begin{aligned} \text{Profit} &= \text{Contribution} - \text{Fixed cost} \\ &= 8,000 - 4,000 \\ &= \text{Rs. } 4,000 \end{aligned}$$

iii) New break-even point when selling price is reduced by 20%

$$\begin{aligned} \text{New break-even} &= 20,000 - 20\% \\ &= \text{Rs. } 16,000 \end{aligned}$$

$$\text{Variable cost} = \text{Rs. } 12,000$$

$$\begin{aligned} \text{Contribution} &= 16,000 - 12,000 \\ &= \text{Rs. } 4,000 \end{aligned}$$

New P/V ratio =  $\frac{4,000}{16,000} = 25\%$

New Break-even Point =  $\frac{12,000}{25\%} = \text{Rs. } 16,000$



## **STANDARD COSTING**

### **Illustration :**

From the following information compute (a) Mix, b) Price, and (c) Usage Variables :

	Standard			Actual		
	Quality	Unit	Total	Quality	Unit	Total
	(kilos)	Price	Rs.	(Kilos)	Price	Rs.
Material A	4	1.00	4.00	2	3.50	7.00
Material B	2	2.00	4.00	1	2.00	2.00
Material C	2	4.00	8.00	3	3.00	9.00
Total	8	2.00	16.00	6	3.00	18.00

### **Solution :**

(i) Price Variance :

$$= (\text{Standard Price} - \text{Actual Price}) \times \text{Actual Quantity}$$

Material A =  $(1 - 3.50) \times 2 = \text{Rs.}5 (-)$  Adverse

Material B =  $(2 - 2) \times 1 = \text{Nil}$

Material C =  $(4 - 3) \times 3 = \text{Rs.} 3 (+)$  Favourable

Total                      Rs. 2 (-) Adverse

ii) Usage Variance

$$(\text{Standard Quantity} - \text{Actual Quantity}) \times \text{Standard Price}$$

Material A =  $(4 - 2) \times 1 = \text{Rs.} 2 (+)$  Favourable

Material B =  $(2 - 1) \times 2 = \text{Rs.} 2 (+)$  Favourable

Material C =  $(2 - 3) \times 4 = \text{Rs.} 4 (-)$  Adverse

Total                      Nil

iii) Material Mix Variance :

$$= \text{Standard cost of Standard mix} - \text{Standard cost of actual mix}$$

Standard cost of actual mix is calculated as below :

Actual quantity x Standard price

2            x Re. 1.00        = 2

1            x Re. 2.00        = 2

3            x Re. 4.00        = 12

Standard cost of actual mix        Rs.16

Standard cost of standard mix is calculated as under :

Actual quantity (i.e., 6th kilos) is apportioned in materials A, B and C in the ratio of 4 : 2 : 2 i.e., standard proportion.

Actual quantity in

Standard mix x Standard prices

3            x Re. 1.00        =        Rs. 3

1.5        x Re. 2.00        =        3

1.5        x Re. 4.00        =        6

Standard cost of standard mix        12

Material mix variance = Rs.12 - Rs.16

= Rs.4 (-) Adverse