

# **Cost Accounting**

## **Class XI**

Study Material

# INDEX

- Unit 1 – General Principles
- Unit 2 – Direct Materials.
- Unit 3 – Direct Labour and Direct Expenses.
- Unit 4 – Overheads General - Classification, Distribution and Control.
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**UNIT 1: GENERAL PRINCIPLES**

<b>Unit Code:</b> <b>1</b>	<b>UNIT TITLE: GENERAL PRINCIPLES</b>			
	Duration:			
<b>Location:</b>	<b>SESSION 1: INTRODUCTION TO COST ACCOUNTING</b>			
Classroom or Company's premises	<b>Learning Outcome</b>	<b>Knowledge Evaluation</b>	<b>Performance Evaluation</b>	<b>Teaching and Training Method</b>
	1. Meaning of cost and other interchangeably used terms	1. Explain the concept of cost, costing, cost accounting and cost accountancy	1. Define -cost -costing -cost accounting -cost accountancy	<b>Interactive Lecture:</b> Basic Overview of meaning of cost and other terms
	2. Objectives of cost accounting	1. Elucidate the purpose of cost accounting	1. Enumerate the various objectives of cost accounting	<b>Interactive Lecture:</b> Discussion of objectives of cost accounting
	3. Cost Accounting vs Financial Accounting	1. Explain the difference between cost accounting and financial accounting	1. Differentiate between cost and financial accounting	<b>Interactive Lecture:</b> Discussion of dissimilarities between cost and financial accounting
	4. Importance of cost accounting	1. Explain the importance of cost accounting	1. Identify the parties and the benefits accruing by use of cost accounting	<b>Interactive Lecture:</b> Elaboration on significance of cost accounting
	5. Objections to Cost Accounting	1. Identify the reasons for resistance to cost accounting	1. Enumerate the objections to cost accounting and rebuttal thereof	<b>Interactive Lecture:</b> Discuss the drawbacks of cost accounting
	<b>SESSION 2: FUNDAMENTALS OF COST, ITS ELEMENTS AND CLASSIFICATION</b>			
1. Basic terminology	1. Define -cost object -cost driver -cost unit -cost centre -profit centre	1. Describe the concepts of cost object and cost driver with examples along with cost unit, cost centre and profit centre	<b>Interactive Lecture:</b> Explain the basic conceptual cost associated terminology	
2. Elements of cost	1. Identify the elements of cost	1. Explain the constituents of cost	<b>Interactive Lecture:</b> Discuss the elements of cost	

	3. Exclusions from cost accounting	1. Explain the items leading to difference in cost and financial results	1. Classify the items excluded from cost accounts	Deliberate upon the exclusions from cost accounting
	4. Components of total cost	1. Explain the various components of cost	1. Categorise the components of total cost under major heads	<b>Interactive Lecture:</b> Discuss the components of total cost and constituents thereof
	5. Classification of costs	1. Identify the basis of classification of costs	1. Explain the various types of costs under the different basis of classification	<b>Interactive Lecture:</b> Give detailed description of the different types of cost under major categorisation
	6. Basics of installation of a costing system	1. Elucidate the major considerations and difficulties faced in installing costing system	1. Examine the key take-aways to be considered while installing costing system along with the practical difficulties in installation	<b>Interactive Lecture:</b> Discuss the considerations and challenges in installation of costing system
	7. Differences between important concepts	1. Differentiate between: - Cost Estimation And Cost Ascertainment - Cost Allocation And Cost Apportionment - Cost Reduction And Cost Control	1. Identify the key differences between some common and important concepts	<b>Interactive Lecture:</b> Explain the distinction between concepts like Cost Estimation And Cost Ascertainment, Cost Allocation And Cost Apportionment & Cost Reduction And Cost Control
<b>SESSION 3: METHODS, TECHNIQUES AND SYSTEMS OF COSTING</b>				
	1. Methods of costing	1. Classify the methods of costing	1. Enumerate the methods of costing	<b>Interactive Lecture:</b> Discuss the various methods of costing
	2. Techniques of costing	1. Identify the commonly used techniques of costing	1. Explain the techniques of costing	<b>Interactive Lecture:</b> Elaborate upon the various techniques of costing
	3. Systems of costing	1. Describe the systems of costing	1. Define the various systems of costing	<b>Interactive Lecture:</b> Discuss the systems of costing

## UNIT – 1: GENERAL PRINCIPLES

### *Learning Objectives:*

#### **After reading this unit, the students will be able to:**

1. Explain the meaning and scope of cost accounting;
2. State the objectives of cost accounting;
3. Differentiate between cost accounting and financial accounting;
4. Comprehend the importance of cost accounting;
5. Understand the Objections to Cost Accounting and rebuttal thereof;
6. Identify the different elements and components of cost;
7. Classify Costs and their exclusions;
8. Understand the basics of installation of Costing System;
9. State the meaning of cost unit, cost centre and profit centre;
10. Examine the difference between cost estimation and cost ascertainment, cost allocation and cost apportionment, cost reduction and cost control;
11. Explain the different methods, techniques and systems of costing and
12. Explain the meanings of certain keywords.

### **SESSION 1: INTRODUCTION TO COST ACCOUNTING**

Human civilisation has been a witness to the concept of cost accounting from times immemorial. The nomenclature and understanding has changed over time. Earlier, the kings used to appoint their representatives to check on the adherence to costs by shopkeepers, imposing heavy penalty on those who attempted to default from the prescribed system. This helped to keep cost constant for a long period in that era.

During the First World War, most of the manufacturing was done on the “cost plus” system. World War II witnessed a blanket control over prices due to government legislations. This made it imperative for industrialists to constantly work towards improvement of quality of products, accuracy in tracing costs of each job/product and to control costs. These objectives were not fulfilled by financial accounting.

In the modern age, although, determination of profitability has always been the root cause of all commercial activities, still cost accounting has made a place for itself as companies have come to realize that calculation and control over the cost is necessary.

## COST, COSTING, COST ACCOUNTING AND COST ACCOUNTANCY

It is important to understand that the terms cost, costing, cost accounting and cost accountancy, which are normally used interchangeably, are not synonyms of each other. The difference can be understood as follows:



sacrificed resource to obtain something



process of ascertaining costs



Process of accounting for costs



practice of costing and cost accounting

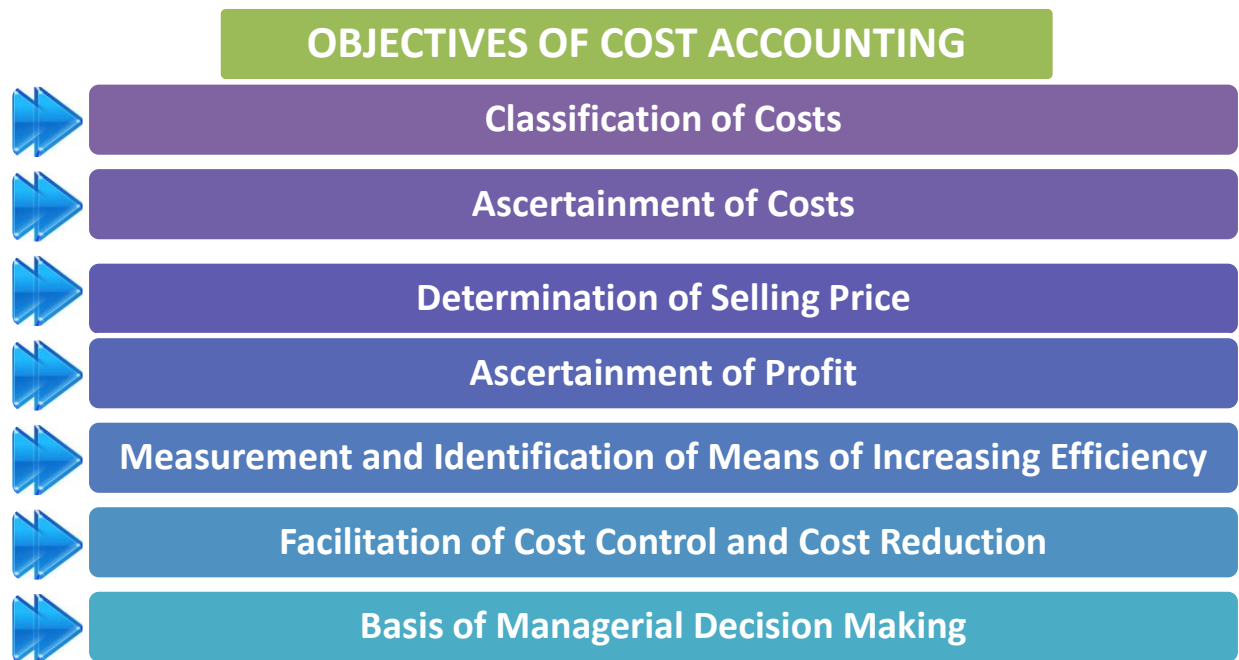
As per Chartered Institute of Management Accountants (CIMA) London, **cost** means “the amount of expenditure (actual or notional) incurred on, or attributable to, a given thing”, but the interpretation of the term depends on a number of factors like nature of business or industry. Moreover, it is difficult to determine an exact cost or a true cost because no figure of cost is true under all circumstances and for all purposes.

According to Wheldon, **costing** is, “the classifying, recording and appropriate allocation of expenditure for the determination of the costs of products or services; the relation of these costs to sales values; and the ascertainment of profitability.” In general, it is understood as process for determining cost.

**Cost Accounting** is usually considered as the next step to costing. It involves meticulously accurate analyzing, standardising, forecasting and comparing relevant costing data so as to interpret and report various concern areas to management. Its scope includes preparation of budgets, determination of standard costs based on technical estimates, identifying variances and reasons thereof, etc.

**Cost Accountancy** envisages application of costing and cost accounting in a business setup. It includes determination of selling price and profitability in addition to forecasting of expenses and future probable incomes. It facilitates management with cost control initiatives, ascertainment of profitability and informed decision making. Besides, costing and cost accounting, the following areas are also covered under cost accountancy:

- **Cost Reduction** is aimed at achieving real and permanent reduction in the unit cost of goods produced or services rendered without compromising the quality or suitability
- **Cost Control** refers to search for better and more economical ways of completing the current operations. It simply identifies and prevents waste within the existing environment.
- **Cost Audit** includes the verification of cost accounts and a check on their adherence to the cost accounting principles, plans, procedures and objectives.



## **COST ACCOUNTING Vs FINANCIAL ACCOUNTING**

Financial Accounting and Cost Accounting rest on the same basic principles and use the same records, but each deals with matters specially pertaining to itself. Financial Accounting discloses the profit/loss of business as a whole during a particular period while cost accounting makes available the unit costs and profits and/or losses of different product lines.

The importance of both, cost accounting and financial accounting cannot be undermined. The two are different from each other on the basis of meaning, objectives, mode of presentation, recording, analyzing profit, periodicity of reporting, degree of accuracy and method of valuation of stock.

<b>S. NO.</b>	<b>BASIS FOR COMPARISON</b>	<b>COST ACCOUNTING</b>	<b>FINANCIAL ACCOUNTING</b>
1	Meaning	Cost Accounting facilitates determination, tracking and controlling of various costs incurred in the business.	Financial Accounting records financial information of the business to reflect the profitability and the correct financial position of the company at a particular date.
2	Objective	Reducing and controlling costs.	Keeping complete record of the financial transactions, measuring profit position and financial position.
3	Information recorded	All information relating to material, labour and overhead, which are used in the production process	All transactions which can be measured in monetary terms.
4	Type of cost recorded	Both historical and pre-determined cost	Historical cost only.
5	Mode of Presentation	No statutory forms and voluntary presentation	Prepared according to accounting concepts and conventions, standards and in compliance with various acts and statutes
6	Time period of Reporting	No fixed time period. Reports prepared as and when required.	Financial statements are prepared at the end of the accounting period, which is normally 1 year.



7	Users	Internal stakeholders like management of the organization.	All stakeholders including, both, internal and external parties like customers, creditors, government, shareholders, etc.
8	Valuation of Stock	At cost	Cost or Net Realizable Value, whichever is less.
9	Mandatory	No, except for manufacturing firms it is mandatory.	Yes for all firms.
10	Profit Analysis	Generally, the profit is analyzed for a particular product, job, batch or process, thus, enabling management to eliminate less profitable product lines and maximise the profits by concentrating on more profitable ones	Income, expenditure and profit are analyzed together for business as a whole.
11	Forecasting	Forecasting is possible through budgeting techniques.	Forecasting is not at all possible.

### **IMPORTANCE OF COST ACCOUNTING**

The management of the company requires detailed information with respect to cost of operations so as to equip the executives with relevant information required for planning, scheduling, controlling and decision making. This is facilitated by Cost Accounting. By cost management, waste elimination, utilization of idle capacity, cost accounting helps to increase the overall productivity of an organization.

The importance of cost accounting can be summarized by categorizing the major parties benefiting and the respective benefits accruing as follows:

## Management

- Aids in price fixation
- Helps in preparing estimate
- Supports channelising production on right lines
- Assists in elimination of wastages
- Makes comparison possible across periods and across product lines
- Provides data for periodical profit and loss accounts
- Aids in determining and enhancing efficiency
- Helps in inventory control
- Facilitates cost reduction
- Assists in increasing productivity

## Employees

- Makes available systems of incentives, bonus plans etc.
- Indirectly benefits through increase in consumer goods and directly through continuous employment and higher remuneration

## Creditors

- Provides a base for judgement about the profitability and further prospects of the company

## Economy

- Facilitates control of costs, elimination of wastages and inefficiencies, thus, leading to the progress of the industry and in consequence of the nation as a whole

### OBJECTIONS TO COST ACCOUNTING

Despite numerous advantages, some objections are generally raised against cost accounting. As has been discussed earlier, cost accounting is voluntary and no specific stereotyped formats or systems of cost accounting are applicable to all industries. Thus, there is no uniform procedure. This leads to difference in understanding and application of concepts, methods and techniques of cost accounting by different industries.

The major objections are:

1. ***It is expensive***: Installation and maintenance of cost accounting system requires resources as analysis, allocation, absorption and apportionment of overheads require considerable amount of

clerical work. Unless benefits accruing from cost accounting are more than the costs involved, it should not be sought.

2. **Different Results from Financial Records:** The results shown by the cost accounts generally differ from those shown by the financial accounts due to a number of reasons. Preparation of reconciliation statements frequently is necessary to verify their accuracy. This leads to increase in work load.

3. **It is inapplicable:** Lack of common formats and systems makes it impossible to apply cost accounting to all industries uniformly. Consequently, the systems need to be adapted by the respective industry on the basis of their nature or the nature of the product manufactured or service rendered.

4. **It is unnecessary:** Maintenance of cost records leads to duplication of work i.e. preparation of financial accounts as well as cost accounts. Moreover, costing system itself does not control costs or improve efficiency. If the management is alert and efficient, it can control costs without the aid of the costing system.

5. **The system is complex:** Cost accounting requires identification, categorization and allocation of the different types of expenses, which is generally considered as complicated.

6. **Lack of Accuracy:** Use of notional cost such as standard cost, estimated cost hampers the accuracy of the cost results.

7. **Use of Secondary Data:** Cost accounting depends largely on financial statements. The limitations and errors in the financial information directly affect the cost results.

These objections are flawed. Most of these drawbacks can be avoided if the cost accounting system is well designed after taking into account technical details and advice of technical personnel of the business, setting up an integrated system of accounts and administering the same in an atmosphere of teamwork and co-operation.

### ***Knowledge Assessment – I***

State whether the following statements are True or False:

1. There is no difference between costing and cost accounting .
2. Cost reduction is a temporary process carried out for a specific unit.
3. The results of financial and cost accounting are always same.
4. Cost accounting helps in fixation of price of the product manufactured or service rendered.
5. The process of cost accounting remains uniform for all companies across industries.
6. Cost accounting depends largely on financial statements.
7. Maintaining cost records is tedious and leads to duplication of work.

**Ans: (1) (False), (2) (False), (3) (False), (4) (True), (5) (False), (6) (True), (7) (True)**

## SESSION 2: FUNDAMENTALS OF COST, ITS ELEMENTS AND CLASSIFICATION

As has been discussed already, 'cost' is referred to "the amount of expenditure (actual or notional) incurred on, or attributable to, a given thing". However, an exact definition of the term 'cost' is difficult as its interpretation depends upon the nature of the business, or industry, and the context in which it is used.

For example, the cost of a product can be calculated excluding packaging expenses if the same are nominal in amount (eg. soap bar) while this treatment of exclusion of cost will not be feasible in case the nature of the product requires heavy packaging cost (eg. perfumes).

Cost can also be considered as monetary valuation of effort, risk involved, opportunity forgone in production and delivery of a good or service and most importantly, resources like time, material and utilities. It is also imperative to remember that all expenses are costs, but not all costs, especially the ones incurred in acquisition of an income-generating asset, are expenses.

Before proceeding with the elements and components of cost, a basic understanding of cost object and cost driver is necessary.

### COST OBJECT

Cost object may be defined as anything for which a separate measurement of cost is desired. The following examples will further enhance the understanding:

COST OBJECT	EXAMPLE
Product	Laptop
Service	Air Fare from Delhi to Mumbai
Project	Construction of a two storeyed building
Department	HR department of a company

### COST DRIVER

Chartered Institute of Management Accountants defines cost driver as "an activity which generates cost". A cost driver triggers a change in the cost of an activity and is generally used to assign overhead costs to the number of produced units.

An activity can have more than one cost driver attached to it. For example, a production activity may have a machine, machine operator(s), floor space occupied, power consumed as the associated cost-drivers.

<b>EXAMPLES OF COST DRIVERS</b>		
• Machine Set-ups	• Purchase Orders	• Quality Inspections
• Production Orders	• Shipments	• Maintenance Requests
• Power Consumed	• Kilometers Driven	• Projects or Working Hours
• Advertisements or Sales Volume		• Product Hours

## **COST UNIT, COST CENTRE AND PROFIT CENTRE**

### **COST UNIT**

The Chartered Institute of Management Accountants (CIMA), London, defines a unit of cost as “a unit of quantity of product, service or time in relation to which costs may be ascertained or expressed.”

The preparation of cost accounts requires selection of a unit for identification of expenditure. The quantity upon which cost can be conveniently allocated is known as cost unit.

For example: in case of electricity companies cost unit will be per unit of electricity generated and in case of transport companies, it will be per passenger-km. or per tonne-km.

### **COST CENTRE**

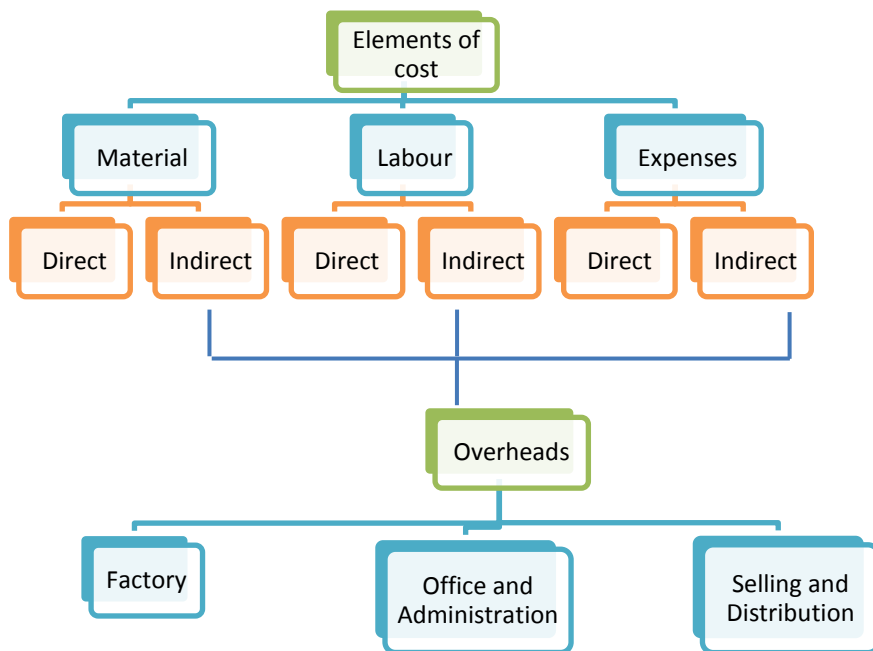
According to the Chartered Institute of Management Accountants, England, cost centre means “a location, person or item of equipment or group of these for which costs may be ascertained and used for the purpose of cost control”. It can be a department or a sub-department or an item of equipment or machinery or a group of persons.

### **PROFIT CENTRE**

A profit center is a business unit or department within an organization that generates revenues and profits or losses. Here, both the inputs and outputs are measured in monetary terms, and accounting for both costs and revenues results in automatic computation of profit with respect to this centre, termed as profit centre.

## **ELEMENTS OF COST**

The basic elements of cost can be illustrated as follows:



The broad elements of cost are categorized as Material, Labour and Expenses, which are further classified as direct and indirect. The indirect material, labour and expenses together are termed as overheads.

**A brief explanation of the elements has been given below:**

**1. Material:** The basic substance used for producing the product is referred to as material. Material can be direct or indirect in nature.

- **Direct Material:** The materials which directly contribute to the production of the product and are easily identifiable in the finished product are called direct materials. Cloth in shirt, paper in books, wood in furniture are examples of direct materials.

- **Indirect Material:** Other material which is ancillary in the production of any finished product and cannot be conveniently assigned to specific physical units is called indirect material. For example, printing in stationery, scissors used in cutting cloth for shirt, nails in shoes or furniture.

**2. Labour** refers to the human effort needed for conversion of materials into finished goods. Labour can be direct or indirect.

- **Direct Labour:** Labour which takes an active and direct part in the production of a particular commodity and can be directly co-related to any specific activity of production is termed as direct labour. Process labour, productive labour, operating labour, manufacturing labour, direct wages etc are used synonymously with direct labour.

- **Indirect Labour:** Employees who do not directly take part in the manufacturing process and whose cost cannot be identified with the individual cost centre are included under indirect labour. Such labour does not alter the construction, composition or condition of the product. Salary of foreman, salesmen and director are some examples of indirect labour.

**3. Expenses:** Costs incurred in the production process but not included under material or labour are generally expenses. They can be direct or indirect.

- **Direct Expenses:** These are expenses which can be directly, conveniently and wholly allocated to specific cost centres or cost units. Direct expenses are sometimes also described as “chargeable expenses.”

- **Indirect Expenses:** All expenses other than direct expenses are indirect in nature.

## OVERHEADS

People generally use the terms overheads and indirect expenses synonymously. But, it needs to be understood that “overheads” has a wider meaning than the term “indirect expenses”. Overheads include the cost of indirect material, indirect labour besides indirect expenses.

Indirect expenses may be classified under the following three categories:

- **Factory (Manufacturing, works or production) Overheads:** All expenses incurred in the factory for its smooth functioning including production management expenses are included here. Examples: Rent, rates, insurance, power etc. of factory.
- **Office and Administrative Overheads** include expenses pertaining to the management and administration of business. Example: Rent of office, lighting, heating, printing, stationery, etc.

- ***Selling and Distribution Overheads:*** These are expenses incurred for marketing of a commodity, for securing orders for the articles, despatching goods sold, and for making efforts to find and retain customers.

## ITEMS EXCLUDED FROM COST ACCOUNTS

The cost and the financial accounts do not always give the same results. The reason can be attributed to certain items which are included in financial accounts but not in cost accounts. These items can be categorized under three major heads:

<b>Exclusions from cost accounts</b>	<b><u>Appropriation of profits</u></b>
	<b><u>Matters of pure finance</u></b>
	<b><u>Abnormal gains and losses</u></b>

### **Appropriation of profits**

- (i) Appropriation to sinking funds.
- (ii) Dividends paid.
- (iii) Taxes on income and profits.
- (iv) Transfer to general reserves.
- (v) Excess provision for depreciation of buildings, plant etc. and for bad debts.
- (vi) Amount written off—goodwill, preliminary expenses, underwriting commission, discount on debentures issued; expenses of capital issue, etc.
- (vii) Capital expenditure specifically charged to revenue.
- (viii) Charitable donations.

### **Matters of pure finance**

#### **(a) Purely financial charges :**

- (i) Losses on sale of investments, buildings, etc.
- (ii) Expenses on transfer of company's office.
- (iii) Interest on bank loan, debentures, mortgages, etc.
- (iv) Damages payable.



- (v) Penalties and fines.
- (vi) Losses due to scrapping of machinery.
- (vii) Remuneration paid to the proprietor in excess of a fair reward for services rendered.

(b) Purely financial incomes :

- (i) Interest received on bank deposits.
- (ii) Profits made on the sale of investments, fixed assets, etc.
- (iii) Transfer fees received.
- (iv) Rent receivable.
- (v) Interest, dividends, etc., received on investments.
- (vi) Brokerage received
- (vii) Discount, commission received.

Abnormal gains and losses

- (i) Losses or gains on sale of fixed assets.
- (ii) Loss to business property on account of theft, fire or other natural calamities.

In addition to above abnormal items (gains and losses) may also be excluded from cost accounts. Alternatively, these may be taken to Costing Profit and Loss Account.

## COMPONENTS OF TOTAL COST

The total cost comprises of four major components:

- 1. Prime Cost** includes all the direct costs, viz. direct material, direct labour and direct expenses. It is also known as basic, first or flat cost.
- 2. Factory Cost** comprises of prime cost and factory overheads. It is also known as works cost, production or manufacturing cost.
- 3. Office Cost** summates office and administration overheads and factory cost. This is also termed as administration cost or the total cost of production.
- 4. Total Cost or cost of sales** is the sum total of selling and distribution overheads and the total cost of production.

Also, adjustment for inventories need to be made in the following manner:

1. Direct Material Consumed = Opening Stock of Direct Material

- + Purchases of Direct Material
- Closing Stock of Direct Material

2. Works Cost = Gross Works Cost

- + Opening Work – in – progress
- Closing Work – in – progress

3. Cost of Production of goods sold = Cost of Production

- + opening stock of finished goods
- closing stock of finished goods

The components of cost can be summarized in the form of a statement, usually referred to as **Cost Sheet**. The same can be presented in a tabular manner as follows:

Particulars	Amount	Amount
Opening Stock of Raw Material	***	
<u>Add:</u> Purchase of Raw materials	***	
<u>Less:</u> Closing stock of Raw Materials	***	
Raw Materials Consumed	***	
Direct Labour	***	
Direct Expenses	***	
Prime cost (1)		***
<u>Add:</u> :- Factory Over Heads	***	
<u>Less:</u> :- Sale of scrap	***	
Gross Works Cost		***
<u>Add:</u> Opening Stock of WIP	***	
<u>Less:</u> Closing Stock of WIP	***	
Net Works cost (2)		***

<u>Add:-</u> Office and Administration Overheads:-	***	
Cost of Production (3)		***
<u>Add:</u> Opening stock of Finished Goods	***	
<u>Less:</u> Closing stock of Finished Goods	***	
Cost of Goods Sold		***
<u>Add:-</u> Selling and Distribution Overheads:-	***	
Cost of Sales (Total Cost) (5)		***
Profit		***
Sales		***

### Illustration 1

Calculate prime cost from the following information:-

Opening stock of raw material = Rs. 2,50,000

Purchased raw material = Rs. 15,00,000

Expenses incurred on raw material = Rs. 1,00,000

Closing stock of raw material = Rs. 4,50,000

Wages Rs. 9,52,000

Direct expenses Rs. 4,68,000

**Solution: -**

Particulars	Details (Rs)	Amount (Rs)
Opening stock of raw material	2,50,000	
<b>Add:-</b> Purchase	15,00,000	
<b>Add:-</b> Expenses incurred on purchases	1,00,000	
	-----	
Raw material available	18,50,000	
<b>Less :-</b> closing stock of raw material	4,50,000	
	-----	

Raw material consumed		14,00,000
<b>Add:-</b> Direct wages or labour		9,52,000
<b>Add:-</b> Direct expenses		4,68,000
		-----
<b>Prime cost</b>		28,20,000

### Illustration 2

Compute factory cost from the following details:-

Raw material consumed	= Rs 50,00,000
Direct wages	= Rs 20,00,000
Direct expenses	= Rs 10,00,000
Factory expenses 80% of direct wages	
Opening stock of work in progress	= Rs 15,00,000
Closing stock of work in progress	= Rs 21,00,000

### Solution

Particulars	Amount (Rs)	Amount (Rs)
Direct material consumed	50,00,000	
<b>Add:-</b> Direct wages	20,00,000	
<b>Add:-</b> Direct Expenses	10,00,000	
	-----	
<b>Prime cost</b>		80,00,000
<b>Add:-</b> Factory expenses		16,00,000
		-----
<b>Gross Factory Cost</b>		96,00,000
<b>Add:-</b> Opening stock of work in progress		15,00,000
		-----
Total goods processed during the period		1,11,00,000
<b>Less:-</b> Closing sock of work in progress		21,00,000
		-----
<b>Factory cost or work cost</b>		90,00,000

### Illustration 3

Prepare cost sheet from the following particulars:

Raw material purchased = Rs. 2,40,000

Paid freight charges = Rs 20,000

Wages paid to laborers = Rs 70,000

Directly chargeable expenses = Rs 50,000

Factory on cost = 20% of prime cost

General and administrative expenses = 4% of factory cost

Selling and distribution expenses = 5% of production cost

Profit 20% on sales

	Opening stock (Rs.)	Closing stock (Rs.)
Raw material	30,000	40,000
Work in progress	35,000	48,000
Finished goods	40,000	55,000

### Solution

Particulars	Amount (Rs.)
Raw material purchased	2,40,000
<b>Add:-</b> freight charges	20,000
Total cost of raw material purchased	2,60,000
<b>Add:-</b> opening stock of raw material	30,000
Cost of raw material available	2,90,000
<b>Less:-</b> closing stock of raw material	40,000
<b>Raw material consumed</b>	2,50,000
<b>Add:-</b> wages paid to labour	70,000
<b>Add:-</b> Directly chargeable expenses	50,000
<b>Prime cost</b>	3,70,000
<b>Add:-</b> Factory overhead (20% of prime cost)	74,000
Gross works cost	4,44,000
<b>Add:-</b> Opening stock of work in progress	35,000
Total goods processed during the period	4,79,000

<b>Less:-</b> closing stock of work in progress	48,000
<b>Factory on work cost</b>	4,31,000
<b>Add:-</b> General & administrative expenses (4% of factory cost)	17,240
<b>Cost of production</b>	4,48,240
<b>Add:-</b> opening stock of finished goods	40,000
Cost of goods available for sale	4,88,240
<b>Less:-</b> closing stock of finished goods	55,000
<b>Cost of goods sold</b>	4,33,240
<b>Add:-</b> selling and distribution expenses (5% of production cost)	21,662
<b>Cost of sales</b>	4,54,902
<b>Add:-</b> Profit (20% on sales or 25% on cost)	1,13,726
<b>Sales</b>	5,68,628

#### Illustration 4

Calculate (a) Cost of raw-materials consumed; (b) Total cost of production; (c) Cost of goods sold and (d) The amount of profit from the following particulars :

Opening Stock	
: Raw-materials	2,00,000
: Finished goods	1,60,000
Closing Stock	
: Raw-materials	1,60,000
: Finished goods	2,00,000
Raw-materials-purchased	20,00,000
Wages paid to labourers	8,00,000
Chargeable expenses	80,000
Rent, rates and taxes	2,00,000
Power	96,000
Factory heating and lighting	80,000
Factory insurance	40,000
Experimental expenses	20,000

Sale of wastage of material	8,000
Office management salaries	1,60,000
Office printing and stationery	8,000
Salaries of salesman	80,000
Commission of travelling agents	40,000
Sales	40,00,000

### Solution

Particulars	Amount (Rs.)	Amount (Rs.)
Raw-materials purchased	20,00,000	
Add : Opening stock	2,00,000	
Less : Closing stock	1,60,000	
<b>COST OF RAW-MATERIALS CONSUMED</b>	20,40,000	
Less : Sale of wastage of materials	8,000	
Material-Direct		20,32,000
Labour—direct		8,00,000
Chargeable expenses		<u>80,000</u>
<b>PRIME COST</b>		29,12,000
Add : Production overheads :		
Rent, rates and taxes	2,00,000	
Power	96,000	
Heating & lighting	80,000	
Insurance	40,000	
Experimental expenses	20,000	<u>4,36,000</u>
<b>FACTORY COST</b>		33,48,000
Add : Administrative overheads		
Office management salary	1,60,000	
Office printing & stationery	8,000	<u>1,68,000</u>
<b>TOTAL COST OF PRODUCTION</b>		35,16,000
Add : Opening stock of finished goods		1,60,000
Less : Closing stock of finished goods		<u>2,00,000</u>
<b>COST OF PRODUCTION OF GOODS SOLD</b>		34,76,000
Add : Selling and distribution overheads :		
Salaries of salesmen	80,000	

Commission to travelling agents	40,000	<u>1,20,000</u>
<b>COST OF SALES</b>		35,96,000
PROFIT (Balancing Figure)		4,04,000
<b>SALES</b>		40,00,000

### **CLASSIFICATION OF COSTS**

The basis of classification and the respective costs associated under each of the basis have been presented below:



F  
i  
x  
e  
d  
,  
v  
a  
r  
i  
a  
b  
l  
e  
,  
s  
e  
n  
s  
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-  
v  
e  
a  
r  
i  
a  
b  
l  
e

**Time**  
• Historical  
• Pre-determined

**Nature of elements**  
• Material  
• Labour  
• Overheads

**Degree of traceability to product**  
• Direct  
• Indirect

**Changes in activity or volume**  
• Fixed  
• Variable  
• Semi-variable

**Association with product**  
• Product  
• Period

**Functional**  
• Manufacturing  
• Administration  
• Selling  
• Distribution  
• Research  
• Development  
• Pre-production

**Relationship with accounting period**  
• Capital  
• Revenue

**Controllability**  
• Controllable  
• Non-controllable

**Analytical and decision making**  
• Opportunity  
• Sunk  
• Differential  
• Imputed  
• Out-of-pocket

**Avoidability**  
• Avoidable  
• Unavoidable

**Others**  
• Conversion  
• Normal  
• Total

### **On the basis of Time**

- **Historical cost** refers to the original cost at the time of a transaction. The ascertainment of such cost can be done after it has been incurred. It is objective in nature and can be verified after actual operations take place.
- **Pre-determined cost** is the cost computed even before commencement of an operation or activity. It is ascertained either from past data or as per organisational standards.

### **On the basis of nature of elements.**

- **Material**
- **Labour**
- **Overheads**

The same have been discussed earlier in the chapter.

### **On the basis of degree of traceability to product**

- **Direct cost** also known as traceable cost, can be directly attributable or traceable to the production of a specific product or service or activity.
- **Indirect cost** also known as common cost, is generally common to several products, thus is either difficult to trace to a certain specific product, service or activity or the process of doing so is uneconomical.

Direct cost can be directly allocated to the cost unit or cost centre while the indirect cost needs to be apportioned to different products.

### **On the basis of association with product**

- **Product costs** are costs which become part of the cost of the product rather than expenses of the period in which they are incurred. They are included in inventory values. They are treated as assets in financial statements until the goods they are assigned to are sold. They become an expense at that time.
- **Period costs** are costs which are not associated with production. They are treated as an expense of the period in which they are incurred. Such costs include general administrative costs, salesmen salaries and commission etc. They are charged against the revenue of the relevant period.

### On the basis of changes in activity or volume

- **Fixed cost** remains static or constant irrespective of changes in output. The fixed costs have relationship with time.
- **Variable cost** changes in direct proportion of change in volume of output.

Theoretically speaking, variable cost remains constant per unit of output and fixed cost remains constant in total or per unit of time. In the long run, these concepts do not hold true. A comprehensive definition of variable cost should include those costs which tend to vary with output or those which have a major relation with output and that of fixed cost should include those costs which tend to be constant at different volumes of output or which have no significant relation with output.

- **Semi-variable costs** neither change proportionately nor remain static. Eg. repairs.
- **Step costs** are costs that remain fixed over a range of activity and then jump to a new level as activity changes.

**On the basis of function:** A company performs a number of functions and needs to ascertain the cost of each of these functions. A brief explanation of each of the functional costs is as follows:

The definitions of the various functional costs as given by Chartered Institute of Management Accountants (CIMA), London are as follows :

- (i) **Manufacturing/Production cost.** The cost of operating the manufacturing division of a company is production cost. It includes costs beginning with supplying materials, labour and services and ends with the primary packing of the product. Thus, it includes the cost of direct material, direct labour, direct expenses and factory overheads.
- (ii) **Administration cost.** The cost of formulating the policy, directing the organisation and controlling the operations, which is not related directly to a production, selling, distribution, research or development activity or function are administration costs.
- (iii) **Selling cost.** The cost of seeking to create and stimulate demand (sometimes termed as marketing) and of securing orders.
- (iv) **Distribution cost.** The expenditure incurred from making the packed product available for dispatch to making the reconditioned returned empty packages, if any, available for use. Expenditure incurred in moving articles to and from prospective customers as in the case of goods on sale or return basis is also included in distribution cost.
- (v) **Research cost.** The cost of searching for new or improved products, new application of materials, or new or improved methods.
- (vi) **Development cost.** The cost of implementation of the decision to produce a new or improved product or to employ a new or improved method till the commencement of formal production of that product or by the method is development cost.

(vii) **Pre-production cost.** That part of development cost incurred in making a trial production run preliminary to formal production is pre-production cost. It is treated as deferred revenue expenditure and charged to future cost of production.

#### **On the basis of relationship with accounting period**

- **Capitalexpenditure** is an expense of a non-recurring nature, where the benefit continues over a long period. It generally results in acquisition of permanent assets.
- **Revenue expense** is of recurring nature, benefits only the current period and is thus, treated as an expense matched with revenues of the current accounting period.

#### **On the basis of controllability**

- **Controllable costs** are costs which can be influenced by the budget holder.
- **Non-controllable costs** are costs which are not subject to control at any level of managerial supervision.

#### **Analytical and decision making costs**

- **Opportunity cost** represents the cost of an alternative given up when a decision is made, i.e. the next best alternative. It is not recorded in books and is used for decision making and comparing alternatives.
- **Sunk costs** are historical or past costs and cannot be changed by any decision that will be made in the future. They are irrelevant for decision making.
- **Differential cost** is the difference in total costs between two alternatives. If the cost of alternative results in increased cost, it is incremental cost and if it is decreased cost, it is decremental cost.
- **Imputed or hypothetical costs** are costs which do not involve cash outlay. They are not included in cost accounts but are important for taking into consideration while making management decisions.
- **Out-of-pocket costs** mean the present or future cash expenditure regarding a certain decision which will vary depending upon the nature of decision made. They involve payment to outsiders and are more relevant for price fixation during recession or when make or buy decision has to be made.

#### **On the basis of Avoidability**

- **Avoidable costs** are those costs which will be eliminated, if a segment of the business (e.g. a product or department) with which they are directly related, is discontinued.
- **Unavoidable costs** are those which will not be eliminated with the segments. Such costs are merely reallocated if the segment is discontinued.

### Others

- **Conversion cost** is the cost incurred by the company in transforming direct materials into the finished products is known as the conversion cost. It excludes direct material cost and is usually taken as the aggregate of the cost of direct labour, direct expenses and factory overheads.
- **Normal cost** is the cost which is normally incurred at a given level of output in the conditions in which that level of output is achieved.
- **Total cost** is the sum total of all costs associated with the product or service, unit or centre.

## BASICS OF INSTALLATION OF COSTING SYSTEM

A company should give carefully planned consideration to the installation of a costing system so as to achieve its objectives. There are some practical difficulties faced in the installation of costing system.

### MAIN CONSIDERATIONS

The followings should be the main considerations to be kept in mind while introducing a costing system in a manufacturing organisation:

**1. The nature of the product:** A product requiring high value of material content requires an elaborate systems of materials control while a product requiring high value of labour content requires an efficient time-keeping and wage system.

**2. The size and type of organization:** The costing system should be designed and implemented in a manner to meet the requirements of the organization. Thus, the size of the organization, size of its departments, different levels of management, physical layout of the organization, extent of decentralization of authority, etc. should be given adequate consideration.

**3. The objective:** The objectives and information which the management wants to achieve and acquire should also be taken care of.

**4. The technical details:** The technical aspects of the business should be analysed in detail seeking assistance and support of the principal members of the supervisory staff and workmen.

**5. Informative and simple:** The system should be informative and simple, capable of furnishing complete information required, regularly and systematically in standard, detailed and precise printed formats. Data, complete and reliable in all respects, should be provided in a lucid form so that measurement of the variations between actual and standard costs is possible.

**6. Method of maintenance of cost records:** The company can maintain cost records in either integral or non-integral accounting systems.

- In case of integral accounting system no separate sets of books are maintained for costing transaction but they are interlocked with financial transactions into one set of books.

- In case of non-integral system, separate books are maintained for cost and financial transactions. At the end of the accounting period the results shown by the two set of books are reconciled.

**7. Flexibility:** The costing system should be flexible, elastic and capable of adopting to the changing requirements of the business.

**8. Accuracy of data:** The extent or degree of accuracy desired with respect to costing data should be determined.

**9. Current practices.** The existing methods and procedures for procurement and payment of materials, labour etc. should be carefully analysed.

## **PRACTICAL DIFFICULTIES**

S. No.	DIFFICULTIES	HOW TO OVERCOME
1.	Lack of support from top management	Taking the top management into confidence before installing the system and instilling a sense of cost consciousness in their mind
2.	Resistance from the existing staff	Educating staff about the strengths and new areas of development brought in by the costing system
3.	Non-cooperation at other levels	Re-orientation and education of employees with respect to the advantages that will accrue to them and to the organisation as

		a whole on account of efficient working of the system.
4.	Shortage of trained staff	Giving the existing staff requisite training and recruiting additional staff if required
5.	Heavy costs	Designing costing system suitably to suit specific requirements avoiding unnecessary sophistication and formalities

### **COST ESTIMATION AND COST ASCERTAINMENT**

**Cost Estimation** is the process of determining the costs of a certain product, job or order in advance for budgeting, measurement of performance efficiencies, preparation of financial statements (valuation of stocks, etc.) make or buy decision, fixation of the sale prices of products etc.

**Cost Ascertainment** is the process of computing costs on the basis of actual data.

*Hence, computation of historical costs is cost ascertainment while computation of future costs is cost estimation.*

The inter-relationship and importance of cost estimation and cost ascertainment cannot be undermined. The ascertained costs will greatly help the management in the process of estimation of rational accurate costs, provided the company has a sound costing system in place.

### **COST ALLOCATION AND COST APPORTIONMENT**

The identification and allotment of costs to cost centres or cost units can be done using cost allocation and cost apportionment.

<b>BASIS</b>	<b><u>COST ALLOCATION</u></b>	<b><u>COST APPORTIONMENT</u></b>
<b>Definition as per CIMA, London</b>	The allotment of whole items of cost to cost centres or cost units	The allotment of proportions of items of cost to cost centres or cost units
<b>Implication</b>	Charges direct expenditure to cost centres or cost units	Charges indirect expenditure to cost centres or cost units
<b>Example</b>	The cost of labour engaged in a service department	Canteen expenses of the factory

## COST REDUCTION AND COST CONTROL

Cost reduction is the process of identifying and eliminating avoidable expenses from a business to increase profits without compromising on product quality. Periodic cost reduction brings in efficiency in the company's operations and boosts profits.

Cost control is the process of controlling costs of an activity, process, or company as a whole, by detecting variances of actual costs from budgeted costs ascertaining the causes of such variances and implementing corrective procedures to effect realignment between actual and budgeted costs.

The basic differences between the two can be presented in a tabular manner as follows:

BASIS	COST CONTROL	COST REDUCTION
<b>Meaning</b>	A process of controlling cost by comparing actual and budgeted costs. Helps in maintaining the costs in accordance with established standards	A process resulting in economizing the unit cost without negatively impacting the quality of the product.
<b>Aim</b>	Achieving the cost targets as its objective	Directed to explore the possibility of improving the targets themselves
<b>Saves</b>	Total Cost	Cost Per Unit
<b>Reduction in Quality</b>	Not necessarily	No
<b>Nature</b>	Temporary effect but continuous process	Permanent reduction
<b>Emphasis on</b>	Historical and Budgeted Cost	Present and Future Cost
<b>Ends when</b>	The pre-determined target is achieved.	No visible end
<b>Type of Function</b>	Preventive	Corrective



## ***Knowledge Assessment – II***

Fill in the blanks with appropriate words:

1. Anything for which a separate measurement of cost is desired may be defined as \_\_\_\_\_.
2. \_\_\_\_\_ refers to an activity which generates cost.
3. \_\_\_\_\_ measures both the inputs and outputs in monetary terms.
4. The elements of cost include \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
5. Certain items which are included in financial accounts but not in cost accounts can be broadly categorized into \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
6. A component of cost which includes all direct costs is \_\_\_\_\_.
7. \_\_\_\_\_ summarises the components of cost in the form of a statement.
8. \_\_\_\_\_ are costs which can be influenced by the budget holder.
9. \_\_\_\_\_ costs are irrelevant for decision making as they cannot be changed by any decision that will be made in the future.
10. \_\_\_\_\_ is the process of computing costs on the basis of actual data.

***Ans: (1) (Cost object), (2) (Cost driver), (3) (Profit Centre), (4) (Direct Material, Direct Labour, Direct Expenses and Overheads), (5) (Appropriation of profits, Matters of pure finance, Abnormal gains and losses), (6) (Prime cost), (7) (Cost Sheet), (8) (Controllable costs) (9) (Sunk), (10) (Cost ascertainment)***

## **SESSION 3: METHODS, TECHNIQUES AND SYSTEMS OF COSTING**

### **METHODS OF COSTING**

The fundamental principles of cost ascertainment remain the same but the methods of analysing and presenting these costs differ from industry to industry. Broadly, there are two main methods used to determine costs viz. Job Cost Method and Process Cost Method.

However, the different methods of costing can be further bifurcated and can be explained in detail as follows:

#### **1. JOB COSTING**

This method is used for tracing specific costs to individual jobs especially where production is not highly repetitive. The cost ascertainment is for specific jobs or orders which are not

comparable with each other. Job costing is commonly used in printing press, automobile garage, repair shops, etc.

## **2. CONTRACT COSTING**

Principally, there is no difference between job and contract costing but it is convenient to prepare and maintain separate contract accounts when large scale contracts are carried out at different sites like in the case of building construction, ship builders, etc. A contract is a big job while a job is a small contract.

## **3. COST PLUS COSTING**

In some contracts, an agreed sum or percentage besides 'cost' to cover overheads and profit is paid to the contractor. This system of costing is termed as cost plus costing. The system is used generally where Government is the contractee.

## **4. BATCH COSTING**

In this method of costing, a batch of similar products is considered as one job and the cost of the complete batch is ascertained. Thereafter, the cost of each unit is determined. Pharmaceutical industries, brick manufacturing companies generally use this method.

## **5. PROCESS COSTING**

If a product passes through different stages, each distinct and well-defined, with the output of one process becoming the input for the other, it is desirable to know the cost of production at each stage. Process costing is employed to ascertain the same. The system of costing is suitable for the extractive industries, e.g., chemical manufacture, paints, foods, explosives, soap making etc.

## **6. OPERATION COSTING**

The procedure of operation costing is broadly the same as for process costing except that cost unit is an operation instead of a process. For large undertakings involving a number of operations, it is important to compute the cost of each operation. For example, the manufacturing of handles for bicycles will make use of operation costing as it involves many operations like cutting steel sheets into proper strips, moulding, machining and finally polishing.

## **7. UNIT COSTING (OUTPUT COSTING OR SINGLE COSTING)**

Under this method of costing, cost of a single product produced by a continuous manufacturing process is computed in addition to amount of each element of cost. The method is suitable in industries such as flour mills, paper mills, cement manufacturing etc.

## **8. OPERATING COSTING**

Also known as service costing, this method is employed to ascertain the cost of services rendered like transport companies, electricity companies, or railway companies. The total expenses regarding operation are divided by the units as may be appropriate (e.g., total number of passenger-kms. in case of bus company) and cost per unit of service is calculated.

### **9. DEPARTMENTAL COSTING**

Departmental Costing aims to ascertain the cost of output of each department of the company separately.

### **10. MULTIPLE COSTING (COMPOSITE COSTING)**

Application of more than one method of costing for the same product is done under multiple costing. Herein, the costs of different sections of production are combined after finding out the cost of every part manufactured. It is applicable where a product comprises of many assembled parts, e.g., motor cars, engines, machine tools, typewriters, radios, cycles etc.

## **TECHNIQUES OF COSTING**

In addition to the above stated methods, the following techniques of costing are used by management for the purpose of managerial decision making and controlling costs.

### **1. MARGINAL COSTING**

Marginal costing has been defined as ‘the accounting system in which variable costs are charged to cost units and the fixed costs of the period are written-off in full against the aggregate contribution.’ Fixed overheads are excluded on the ground that in cases where production varies, the inclusion of fixed overheads may give misleading results.

### **8. DIRECT COSTING**

The practice of charging all direct costs to operation, process or products, excluding all indirect costs to be written off against profits in the period in which they arise, is referred to as direct costing. Direct costing The technique considers some fixed costs as direct costs in appropriate circumstances, thus differentiating it from marginal costing.

### **9. ABSORPTION COSTING**

The Institute of Cost and Management Accountant of India defines absorption costing as “a method of costing by which all direct costs and applicable overheads are charged in products or cost centres for finding out the total cost of production. Absorbed cost includes production cost as well as administrative and other costs.”

Absorption costing does not make any difference between variable and fixed cost in the calculation of profits. It charges all costs, both variable and fixed, to operations, products or processes.

### **10. UNIFORM COSTING**

Uniform costing refers to a technique of costing wherein standardised principles and methods of cost accounting are employed by a number of different companies and firms, thus, facilitating inter-firm comparisons, establishment of realistic pricing policies etc.

### **11. ACTIVITY BASED COSTING**

The Chartered Institute of Management Accountants (CIMA), London, defines it as a technique of “cost attribution to cost units on the basis of benefits received from indirect activities e.g. ordering, setting up, assuring quality.” In other words, it is a method of assigning organisation’s resource costs through activities (called cost drivers) to the products and services. It is generally used by a company having products that differ in volume and complexity of production for the purpose of apportionment of overhead costs.

## **SYSTEMS OF COSTING**

There are two main systems of costing:

- 1. Historical Costing.**
- 2. Standard Costing.**

### **HISTORICAL COSTING**

Historical costing also known as conventional or orthodox costing determines cost on the basis of actuals. It may be in the nature of *post costing*, wherein cost ascertainment is done after the production is completed or in the form of *continuous costing*, wherein cost ascertainment is done as soon as the job is completed or even when the job is in progress.

Post costing is done by analyzing the financial accounts at the end of the period in such a way as to disclose the cost of the units which have been produced while continuous costing is usually done by charging the job or product with actual expenditure on materials and wages and estimated share of overheads, thus, leading to inexact cost.

Post costing does not help in exercising control over cost as it is based on actuals which can be known only after the activity is over while continuous costing provides prompt cost information to the management thereby facilitating timely, necessary corrective action in time. However, it

neither provides any standard for judging current efficiency nor does it disclose what the cost of the job ought to have been.

### **STANDARD COSTING**

Standard costing makes use of certain pre-determined standards for cost ascertainment in advance and requires in force a vigorous system of controlling cost and maintaining standard cost.

#### ***Knowledge Assessment – III***

Choose the correct option:

1. The two main methods used to determine costs are:
  - a. Job Cost Method and Process Cost Method.
  - b. Unit costing and contract costing
  - c. Job costing and batch costing
  - d. Process costing and contract costing
2. In case of building construction, \_\_\_\_\_ method of costing will be used.
  - a. Batch costing
  - b. Job costing
  - c. Process costing
  - d. Contract costing
3. Unit costing is also known as \_\_\_\_\_.
  - a. Output costing
  - b. Batch costing
  - c. Process costing
  - d. Contract costing
4. \_\_\_\_\_ and operating costing are the same.
  - a. Job costing
  - b. Process costing
  - c. Contract costing
  - d. Service costing.
5. Cost of each department is ascertained under:
  - a. Batch costing
  - b. Departmental costing
  - c. Process costing
  - d. Contract costing
6. \_\_\_\_\_ costing excludes fixed cost from consideration
  - a. Job costing
  - b. Absorption costing
  - c. Contract costing

d. Marginal costing.

*Ans: (1) (a), (2) (d), (3) (a), (4) (d), (5) (b), (6) (d)*

### KEYWORDS

1. **Cost:**The amount of expenditure (actual or notional) incurred on, or attributable to, a given thing.
2. **Costing:**The process of classifying, recording and appropriate allocation of expenditure for the determination of the costs of products or services; the relation of these costs to sales values; and the ascertainment of profitability.
3. **Cost Reduction:**The process of achieving real and permanent reduction in the unit cost without reduction in the quality or suitability.
4. **Cost Control:**Process of identification and prevention of waste within the existing environment.
5. **Cost Audit:**Verification of cost accounts to check their adherence to the cost accounting principles, plans, procedures and objectives.
6. **Cost object:**Anything for which separate cost ascertainment is preferred.
7. **Cost driver:**Any activity which generates cost.
8. **Cost unit:**The quantity upon which cost can be conveniently.
9. **Cost centre:**A location, person or item of equipment or group of these for which costs may be ascertained and used for the purpose of cost control.
10. **Profit center:**Any part of the organization to which revenues and cost can be assigned and profitability can be ascertained.
11. **Direct Material:**Material which becomes an integral part of the finished product and can be conveniently assigned to specific physical units.
12. **Direct Labour:**Labour which takes active and direct part in the production of a particular commodity
13. **Cost Sheet:**A sheet which brings together different costs in respect of a cost centre or a cost unit under various heads like prime cost, works cost, etc.

### SUMMARY

1. Cost accounting facilitates overcoming drawbacks of financial accounting like cost ascertainment, tracing costs to individual products, cost reduction, cost control, etc.
2. Although, the terms costing, cost accounting and cost accountancy are generally used interchangeably but they differ from each other., cost accounting
3. Cost accounting and financial accounting are different from each other on the basis of their meaning, objective, information recorded, type of cost recorded, mode of presentation, time period of Reporting, users, basis of valuation of stock and such other reasons.

4. Cost accounting, being voluntary with no specific uniform systems of cost accounting applicable to all industries, makes comparisons difficult due to difference in understanding and application of concepts, methods and techniques of cost accounting by different industries.
5. Elements of cost include cost of material, labour and expenses.
6. Overheads are different from indirect expenses as the term includes indirect material and indirect labour in addition to indirect expenses.
7. There are two main methods of determination of costs, Job costing and process costing.

## **EXERCISE QUESTIONS**

### **Short Answer Questions**

1. Define costing, cost accounting and cost accountancy.
2. Write a short note on objectives of cost accounting.
3. What is a cost unit and a cost centre.
4. How is a cost centre different from profit centre.
5. Differentiate between product cost and period cost.
6. Enumerate the different basis for classifying costs.
7. Write a short note on the elements of cost.
8. What are the different systems of costing.
9. Briefly explain the techniques of costing.
10. Enumerate the methods of costing.

### **Long Answer Questions**

1. Describe the relationship between cost and financial accounting. Explain in brief advantages of cost accounting.
2. You have been asked to install a costing system in a manufacturing company. What practical difficulties will you expect and how will you propose to overcome the same?
3. Discuss cost classification based on variability and controllability.
4. Explain the various methods of costing with their applicability to industries.
5. The results of financial and cost accounting generally vary. State the reasons for the arising differences.

6. Differentiate between the following:

- a) Cost Estimation and Cost Ascertainment
- b) Cost Allocation And Cost Apportionment
- c) Cost Reduction And Cost Control

7. Categorise and elaborate upon the classification of costs.

### Numerical Questions

1. Prepare a statement of cost using the following information:

Particulars	Amount (Rs.)
Cost of raw materials on June 1	60,000
Purchase of raw materials during the month	9,00,000
Wages paid	4,60,000
Factory overheads	1,84,000
Cost of work in progress on June 1	24,000
Cost of raw materials on June 30	30,000
Cost of stock of finished goods on June 1	1,20,000
Cost of stock of finished goods on June 30	1,10,000
Selling and distribution overheads	40,000
Sales	18,00,000
Administration overheads	60,000

*(Answer: Prime cost: Rs. 13,90,000, Factory cost: Rs. 15,98,000, cost of production of goods manufactured: Rs. 16,58,000, cost of production of goods sold: Rs. 16,68,000, cost of sales: Rs. 17,08,000, Profit: Rs. 92,000)*

2. The cost of sale of production 'A' is made up as follows:-

Particulars	Amount (Rs.)
Material used in manufacturing	Rs 55,000
Material used in packing material	Rs 10,000
Material used in selling the product	Rs 1,500



Material used in the factory	Rs 1,750
Material used in the office	Rs 1,250
Labour required in production	Rs 10,000
Labour required for supervision in factory	Rs 2,000
Expenses direct factory	Rs 5,000
Expenses indirect factory	Rs 1,000
Expenses office	Rs 1,250
Depreciation of office building	Rs 750
Depreciation on factory plant	Rs 1,750
Selling expenses	Rs 3,500
Freight on material	Rs 5,000
Advertising	Rs 1,250

Assuming that all products manufactured and sold, what will be the value of sales to obtain a profit of 20% on sales.

*(Answer: Sales: Rs. 1,25,000, Profit: Rs. 25,000)*

3. Calculate the prime cost, factory cost, total cost of production and cost of sales from the following particulars :

	Rs.
Raw-materials consumed	12,000
Directly chargeable expenses	500
Wages paid to labourers	2,500
Grease, oil, cotton waste etc.	25
Salary of factory manager and clerks	1,750
Insurance of stock of raw-materials	300
Consumable stores	400
Printing and stationery	
- Factory	50
- Office	200
- Sales deptt.	100
Rent of office building	150
Depreciation	
- Factory premises	200
- Office furniture	50

- Delivery vans 75
- Power and fuel 500
- Contribution to provident fund of factory employees 1,000
- Salaries of administrative directors 100
- Bank charges 75
- Cost of samples 250
- Salaries of sales manager 300
- Advertising 500
- Packing material 350
- Shortage in stocks of finished goods 20

*(Answer: Prime cost Rs. 15,000; Factory cost Rs. 19,225; Total Cost of production Rs. 19,800, Cost of sales Rs. 21,395)*

4. Calculate (a) Value of raw-materials consumed (b) Total cost of production, (c) Cost of goods sold and (d) The amount of profit from the following particulars :

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)
Opening Stock		Power	2,000
- Raw-Materials	5,000	Factory Heating and Lighting	2,000
- Finished Goods	4,000	Factory Insurance	1,000
Closing Stock		Experimental Expenses	500
- Raw-Materials	4,000	Sale of Wastage of Materials	200
- Finished Goods	5,000	Office Management Salaries	4,000
Raw-Materials Purchased	50,000	Office Printing & Stationery	200
Wages paid to Labourers	20,000	Salaries of Salesmen	2,000
Chargeable Expenses	2,000	Commission of Travelling Agents	1,000
Factory Rent, Rates and Taxes	5,000	Sales	1,00,000

*(Answer.(a) Rs. 50,800, (b) Rs. 87,500, (c) Rs. 89,500, (d) Rs. 10,500)*

5. From the following information, prepare a cost sheet showing the total cost per ton, if the total output for the period has been 40,000 tons.

Particulars	Amount (Rs.)	Particulars	Amount (Rs.)

Raw materials	132,000	Rent and taxes (office)	2000
Productive wages	140,000	Water supply	4,800
Direct expenses	12,000	Factory insurance	4,400
Unproductive wages	42,000	Office insurance	2000
Factory rent and taxes	8,800	Legal expenses	1600
Factory lighting	6,000	Rent of warehouse	1200
Factory heating	17,600	Depreciation--	
Motive power Haulage	12,000	Plant and machinery	8,000
Director's fees (works)	4,000	Office building	4,000
Directors fees (office)	8,000	Delivery vans	800
Factory cleaning	2000	Bad debt	400
Sundry office expenses	800	Advertising	1200
Expenses	3200	Sales department salaries	6,000
Factory stationery	3000	Up keep of delivery vans	2800
Office stationery	3600	Bank charges	200
Loose tools written off	2400	Commission on sales	6,000

*(Answer: Total cost: Rs. 4,72,800 and cost per ton: Rs. 11.82)*

6. ABC Ltd. has given the following Trading and P/L account for the year ending March 31, 2016. Prepare a statement of cost using relevant information from the statements.

<b>Particulars</b>	<b>Amount (Rs)</b>	<b>Particulars</b>	<b>Amount (Rs)</b>
To Opening Stock– Material	60,000	By Sales	10,00,000
- Finished Goods	2,00,000	By Closing Stock - Material	1,00,000
To Purchases Of Material	6,00,000	- Finished Goods	2,50,000
To Direct Labour	1,50,000		
To Cost Of Moulds	15,000		
To Salary Of Factory Manger	5,000		
To Depreciation Of Machine	4,000		
To Gross Profit	3,16,000		
	<b>13,50,000</b>		<b>13,50,000</b>
To Office Salary	45,000	By Gross Profit	3,16,000
To Salesman Salary	30,000	By Interest From Bank	4,000
To Insurance Of Office Building	5,000	By Dividend Received	1,000
To Insurance Of Godown	4,000	By Rent Received	4,500
To Directors' Fees	10,000		
To Telephone Charges	3,500		
To Showroom Expenses	6,000		
To Delivery Van Expenses	7,500		
To Preliminary Expenses	10,000		
To Interest On Debentures	3,500		
To Market Research Expenses	3,000		
To Underwriting Commission	3,000		
To Net Profit	1,95,000		
	<b>3,25,500</b>		<b>3,25,500</b>

*(Ans. Prime cost: Rs. 7,10,000, Factory Cost: Rs. 7,34,000, Cost of Production: Rs. 7,97,500, Cost of Production of goods sold: Rs. 7,47,500, cost of sales: Rs. 7,98,000, Profit: Rs. 2,02,000, Sales: Rs. 10,00,000)*

## UNIT2: DIRECT MATERIALS

<b>Unit Code:</b>	<b>UNIT TITLE: DIRECT MATERIALS</b>			
<b>II</b>	<b>DURATION:</b>			
<b>Location:</b>	<b>SESSION 1: INTRODUCTION TO MATERIAL</b>			
Classroom or Company's premises	<b>Learning Outcome</b>	<b>Knowledge Evaluation</b>	<b>Performance Evaluation</b>	<b>Teaching and Training Method</b>
	1. Meaning of Materials and its components.	1. Explain the different components of Materials.	1. Classify the different component of Materials.	<b>Interactive Lecture:</b> Basic overview of different type of materialsin the manufacturing organization.
	2. Meaning of Direct Materialsand Indirect Materials andits distinction.	1. Explain direct and indirect materials with some examples	1. Enumerate some live examples of direct material cost and indirect material cost.	<b>Interactive Lecture:</b> Discussion of direct and indirect materials
	3. Define the various objectives and essentials of a sound Material control.	1. Highlight the importance of Material control. 2. Explain the steps/essentials for a Sound Material Control system.	1 Understanding the concept of Material control. 2. Identify the various steps/essentials of Material Control	<b>Activity:</b> Identify various steps for Material Control adopted by companies and compare them with the steps of a sound material control system. If the company has adopted steps other than discussed in the class then find out the reasons/ circumstances for the same.
	<b>SESSION II: MATERIAL CONTROL (PURCHASE, RECEIPT,INSPECTION AND STORAGE)</b>			
	1. Explain the Steps of Material	1.Comprehend the components of	1.Identify the importance of the various steps in	<b>Interactive Lecture:</b> Introduction of

	Control: Material planning, purchasing, Receiving, Inspection and Storage	material control and their procedure.	material control procedure.	material control and its application in actual practice.  <b>Activity:</b> Collect the documents related to process of material control of a company in an industry.
	2. Different holding levels of materials and Economic Order Quantity	1.Explain the importance and Linkages among different holding levels of materials.  2. Usage of the concept of Economic Order Quantity	1.Enumerate the importance of calculating various holding levels of materials.	<b>Interactive Lecture:</b> Discussion on holding levels for various industries and its application in actual practice.  <b>Activity:</b> Collect the information related to holding levels of a company in an industry.
	3.Various modes of purchases and steps of Purchase Procedure	1. Explain the various modes of purchases and procedure of purchase.	1.Circumstances under which centralized and decentralized purchase methods can be adopted.	<b>Interactive Lecture:</b> Discussion of centralized and decentralized method of purchasing with live examples.
<b>SESSION III: VALUATION OF MATERIALS</b>				
	1. Meaning of Valuation of Materials.	1.Understanding the Concept and Importance of valuing the incoming materials.	1. Explain the procedure of valuation of incoming materials.	<b>Interactive Lecture:</b> Basic overview of the suitability of valuation procedure in different industries.
	2. Procedure to be followed for the valuation of	1.Understanding how the cost of containers and various types of	1. Discuss the need for finding the new price of incoming	<b>Interactive Lecture:</b> Discuss the treatment of containers under

	incoming materials.	discounts modify the valuation of incoming materials.	materials.	different situations.
	3. Various Methods of Valuing Outgoing Materials and their assumptions, advantages and disadvantages	1. Discuss the basis of valuing the outgoing Materials. 2. Understanding the suitability of different methods of pricing the issues/valuing outgoing materials under different price situations.	1. Explain the reason of difference in the valuation of closing stock in different methods of pricing issues. 2. Identify the different assumptions of different methods	<b>Interactive Lecture:</b> Discussion of suitability of different methods under different situations in different industries



## UNIT 2: DIRECT MATERIALS

### *Learning Objectives:*

After reading this unit, the students should be able to:

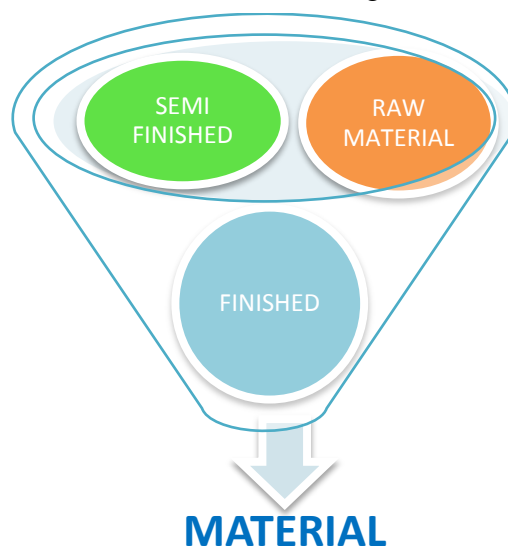
1. Understand the concept of Material;
2. Explain the meaning of raw material, semi-finished material, and finished material;
3. Differentiate between Direct and Indirect Material;
4. Explain the meaning, objectives essentials and steps of Material control;
5. Explain the process of material planning, Purchasing, Receiving and Inspection;
6. To know the specimens of various documents used in process of Material control;
7. Understand the need to value the incoming materials and not necessarily to be taken at a purchase price only;
8. Understand the problem of pricing of issues of materials and hence the various method of pricing the issues;
9. Explain the impact of various methods of pricing issues on the cost of production and valuation of stocks and
10. Explain the meaning of certain keywords.

### SESSION I: INTRODUCTION TO MATERIAL

#### MEANING OF MATERIAL:

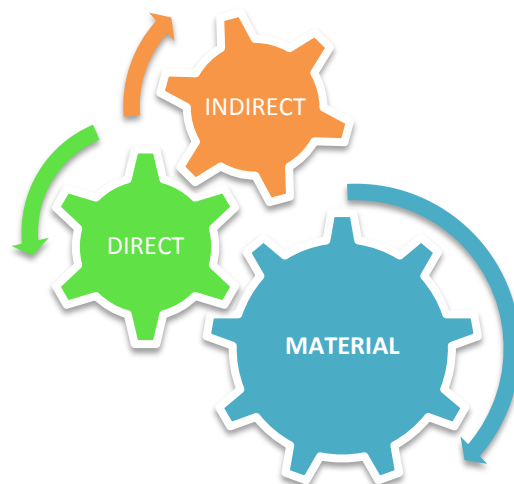
The first and the most important element of the product cost is material. Material is a substance, an integral part, from which the product is made. And constitutes a significant component of total cost. Depending upon the type of product manufactured, the material cost may go upto 70-80% of the total cost.

Material may be classified in three broadcategories:



1. **RAW MATERIAL:** Materials entering the production process at the very beginning in their natural or raw form. The materials might be appearing in the final product, for example raw cotton (KAPAS) in the Production of Cotton textile or disappearing in the production process without forming a tangible part of the output, for example, Coal.
2. **SEMI FINISHED MATERIAL:** Partly finished materials purchased from outside or produced within the organization for assembling into a final product, e.g., unpolished furniture purchased from outside and polished in-house before sale.
3. **FINISHED MATERIAL:** Finished Material are products that are used in the form they are manufactured without any further value addition, e.g., an automobile is a finished product used directly by the consumer. However, finished components can also be used as raw materials or semi-finished materials for manufacturing of the final product e.g. Tyres, batteries, engine, and other components are finished material used by automobile manufacturers.

Material Cost may be either direct or indirect:



### **DIRECT MATERIAL:**

Direct Materials are those that can be conveniently and wholly identified with specific units of output/ product/Job/ contract/ processor operations. These become the part of finished product itself. Example: Leather in leather products, Wood in Furniture production etc. At times, certain materials of small value though traceable to specific cost unit are treated as indirect material because the time, energy and cost involved in record keeping of such small value is not worth achieving a slightly higher accuracy in ascertaining the cost. e.g. Glue, nails, nut bolt etc. in furniture production. However, material, of whatever value, used in contracts performed as special sales outside the factory are ascertained as direct materials as they are for specific contract only.

## **INDIRECT MATERIAL:**

All those materials that cannot be classified as direct material are called indirect materials. Indirect materials, generally, do not physically constitute a part of the product as direct material do. Indirect materials include:

1. Materials, though used in production, which have so small or complex consumption that it is not feasible to try to trace them to specific products.
2. Production supplies & materials which cannot be identified with specific cost units e.g. Grease, Lubricating oil, scrap, small tools etc. used in a factory.

Material forms an important part of the cost of the product and, therefore, proper control over material is necessary from the time the order is placed with the supplier till they are consumed. The segregation of materials into direct and indirect categories facilitates control. The direct material having high value, require direct control while indirect materials having low value need not require excessive controls. An efficient material control system leads to significant reduction in production cost.

## **MEANING OF MATERIAL CONTROL:**

Material Control is a system which ensures the provision of the right quantity of material of the right quality, at the right time with a minimum amount of investment. It is a systematic control over the procurement, storage, and usage of materials so as to maintain an even flow of materials and at the same time avoiding excessive investment in inventories. The essentials of a good system of material control include scheduling the requirements of purchasing, receiving, inspecting, maintaining stock records and material accounting and recording. In fact, Material control is a matter of coordination among the purchase department, receiving and inspection department, store keeping department, product control department and stock Control department. The success of a business concern largely depends upon the efficiency of its Material Control System.

## **OBJECTIVES OF MATERIAL CONTROL:**

1. ***Continuous supply of materials for uninterrupted flow of production:*** Situation of production stoppage due to materials running out of stock should be avoided. Such production stoppage is very costly in terms of overheads, denial of sales or panic purchases.
2. ***Optimum investment in materials:*** Excessive investments due to over stocking of materials reduce profitability of the business as it locks large capital without any returns as well as increased storage cost.
3. ***Economy in purchasing:*** Material should be purchased at the lowest possible cost without sacrificing the quality, regularity, and dependability of supplies.
4. ***Strict quality control:*** There should be a strict system of quality control. The order of supplies of right quality of raw materials should be authorized. Material should be tested at the time of their receipt and a report should be generated initialed by the person who has tested them for fixing responsibility.
5. ***Minimum handling cost and time:*** Material should be stored at such a place and in such manner, that:

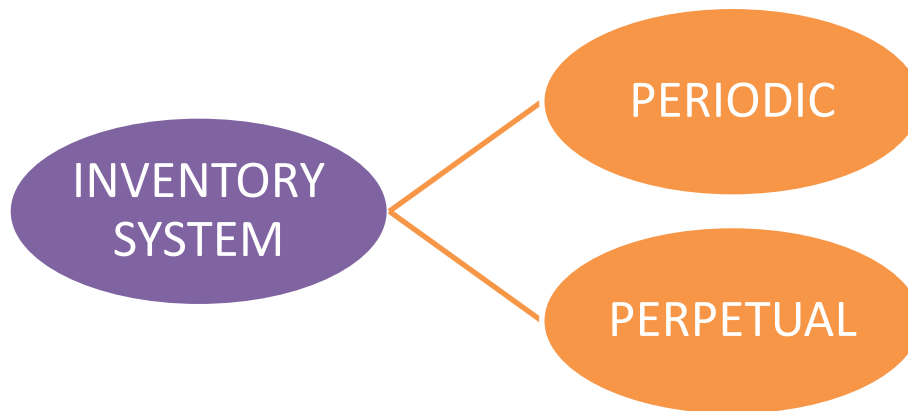
- Material can be located at ease
  - Made available to the user departments with least efforts
  - Time consumed in tracing material and making them reach the user department should be the least.
6. **Control on payment for materials:** Ensure that no payment is made for materials not ordered though received, or for material not received or for materials of defective quality.
  7. **Authorized issues:** Ensure that no issue from the store takes place without a proper authorization. The store keeper has to be made accountable for all issues.
  8. **Minimize wastages:** Minimizing wastages in handling at the time of receipt of materials in stores, during their issues and during use in the user department. Norms should be fixed for wastages at each stage and wastages above the norms should be investigated.
  9. **Control on the pilferages and leakages and other losses:** A system should be put in place to ensure that pilferages of material do not take place. Special control is required to be put in place for material prone to pilferage.
  10. **Detect the slow moving and fast moving materials:** The system should detect, on a regular basis, the items of material which are slow moving and items which are not moving at all. This will help in regulating further purchases of such materials and prevent losses. Many times, disposal of non-moving items is better than keeping them in stores and incurring storage cost.
  11. **Control on misappropriations:** Ensure that no misappropriation of materials take place as once leakages develop in the system, they tend to become recurring in nature.
  12. **Regular and dependable information about materials:** There should be regular and dependable record of information of each type of material- the stock position, minimum level, maximum level, special problems with respect of certain materials and the list of dependable suppliers. This will help in placing order of the right quantity at the right time and to the right supplier.

## INGREDIENTS/ ESSENTIALS OF SOUND MATERIAL CONTROL SYSTEM

1. **Organization for Material Control:** There should be a proper coordination and internal check between sales, production, purchases, receiving, testing, and storage and issue functions.
2. **Material Planning:** Material requirement should be determined in advance. Through the adoption of perpetual inventory system, the quantity of material in hand and its value is always available, which helps in avoiding the situation of over and under stocking.
3. **Material Purchasing and Receiving:** Exploration of different sources of materials and its reliable suppliers should be regularly reviewed and revised. A proper system should be laid down for comparing quotations, receiving and inspection of materials and testing the quality of materials received.
4. **Storage of Material:** Location and layout of the stores should be such that the time and transportation cost involved in receiving and issue of materials to the users is least. It should facilitate strict control on the stores by adopting perpetual inventory Bin card system.

5. **Issue of Material:** Materials should be issued only against a proper Material Requisition slip. Surplus material, if any, should only be returned to the Stores department and direct transfer of surplus material from one job to another should be discouraged.
6. **Material Accounting and Reporting:** A complete record of all purchases, issues, returns, transfers and losses of material should be prepared and an efficient system of internal audit should be established.

## INVENTORY SYSTEMS



Inventory records in quantity and value can be maintained as per any of the following system:

1. **Periodic inventory system:** In this case the value and amount of inventory is found out only at the end of accounting period after having physical verification of units in hand. This system does not continuously provide information regarding quantity and value of material in stock.
2. **Perpetual Inventory system:** In this system, the quantity of stock in hand and its value is available after each issue or receipt of material. The system thus provides a rigid control over the stock of materials as physical stock can be verified anytime with stock records.

### ADVANTAGES OF MATERIAL CONTROL:

1. Wastages in the use of material are reduced to minimum.
2. Risk of loss from fraud and theft is almost eliminated.
3. The records maintained under material control cycle facilitate the preparation of proper and accurate reports for the management.
4. Cost of storage is reduced.
5. Investment in inventories is reduced.

Thus, there is a need to make a perfect synchronization between the availability of Material and its utilization. The quantitative and financial aspects of Material Control are mutually complementary in nature as the control on physical units of Material at the time of purchasing, storage and use in production will also result in lower investment. Material Control helps in reconciling the conflict in the objectives of the Purchase department, Production department and the Finance department. The purchase department is interested in bulk purchase at the lowest price and overhead cost, though this may lead to large investment in materials.

The production manager is interested in having regular supplies so that production never stops or slows down due to inadequate supplies of materials, which also may lead to large investment in inventories. On the other hand, the finance Manager aims at cutting unnecessary investment in inventories. His objective is to facilitate smooth production with minimum necessary investment in inventories. Thus Material Control entails synergy through managing the conflicting interests of these departments and reaching an optimal solution.

### ***Knowledge Assessment - I***

**State whether each of the following statement is True or False:**

1. Material Control relates to Direct Material only and not to consumable stores.
2. Control on Materials has no effect on overhead cost.
3. Inefficiencies and frauds relating to Materials have an impact on organizational environment.
4. Material Control involves Control over entire material cycle.
5. Procedure, documentation and systems for Material Control may be different in different organization.
6. Direct Material cost can be identified with a cost center.
7. Cost of Indirect Material is to be treated as overheads.
8. Material Control helps in reconciling the conflicting objectives of purchase department and finance department.
9. Material control does not work on material handling cost but only on the material purchase cost.
10. Material control is a matter of coordination of purchase, receiving, inspection, store keeping, production control and stock control department.

***(Answers.(1) (False),(2) (False),(3) (True),(4) (True),(5) (True),(6) (True),(7) (True),(8) (True),(9) (False),(10)(True))***

## **SESSION 2: MATERIAL CONTROL -PLANNING, PURCHASE, RECEIPT, INSPECTION AND STORAGE**

Materials are the most basic and important substances from which a useable product is made. In order to have an uninterrupted flow of materials for production at least cost, an organization should have a proper material control system.

### **MATERIAL CONTROL:**

Material control, as already discussed in the previous chapter, is a system which ensures the provision of material in the right quantity, of the right quality at the right time with minimum investment. It is a systematic control over the procurement, storage and usage of material avoiding, at the same time, any excessive investment in inventories. Thus, there should be a perfect synchronization between the availability of material and their utilization. Material Control System (MCS) involves monitoring the entire cycle starting from the initiation of material requirement, passing through the placement of order, receiving, Inspection and storage of

material, Issue of material and ending at the replenishment of material consumed, which is also the beginning of the cycle as well. Responsibilities are assigned at all these places by observing appropriate procedures, documentation and accounting systems tailor made to suit the requirements of individual organization.

The steps involved in a sound MCS are:

1. Material Planning.
2. Material Purchasing.
3. Material Receiving.
4. Material Inspection.
5. Material storage.
6. Material Issue.

The 1<sup>st</sup> five steps will be discussed in this chapter while the 6th step will be taken care of in the next chapter.

### **MATERIAL PLANNING:**

It includes the following:

1. Suitable classification and Codification of all material items to facilitate the other functions of MCS
2. Ascertainment of the requirement of material in advance.
3. Adoption of perpetual inventory system (chronological recording of receipts and issue of materials) so that the quantity and value of material in stock is continuously available after every transaction.
4. Ascertainment of the quantity of material to be purchased through centralized or through decentralized purchasing.
5. Ascertainment of Economic order quantity, Maximum Level, Minimum Level and Re-order level for each material separately.
6. Adoption of ABC (Always Better control) analysis for selective and focused control on high value low volume items.
7. VED (Valuable, Essential, and Desirable) analysis can be used for controlling spare parts.

### ***Material Requirement Planning (MRP)***

Automated planning for materials that works on the requirement of materials by first ascertaining the amounts and timings of finished goods required and then working back to determine the demand for sub components, raw material etc. at various stages of productions.

### **MATERIAL PURCHASING:**

Efficiency in purchasing function is crucial to the success of an organization as it leads to timely availability of right type and quantity of material necessary for supply of right quality and quantity of products to its customers. A separate purchasing department ensures that the right

type of materials in the right quality and quantity is purchased from a right source at the right price and time.

Whether an organization opts for centralized purchasing or decentralized purchasing depends on a number of factors such as size of the organization, Percentage of materials in the total cost and nature of materials. In case of centralized purchasing there is one central purchase department which makes purchases of all types of materials for all departments in the organization. The central purchase department can be located at one place or it may have its sub units located at different places. All departments which require any type of material supplies, services, tools, components etc. send their requirements in the form of indents or purchase requisitions to the centralized purchasing department which makes the purchases as per specifications, specific procedures and norms.

In case of decentralized purchasing each branch or department does its own purchasing. In this case the advantages of centralized purchasing like bulk discounts, specialized knowledge, less purchasing overhead cost per unit, expert quality testing is not available. But on the other hand, when branches and departments are located far and wide, it may not be practical to do centralized purchasing and hence decentralized purchasing is done. More so in case of urgent needs, small purchases, highly technical material requiring testing by the user department, decentralized purchasing is suitable.

In most of the cases, a blend of centralized and decentralized purchasing is adopted. Material of standard specifications and required in bulk are reserved for centralized purchasing while highly technical materials, small value materials or materials available cheaper in local markets are allowed to be purchased by the user department.

### ***Just in Time Purchasing (JIT):***

This concept aims at eliminating avoidable investment in stocks of raw materials, work in progress and finished goods. Raw material is procured just when they are required for production and production is fully synchronized with sale. This leads to minimization of losses due to pilferage, spoilage and obsolescence. This needs a close relationship with suppliers and frequent deliveries of small quantities so that deliveries just precede their use. The guaranteed quality of materials is directly delivered to the shop floor just when needed.

### ***Purchase Procedure:***

The initiation of purchase begins with the receipt of purchase requirement/ requisition slip by the purchase department from either the stores department for regular stocks items or by the departmental head for specialized materials. The purchase requisition is the formal request made by the stores or the user department to the purchase department. This requisition contains complete details such as the date of making the request, the quantity, quality, any specific characteristic of material demanded, code number of material required, the latest date by which material should be available etc.



## SPECIMEN OF PURCHASE REQUISITION OR INDENT

XYZ Ltd. ABC Department Purchase Requisition (Regular/Special) Purchase Requisition No..... Date: _____ Date By Which Required.....					
Serial No.	Stores Code No.	Description of Material	Grade Or Quality	Quantity	Remarks
Requisitioned By.....Checked By..... Approved by..... For use in Purchase Department Quotation invited on and from: Date _____ Quotation by _____ 1. -----1. ----- 2. -----2. ----- Purchase order No----- Date----- Name of the supplier----- Promised /Expected Delivery Date----- Remarks----- Purchase Officer-----					

The purchase requisition has to be prepared in triplicate- one copy has to be sent to the purchase department for initiating the purchase procedure, second to the costing department and the third copy is retained by the department initiating the purchase requisition.

### ***Exploring the supply sources and selection of supplier:***

On the receipt of purchase requirement/requisition, the purchase department would invite tenders or quotations for the supply of goods. After the receipt of quotations, the purchase department will make the schedule of quotations for the selection of a supplier, keeping in mind all the required considerations such as price, quality, and terms of payment, reliability of supplier, mode and time of delivery. The schedule may be in the following format:

**SPECIMEN FORM OF TENDER/ INVITATION OF QUOTATION**

<b>ABC Ltd. Tender Form</b>						
Tender No.-----						
Date-----						
Dear Sir,						
Your best offer to supply the following items is solicited. The delivery should be F.O.R Delhi. The tender closed on September 30 <sup>th</sup> 2016 and will be opened next day at 10.00 AM.						
						Yours Sincerely For ABC Ltd. <b>Purchase Officer</b>
Serial No	Description of Materials	Quality/Grade	Quantity	Price	Terms of Delivery	Other Terms

**SPECIMEN FORM OF COMPARATIVE STATEMENT OF QUOTATION**

<b>SCHEDULE OF QUOTATION</b>				
Material name-----			Date -----	
Tender No-----				
Name of the supplier	Rate per Kg	Time of Delivery	Terms of Delivery	Remarks
A	1000/-	7 days	Free	Accepted
B	1030/-	6 days	Free	
C	1100/-	7days	Free	
D	1070/-	7days	Free	
Purchasing Clerk-----			Purchaser Manager-----	

***Purchase Order:***

Having selected the supplier, the next step is placing a formal purchase order i.e. The written authorization to the vendor to supply specific quantity and quality of materials at stipulated terms and at the time and place mentioned. It is to be signed by the purchase manager. The requisition format may be in the following format:

<b>ABC Co. Ltd.</b>				
<b>PURCHASE ORDER</b>				
To, XYZ & Co. Delhi		Purchase Order No. 441 RequisitionNo. 112		
Date: 22 <sup>nd</sup> September 2016			Date: by which materials are	
Required- 30 <sup>th</sup> Sep. 2016				
Please supply the following;				
Serial no	Description of Articles	Quantity	Rate	Amount
1.	6 ft log of woods	12 dozens	24,000/dozen	Rs 2,88,000/-
2.				
3.				
4.				
Please quote purchase order number on all the advice notes and invoices.				
Terms of Delivery-----				
Discount Allowed-----				
Terms of payment: 20 days' credit				
Packing and Dispatching Instructions- sealed cartons				
				R Venkateshwar Purchase Manager For ABC Ltd.

### RECEIVING OF MATERIALS:

The work of unpacking the goods and their verification is performed by the receiving department. The receiving clerks verify the contents of the packages with the consignment notes sent by the suppliers in triplicate along with the packages. He enters the date of receipts, quantity received by him and the condition of goods in the material received report. The original copy of consignment note along with material received report in duplicate is sent to the stores department. Five copies of Material received report are generally prepared. The original is sent to the purchasing department as a proof that the goods ordered have been received. Three copies are sent to the stores/ production department along with the materials. Stores /production department sends one copy each to the receiving department and to the accounts departments. One copy is retained for the future reference. The report may be in the following format:

### MATERIAL RECEIVED REPORT

Received at ----- Purchase Order No:----- G.R.N No.-----  
 Name of the Carrier ----- Delivery Note/ ChallanNo.----- Date:-----  
 Date of delivery:-----  
 From: XYZ Ltd, Mumbai.

Quantity Received	Description	Stock code No	Condition of Goods	Amount Rs
12 dozens	6 ft log of woods	RZ 20	Good	2,88,000

Received By:-----Inspected By-----  
 Counted By:----- Approved by:-----  
 (Receiving Officer)

### INSPECTION OF MATERIALS:

The inspection department will confirm that whether the goods have been received as per the specification mentioned in the purchase order or not. It may also send samples for laboratory test, if necessary. It submits its reports of Inspection and testing in triplicate. The original is sent to the purchasing department and second to the stores or production department and third is retained by the department for future reference. The inspection report can be in the following format:

### XYZ Ltd. Material Inspection Report

Date of Receipt----- Goods Received Note No.-----  
 Purchase Order No.----- Date:-----  
 Challan No-----  
 Suppliers Name and Address-----

Serial No.	Description	Code No	Quantity			Remarks for Rejection	Initials of Person Inspecting
			Received	Rejected	Accepted		

Special Remarks----- Chief Inspector-----

## **STORAGE OF MATERIALS:**

After the purchase process has been completed and materials have reached the stores it is necessary to ensure that these are efficiently stored. The store keeper should accept the materials only after verifying the material received with consignment note, material received report and inspection report.

### ***Classification and Codification:***

Classification is the process of arranging items in groups and sub groups according to common characteristics. Materials should be classified according to the nature (subjective Classification) or the purpose to be fulfilled (objective classification). The subjective classification is useful for identification, storage, ordering and accounting of materials. The objective classification is useful for costing purposes.

Classification and codification go together. Classification is the first step and Codification is the next step. Codification is the process of assigning a symbol or number to different items of material falling in different groups and subgroups. According to ICMA terminology “a code has been defined as a system of symbols designed to be applied to a classified set of items”. Classification facilitates identification of items on the basis of description while coding is the process of assigning symbol or code number on the basis of classification. Code is shorter, precise and substitute for long and imprecise description.

The codification can be as per any of the three methods.

- a) Alphabetical
- b) Numerical
- c) Alphabetical cum Numerical

### ***Bins and Racks:***

The store should be divided into several sections for particular types of material. Each section should have various suitable containers for keeping different variety of that material. Such containers or place are called as bins or racks. Each bin or rack is properly numbered and indexed for easy identification. The floor plan also exhibit at the entrance of store room for ready location of various sections and corresponding bins. The card is hung outside each bin and whenever the material is received or issued, entry is made in the card by the store keeper and correspondingly the balance is shown after every transaction. Thus, bin card consist of three columns only and gives the ready reference for finding the balance of material available at any point of time.

### **Stores Ledger:**

The cost office maintains a store ledger in which separate card is maintained for each type of raw material and spare parts in the store. Stores ledger gives the same information as is available in

the bin cards except that it gives the monetary information also, such as the rate, amount of receipts, issues and the balance of materials. So the stores ledger account has three broad sections – receipts with quantity, rate and amount, issues with quantity, rate and amount and balance with quantity, rate and amount. Sometimes it also consists of a fourth section-for material ordered. This column enables the planning of production without unnecessary reference to other books and accounts.

**Distinction between Bin card and stores ledger:**

1. Bin Card contains only quantitative record of receipt, issue and balance of different materials while stores ledger records both quantities and value of materials.
2. Bin card is maintained by the store keeper in the stores department while the stores ledger is maintained by the cost clerk in the costing department.
3. Posting in the bin card is made simultaneously with the receipt and issue of materials while the in the stores ledger, it is made after the transaction.
4. Bin card is not a basic accounting record while stores ledger is a basic accounting record.
5. Inter department transfer or inter job transfer are only recorded in the stores ledger and not in the bin card.

**BIN CARD**

Bin No----			Description-----				
Department----			Maximum Quantity-----				
Stores Ledger Folio-----			Minimum Quantity-----				
Code No-----			Reorder level-----				
Receipts			Issues			Balance	Remarks
Date	Challan or Credit Slip number	Quantity in tonnes or Kgs.	Date	Requisition Number	Quantity in tonnes	Quantity in tonnes	Goods on order or audit notes

## Stores Ledger

Name of the article:----Folio-----      Maximum Quantity-----																						
Symbol/Code Number---							Unit-----							Minimum Quantity-----								
Bin Number -----							Source of Supply-----							Ordering Level-----								
Ordered			Reserved			Received					Issued					Balance			Stock checked			
D	P	Q	D	J	Q	D	G	Q	R	A	D	M.	Q	R	A	Q	R	A	D	Ini	Re	
/	O	t	/	o	t	/	R	t	a	t	/	R.	t	a	t	y	a	t	/	t	ia	ma
T	N	y	T	b	y	T	R	y	e	t	T	No.	y	e	t	y	e	t	T	ls	rks	

PON – Purchase Order Number

GRRNo --- Goods Requisition Receipt Note Number

M.R. No. – Material Requisition No.

D/T – Date

Amt. - Amount

Qty. - Quantity

### ***Investment in Materials:***

One of the basic objectives of Material Control is to make the best use of every Rupee invested in inventories. This requires that the right quantity of material should be ordered at the right level of stock so that the production and sales process goes on smoothly. This avoids excess investment in materials, maintain necessary cushions in the forms of safety stocks which act as a buffer against contingencies, ensure availability of all material items just in time and control scraps, wastages, spoilage and defectives. There should be neither overstocking nor under stocking. This leads to minimization of material holding related cost.

### ***Safety Stock:***

Safety stock serves the same purpose in a business unit as a shock absorber in a vehicle. It maintains a cushion for contingencies arising out of uncertainties on either demand/supply side. Higher the degree of uncertainties, greater is the need for safety stock. Each producer has to exercise the balance between the cost of having plenty of safety stocks and the risk of lack of safety stocks. The objective should be to optimize the total cost/risk entailed in fixing the level of safety stock.

### ***Economic Order Quantity (EOQ):***

It refers to the size of the purchase order for a material which results in making material available in a year at minimum total material related costs. Cost relating to materials is:-

- 1) Purchase Cost
- 2) Ordering Cost
- 3) Storage Cost
- 4) Stock Out Cost

The order size which results in lowest material related costs for meeting a given material requirement in a period is EOQ. Thus, if EOQ is adopted as ordering quantity or the re-order quantity than the sum total of prices paid for materials, ordering cost and storage costs will be least. In case the prices of the materials do not change with change in order size than EOQ is determined by only ordering cost and storage costs.

#### **Purchase cost:**

The cost of acquiring the raw material from the supplier is called as Purchase Cost.

#### **Ordering Cost:**

All costs involved in placing the order is considered as Ordering Cost. Example: transportation cost, travelling allowances of purchases officers, telephone bills, printing and stationery bills etc. are the few examples of ordering costs. It is assumed that ordering cost per order remain constant. Larger the order size, less is the number of orders and therefore smaller is the total ordering cost in a given period and vice versa.

#### **Storage Cost:**

It includes all costs involved in holding costs example: interest on investment in stocks, insurance, godown rent, cost of bins, pilferage, spoilage, obsolescence etc. All these costs are closely related to the number of units held in stores and therefore larger the order size larger is both the average investing and total storage cost and vice versa.

#### **Stock Out Cost:**

The cost arising from non-fulfillment of delivery promises is called the Stock Out cost- like, loss of sales, loss of goodwill, loss of customers, etc. It is associated with carrying too little inventory.

**Graphic Determination of EOQ:** Ordering cost exercises pull in favour of larger order size because that will result in smaller no. of orders and smaller total ordering cost. Storage cost exercise pull in favour of smaller order size because smaller order size will result in smaller average inventory and hence smaller storage cost.

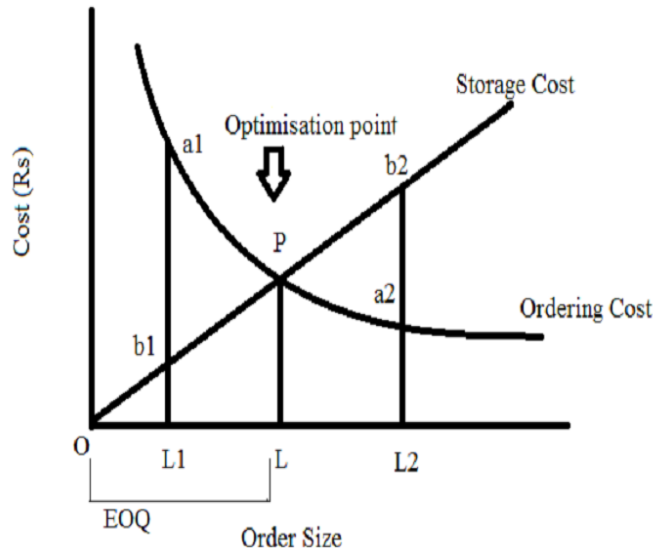
EOQ or least cost order size is determined at a point where both these pulls exactly meet each other. Thus, EOQ is determined by the intersection of ordering cost curve and storage cost line.



At EOQ,

1. **Total Ordering Cost = Total Storage Cost; and**
2. **The total of the two costs is the least.**

So EOQ refers to that size of purchase order for a material which results in making material available in a given year at a minimum total material related cost (i.e. Ordering Cost + Storage Cost). At any other quantity of material ordered the total cost of ordering and storage will be more.



P is the point of intersection of cost line and ordering cost curve. It determines EOQ which is OL. At OL Order size, total storage cost is PL and total ordering cost is also PL.

$$\text{Total Cost} = \text{Total Storage Cost} + \text{Total Ordering Cost} = PL + PL = 2PL$$

At EOQ Total Storage Cost = Total Ordering Cost with the total of the two being the least.

Suppose a smaller order size OL1 is adopted. Then total ordering cost is a1L1 and the total storage cost is b1L1. Total cost is a1L1 + b1L1 which is more than 2PL. thus OL is the best order size where the total storage cost is equal to the total ordering cost.

**Impact of changes in ordering and storage cost:**

In case the ordering cost per order increases, it will be advisable to reduce the total number of orders in the period. As a result, the size of EOQ will increase. With decrease in ordering cost, the pull of these costs will get weakened and the size of EOQ will decrease.

With increase in per unit storage costs it will be profitable to maintain thinner inventories. Thus, the size of EOQ will come down. With decrease in storage cost, the pull of these costs will have weakened and carrying inventories will become less costly. As a result the size of EOQ will go up.

## MATHEMATICAL FORMULATION OF EOQ

Determination of EOQ has been explained graphically above. The same can be calculated mathematically with a greater degree of accuracy as explained below:

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

Where EOQ = Economic Order Quantity  
A = Annual demand or requirement of the material in units  
O = Ordering cost per order  
C = Storage cost per unit of material for a period, say, per annum

## ASSUMPTIONS IN EOQ MODEL

EOQ Model explained above is based on the following assumptions relating to the degree of certainty and linearity:

- Annual requirement of material can be estimated with reasonable accuracy.
- Storage cost per unit of material is constant.
- Ordering cost per order is constant.
- Daily consumption of materials is more or less constant.
- Determination of EOQ is with reference to circumstances prevailing at a point of time or projected for a given period. In case parameters involved with EOQ calculations change, then EOQ will also change.

**Illustration 1:** Purchase Manager has been given an estimated annual purchase requirement of 2000 units of material. Unit price of material is Rs20. Annual cost of carrying inventory is 25% of cost of material. Ordering cost for an order is Rs50. What order size would you recommend to the Purchase Manager?

**Solution:**  $EOQ = \sqrt{\frac{2 \times A \times O}{C}}$

$$= \sqrt{\frac{2 \times 2000 \times 50}{20 \times 0.25}}$$
$$= \sqrt{\frac{2,00,000}{5}}$$
$$= \sqrt{40,000}$$
$$= 200 \text{ units}$$

## Maximum Level, Minimum Level and Reorder Level:

In order to avoid over and under investment in materials the management should decide the maximum and minimum quantity of materials to be stored at any point of time. The fixation of

maximum level is necessary in order to avoid unnecessary blocking of capital, losses on account of obsolescence, deterioration of materials, thefts, storage cost etc.

**Maximum Level** = Re-Order Level + Re- Order Quantity-(Minimum Consumption × Minimum reorder period)

The fixation of Minimum Level of materials is again a necessary requirement in order to have un-interrupted production cycle.

**Minimum Level** = Reorder Level – (average rate of consumption × average delivery period)

In order to maintain these levels, it is very necessary to determine the re-order level i.e. at what level of stock the fresh order should be placed for Economic order quantity so that at the time of the receipt of ordered quantity, the material level should reach at the maximum level.

**Re-order Level** = Maximum daily consumption × Maximum delivery period.

Average level indicates the average stock held by the concern. It can be calculated with the help of following formula.

**Average Level**= (Minimum Level + maximum Level)/2

Or

**Average Level**= Minimum stock Level+1/2(Reordering Quantity)

**Illustration 2:** Find the Re-order quantity if consumption is 80-100 units per day, delivery period is 3-5 days and maximum level is 660 units.

**Solution:**

Re-order Level = Maximum Consumption × Max Re-Order period.  
= 100×5 = 500.

Maximum Level = Re-Order Level + Re-Order Quantity- (Minimum Consumption × Minimum Re-Order period)

Hence,

Re-Order Quantity = Maximum Level – Re-Order Level + (Minimum Consumption × Minimum Re-Order period).  
= 660-500+ (80×3) = 400 units.

**Illustration 3:** A producer has estimated annual requirements of a material as 7200 units. Cost of placing an order is estimated as Rs 50/order and annual storage cost/unit of material is Rs. 5. Calculate the optimum order quantity or EOQ. Also show that at EOQ level, total ordering cost is equal to total storage cost.

**Solution:**

$$= \sqrt{\frac{2AO}{c}}$$
$$= \sqrt{\frac{2 \times 72,000 \times 50}{5}}$$

= 1200 units

Total ordering Cost = No. of orders  $\times$  ordering cost per order.

$$= \frac{\text{Total annual requirements}}{\text{Order size}} \times \text{Ordering cost per order}$$

= Number of orders  $\times$  Ordering cost per order

$$= \frac{72000}{1200} \times 50$$
$$= 6 \times 50 = 3000$$

Total Storage Cost = Average Stock  $\times$  Annual Storage Cost per unit.

$$= \frac{\text{Ordering Size}}{2} \times S.$$
$$= \frac{1200}{2} \times 5 = 3000$$

Therefore, at EOQ = Total Storage Cost = Total Ordering Cost  
3000 = 3000

**Illustration 4:** Find the Maximum Stock level from the following:

Consumption rate is 80-100 units per week

Delivery period is 5-7 weeks

EOQ is 660 units.

**Solution:**

Maximum Level = Re-order Level + Re-order quantity - (Minimum weekly Consumption  $\times$  Minimum Delivery period)

Re-order Level = Maximum weekly Consumption  $\times$  Maximum Delivery Period.

$$= 100 \times 7 = 700 \text{ units}$$

Hence: Maximum Stock Level =  $700 + 660 - (80 \times 5) = 960 \text{ units}$

**Illustration 5:** A company uses 3000 units of material per month. Cost of placing an order is Rs. 200. The Cost per unit is Rs. 20. The reorder period is 4-8 weeks. The minimum consumption of raw material is 100 units to 350 units whereas the average consumption is 275 units. The Carrying cost of inventory is 20% per annum. Calculate:

1. EOQ/ Re-order quantity
2. Re-order level.

**Solution:**

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

Or reorder quantity

Where: A = Annual Usage of Inputs in units

O = Ordering Cost / Order

C = Carry Cost / Unit / annum

EOQ= Economic Order Qty.

$$= \sqrt{\frac{2 \times 36,000 \times 200}{20 \times 20\%}}$$

$$= \sqrt{36,00,000} = 1897.33$$

- b. Re order Level=Maximum consumption x Maximum Delivery period  
= 350 x 8 =2800 units

**Illustration 6:**A company buys its annual requirement of 36,000 units in six instalments. Each unit costs Rs.10 and the ordering cost is Rs.250. The inventory carrying cost is estimated at 20% of the unit value per annum. Find the total annual cost of the existing inventory policy. How much money can be saved by economicorderquantity?

**Solution:**Calculation of the Annual cost of Existing Inventory Policy

Details	Amount (Rs)
Ordering cost for six orders @ Rs.250 per order	1,500
Carrying cost @ 20% [i.e. (36,000/6) X 10 X (1/2) X.02]	6,000
Annual cost (Excluding purchase price of material)	7,500

Calculation of Economic Order Quantity

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

$$= \sqrt{\frac{2 \times 36,000 \times 250}{10 \times 20\%}} = \sqrt{\frac{1800000}{2}}$$

$$= 3,000 \text{ units}$$

Calculation of the Annual cost if ordering as per EOQ

Details	Amount (Rs)
Ordering cost for 12 orders @ Rs.250 per order	3,000
Carrying cost @ 20% [i.e. (36,000/12) X 10 X (1/2)]	3,000
Annual cost (Excluding purchase price of material)	6,000

Calculation of saving in cost if ordered as per EOQ

Details	Amount (Rs)
Annual cost of existing inventory policy Less: Annual	7,500
Cost by EOQ	6,000
Saving in cost by EOQ	1,500

(Note: Carrying cost will always be calculated on the average no of units carried)

**Illustration 7:** ABC Company buys in lots of 125 boxes which is a three-month's supply. The cost per box is Rs.125 and the ordering cost is Rs. 250 per order. The inventory carrying cost is estimated at 20% of unit value per annum. You are required to ascertain:

1. The total annual cost of existing inventory policy.
2. How much money would be saved by employing the economic order quantity?

**Solution:**

Calculation of the Annual cost of existing inventory policy

Details	Amount (Rs)
Ordering cost of Four orders @ Rs.250 per order	1,000.00
Carrying cost @ 20% [i.e. (500/4) X 125 X (1/2) X .20]	1,562.50
Annual cost (Excluding purchase price of material)	2,562.50

Calculation of Economic Order Quantity

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

$$= \sqrt{\frac{2 \times 500 \times 250}{25}}$$

$$= 100 \text{ units}$$

Calculation of the Annual cost if ordering as per EOQ

Details	Amount (Rs)
Ordering cost of 5 orders @ Rs.250 per order	1,250.00
Carrying cost @ 20% [i.e. (500/5) X 125 X (1/2) X .02]	1,250.00
Annual cost (Excluding purchase price of material)	2,500.00

Calculation of saving in cost if ordered as per EOQ

Details	Amount (Rs)
Annual cost of existing inventory policy	2,562.50
Less: Annual cost by EOQ	2,500.00
Saving in cost by EOQ	62.50

**Illustration 8:** A company manufactures 5000 units of a product per month. The cost of placing an order is Rs. 100. The purchase price of a raw material is Rs. 10/kg. The re-order period is 4 to 8 weeks. The consumption of raw material units is 100kg to 450 kg / week. The average Consumption is 275 kg. The carrying cost inventory is 20% / annum. You are required to calculate:

1. Re-order quantity
2. Re-order Level
3. Maximum Level
4. Minimum Level
5. Average Stock Level

**Solution:**

Annual Requirement of Material = 275 × 52 = 14300

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

$$= \sqrt{\frac{2 \times 14,300 \times 100}{10 \times 20\%}}$$

= 1196 units

Re-order Level = Maximum weekly Consumption × Maximum Delivery Period.

$$= 450 \times 8$$

= 3600 Kg.

$$\begin{aligned} \text{Maximum Level} &= \text{Re-order Level} + \text{Re-order quantity} - (\text{Minimum weekly Consumption} \times \\ &\text{Minimum Delivery period}) \\ &= 3600 + 1196 - (100 \times 4) \\ &= 4396 \text{kg} \end{aligned}$$

$$\begin{aligned} \text{Average Delivery Period} &= \frac{(4+8)}{2} \\ &= 6 \text{ weeks.} \end{aligned}$$

$$\begin{aligned} \text{Minimum Level} &= \text{Re-order Level} - (\text{Average Weekly consumption} \times \text{Average Delivery} \\ &\text{period}) \\ &= 3600 - (275 \times 4) \\ &= 2500 \text{kg.} \end{aligned}$$

$$\begin{aligned} \text{Average Stock Level} &= (\text{Minimum Level} + \text{Maximum Level})/2 \\ &= (439 + 2500)/2 \\ &= 3448 \text{kg} \end{aligned}$$

**Illustration 9:** Long life pharmacy produces Sanjivini tonic using two herbs H-1 and H-2. Each liter of tonic requires 35 centiliters of H-1 and 65 centiliters of H2. Weekly production varies from 500 liters to 600 liters averaging 550 liters. Delivery period for both the herbs is 2 to 6 weeks. The economic order quantity for H-1 is 800 liters and for H-2 is 1,500 liters

Compute:

1. Re-order level of H-1;
2. Maximum level of H-1;
3. Minimum Level of H-1.
4. Re-order level of H-2;
5. Maximum level of H-2;
6. Minimum level of H-2.

**Solution:**

$$\begin{aligned} &\text{Re- order level of H-1} \\ &= (\text{Maximum consumption} \times \text{Maximum re-order Period}) \\ &= (600 \times 0.35) \times 6 = 1,260 \text{ Litres} \end{aligned}$$

$$\begin{aligned} &\text{Maximum level of H-1:} \\ &= \text{Re- order level} + \text{Re- order Quantity} - \\ &(\text{Minimum consumption} \times \text{Minimum Re-order Period}) \\ &= 1,260 + 800 - (500 \times 0.35 \times 2) \\ &= 1,260 + 800 - 350 = 1,710 \text{ Litres} \end{aligned}$$

$$\begin{aligned} &\text{Minimum Level of H-1:} \\ &= \text{Re-order level} - (\text{Average consumption} \times \text{Average Re-order Period}) \\ &= 1,260 - (550 \times 0.35 \times 4) \\ &= 1,260 - 770 = 590 \text{ Litres} \end{aligned}$$



$$\begin{aligned} &\text{Re- order level of H-2} \\ &= (\text{Maximum consumption} \times \text{Maximum Re-order Period}) \\ &= (600 \times 0.65) \times 6 = 2,340 \text{ Litres} \end{aligned}$$

$$\begin{aligned} &\text{Maximum of Level of H-2:} \\ &= \text{Re- order level} + \text{Re- order Quantity} - (\text{Minimum consumption} \times \text{Minimum Re- order period}) \\ &= 2,340 + 1500 - (500 \times 0.65 \times 2) \\ &= 2,340 + 1500 - 650 = 3190 \text{ Litres} \end{aligned}$$

$$\begin{aligned} &\text{Minimum Level of H-2:} \\ &= \text{Re-order level} - (\text{Average consumption} \times \text{Average Re-order Period}) \\ &= 2,340 - (550 \times 0.35 \times 4) \\ &= 2,340 - 770 = 1570 \text{ Litres} \end{aligned}$$

**Illustration 10:** In manufacturing its product P, a company uses two types of raw materials, M-1 and M-2 in respect of which the following information is supplied:

One unit of P requires 16 Kg of M-1 and 6 Kg of M-2 materials. Price per Kg of M-1 is Rs.25 and that of M-2 is Rs.50. Re-order quantities of M-1 and M-2 are 16,000 kg and 7,600 kg. Re-order levels of M-1 and M-2 12,000 kg and 7,000 kg respectively. Weekly production varies from 200 units to 300 units averaging 250 units. Delivery period of M-1 is 1 to 3 weeks and that of M-2 is 3-5 weeks.

Compute:

1. Minimum Stock level of M-1.
2. Maximum Stock level of M-2.

**Solution:**

$$\begin{aligned} &\text{Minimum Stock level of M-1} = \text{Re-order level} - (\text{Normal Consumption} \times \text{Normal Re-order Period}) \\ &= 16,000 - [(250 \times 16) \times 2] \\ &= 16,000 - 8,000 = 8,000 \text{ Kg.} \end{aligned}$$

$$\begin{aligned} &\text{Maximum Stock level of M-2:} = \text{Re- order Level} + \text{Re- order Quantity} - (\text{Minimum consumption} \times \text{Minimum Re- order Period}) \\ &= 7,000 + 7,600 - [(200 \times 6) \times 3] \\ &= 7,000 + 7,600 - 3,600 = 11,000 \text{ Kg} \end{aligned}$$

**Illustration 11:** Find out re-order quantity if consumption is 80-100 units per day, delivery period is 3- 5 days and maximum level is 660 units.

**Solution:**

$$\begin{aligned} &\text{Re-order level} = (\text{Maximum Consumption} \times \text{Maximum Re- order Period}) \\ &= (100 \times 5) = 500 \text{ units} \end{aligned}$$

Maximum Level:

$$= \text{Re-order level} + \text{Re-order Quantity} - (\text{Minimum consumption} \times \text{Minimum re-order Period})$$

Therefore, Re-order Quantity

$$\begin{aligned} &= \text{Maximum level} - \text{Re-order level} + (\text{Minimum consumption} \times \text{minimum re-order Period}) \\ &= 660 - 500 + (80 \times 3) \\ &= 660 - 500 + 240 = 400 \text{ units} \end{aligned}$$

**Illustration 12:** The following data pertain to Material M-1: Supply Period 4 to 8 months  
Consumption Rate:

Maximum	600 units' per month
Minimum	200 units' per month
Average	400 units' per month
Monthly	625 units'

Storage cost is 40% of stock value, ordering costs are Rs.600 per order. Price per unit is Rs.250.

Compute:

Re-order level; Maximum Stock Level; Minimum Stock Level; Average Stock Level.

**Solution:**

Re-order Quantity or Economic Order Quantity (EOQ):

$$\begin{aligned} &= \sqrt{[(2AB)/C]} \\ A &= 625 \times 12 = 7,500 \text{ units} \\ B &= \text{Rs.} 600 \\ C &= \text{Rs.} 100 \text{ i.e. } (250 \times 0.4) \\ &= \sqrt{[(2 \times 7,500 \times 600)/100]} \\ &= 300 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Re-order level} &= (\text{Maximum consumption} \times \text{Maximum Re-order Period}) \\ &= (600 \times 8) = 4,800 \text{ units} \end{aligned}$$

Minimum Stock level:

$$\begin{aligned} &= \text{Re-order level} - (\text{Normal Consumption} \times \text{Normal Re-order Period}) \\ &= 4,800 - (400 \times 6) \\ &= 4,800 - 2,400 = 2,400 \text{ units} \end{aligned}$$

Maximum Stock Level:

$$\begin{aligned} &= \text{Re-order level} + \text{Re-order quantity} - (\text{Minimum consumption} \times \text{Minimum Re-order Period}) \\ &= 4,800 + 300 - (200 \times 4) = 4,300 \text{ units} \end{aligned}$$

Average Stock Level

$$\begin{aligned} &= \text{Minimum Level} + 0.5 \text{ Re-order Quantity} \\ &= 2,400 + 0.5 \times 300 \\ &= 2,400 + 150 = 2,550 \text{ units} \end{aligned}$$

OR

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

$$\begin{aligned} &= (2,400 + 4,300) / 2 \\ &= 6,700 / 2 = 3,350 \text{ units} \end{aligned}$$

***Knowledge Assessment - II***

**State whether each of the following statement is True and False:**

1. At EOQ total storage cost is equal to the total ordering cost
2. With increase in ordering cost, EOQ will go up.
3. With decrease in storage cost, EOQ will come down.
4. Reorder will lie between minimum and Maximum level.
5. Larger the no. of orders, lower will be the storage cost.
6. Re-order level means the quantity to be ordered.
7. The Economic order quantity means the re order quantity.
8. Ordering Cost includes the cost of goods also.
9. Bill of Material and Material requisition are same.
10. Either of Material Received note or Material Inspection note is to be prepared.

***Ans. (1)( True),(2)(True),(3)(False),(4)(True),  
(5)(True),(6)(False),(7)(True),(8)(False),(9)(False), (10)(False)***

## SESSION –III: VALUATION OF MATERIALS

### ISSUING OF MATERIALS

Various products, jobs, processes, contracts, etc. are charged with the cost of materials used by them. In case, the materials have been exclusively purchased for a job or a contract, these can be charged at the same rate at which these materials were purchased. But if, the raw materials have been issued from the stores it becomes necessary to decide about the price which is to be charged for a material requisition to be used for a particular job or a contract.

### MATERIAL REQUISITION:

It is a formal request by the user department to the store keeper for the issue of material. This request should be duly signed by an officer authorized to make such request. It serves as an authority to the store keeper to issue materials. It is prepared in triplicate. All the three copies are signed by the store keeper. One copy is returned to the requisitioning department along with the materials. Second copy is retained by the store keeper which helps him completing its own record of issue in Bin Cards/ Store Ledger. The third copy is send to the costing department as a basis of debiting the requisitioning department. This copy facilitates the ascertainment of the cost of the job, products and processes for which these materials have been used.

<b>XYZ Ltd.</b>								
<b>Material Requisition</b>								
Department-----		Requisition Number-----						
Job Number-----		Date-----						
To,								
The Store Keeper								
Please issue the material stated below:								
S. No.	Description	Code No.	Quantity	For Cost Office		Bin Card No.	Store Ledger folio	Remarks
				Rate	Amount			
Authorized by-----				Storekeeper-----				
Issued By-----				Received By-----				
Bin Card Entered By-----				Rate Entered By-----				
Checked By-----								

**BILL OF MATERIAL:**

A bill of material is a schedule of materials needed for job or unit of production. It is prepared generally by the production department or an engineering department as soon as the order is received. It is prepared for non-standardized jobs where exact material requirement differs from job to job and there is a need to prepare an advance estimate of cost expected to be incurred on the job. Commonly followed format is as follows:

<b>XYZ Ltd.</b>								
<b>Bill of Materials</b>								
Department-----			Number-----					
Job Number-----				Date-----				
S. No.	Description	Code No.	Quantity	For Cost Office		Bin Card No.	Store Ledger folio	Remarks
				Rate	Amount			
Authorized by----- Storekeeper-----								
Issued By-----				Received By-----				
Bin Card Entered By-----						Rate Entered By-----		
Checked By-----								

A bill of material serves the purpose of material requisition also and therefore must be duly authorized. It is also prepared in triplicate. One copy is returned to the requisitioning department, one copy to the costing department and one copy is retained by the storekeeper for completing his records.

**COMPARISON BETWEEN BILL OF MATERIAL AND MATERIAL REQUISITION:**

1. Material requisition is an authorization for the store keeper to issue materials. Bill of materials is a list of materials with complete specification required for a job, contract or order.
2. Bill of material can serve as a material requisition but material requisition cannot serve as bill of material.
3. Bill of material helps in exercising quantitative control over issues through material requisition. Withdrawal of material for a job in excess of bill of material may be indicative of wastage requiring investigations.
4. Bill of material facilitates preparation of quotation for a job. Material requisition cannot be used for this purpose.
5. Both can be used as material requisition.
6. Both contain description of materials required by the production department.

*Under the following situation both material requisition and bill of material should be prepared:*

1. In case if the job or process requires longer time for completion, bill of material is prepared in advance while material requisition is prepared as and when certain materials are required.
2. In case system of standard costing is adopted, bill of material can be prepared based on standard cost and material requisition can be prepared on actual use of material.
3. Material requisition can be made for issues of material over and above that stated in Bill of material.

### MATERIAL RETURN NOTE:

Sometimes a production department may have materials left over either due to wrong estimation of requirement for a job or material defect. This excess material should be returned to stores without delay. Department returning the materials prepares a material return note in triplicate. One copy, duly signed, is returned by the store keeper to the returning department, one copy is sent to the costing department as a basis for giving credit to the returning department and the third copy is retained by the store keeper for completing his own records. Material returned note contains particulars similar to a material requisition note.

<b>XYZ Ltd.</b>								
<b>Materials Return Note</b>								
Department-----				Number-----				
Job Number-----				Date-----				
S. No.	Description	Code No.	Quantity	For Cost Office		Bin Card No.	Store Ledger folio	Remarks
				Rate	Amount			
Authorized by-----				Storekeeper-----				
Issued By-----				Received By-----				
Bin Card Entered By-----				Rate Entered By-----				
				Checked By-----				

### MATERIAL TRANSFER NOTE:

Direct transfer of material from one department to another is generally discouraged due to control considerations. However, in cases where the transfer of material from one job to stores and from there to another job is costly and inconvenient on account of heavy transport and handling charges, material may be directly transferred from one job to another provided they are accompanied with the “material transfer note.” The note will contain the details regarding materials and the job involved. It will be signed by the foreman of the receiving job and then sent to the cost office for making appropriate entries. A specimen of material transfer note is given below:

<b>XYZ Ltd.</b>						
<b>Materials Transfer Note</b>						
From:						
Department-----			Number-----			
To:						
Department-----			Date-----			
S. No.	Description	Code No.	Quantity	For Cost Office		Remarks
				Rate	Amount	
Authorized by-----		Received By-----		Returned By-----		
Rate Entered By-----		Debit Job No.-----		Credit Job No.-----		
Checked By-----						

### VALUATION OF INCOMING MATERIALS

The receipt of materials means incoming materials meant for conversation into final product. The incoming materials are to be valued at invoice price subject to trade or quantity discount plus all expenses incurred up to the point of placing materials in a condition suitable for issuance from the stores. These Expenses includes:

- Transportation including cartage expenses.
- Receiving unpacking and inspecting costs.
- Insurance and storage costs.
- Accounting and purchasing costs.

The basic price of Materials is to be adjusted upwards considering the cost of containers and the discount availed. The supplier of materials may charge separately for the containers that he has used for supplying materials. In case these containers are not returnable, their cost must be added to the cost of materials received. If the containers are returnable at a price less than the cost charged the difference must be charged to the cost of material received. In case they are to be returned at full cost charged their cost should not be added to the cost of incoming materials. Sales Tax, excise duty, custom duty, Insurance etc. are to be added to the purchase price. The price of material is to be adjusted with respect to discount too. Discount is of three types:

**Trade Discount:**It refers to allowance which is permitted by the vendor to a purchaser who must resell the articles. The allowance is permitted to compensate the purchaser for storage, bulk breaking and delivering small quantities.

**Quantity Discount:** Such discount is allowed by the supplier to the buyer to encourage him to place large orders. Both trade and quantity discounts should be taken into account while valuing the incoming materials.

**Cash Discount:**Such discount is allowed by the vendor to the buyer to encourage him to make prompt payment of invoice. It is given only when the debtor gives the payment within the





5. Total freight paid by Quality Ltd. Rs. 1000.
6. Insurance @ 4 % (on net invoice value) paid by the purchasing company.
7. Stores overhead absorbed @ 6% on total purchase cost of raw material.

The entire quantity was received and issued to production. The containers are returned in the due course. Draw up a suitable statement to show:

- Total cost of material purchased.
- Unit cost of material issued to production.

**Solution:**

Details	Cost per liter(Rs)	Total cost (Rs)
10,000 liters of material @ Rs. 25.00	25.00	2,50,000
Less Trade Discount @ 20%	5.00	50,000
	20.00	2,00,000
Add: charge for containers: 200 containers charged @Rs. 10 each(10,000 liters/50 liters per container)	0.20	2,000
Add Vat:12.5% on 2,00,000(raw material)	2.50	25,000
5% on Rs. 2000( Containers)	0.01	100
Net invoice value	22.71	2,27,100
Add: Freight Paid	0.10	1,000
Add: Insurance @4% onRs 2,27,100	0.9084	9,084
Total	23.7184	2,37,184
Less credit @Rs. 6 per container	0.12	1,200
Purchase cost	23.5984	2,35,984
Add stores overhead@6%	1.4159	1,41,591
Total value for costing purposes	25.0133	2,50,133

**METHODS OF PRICING ISSUES:**

The problem of pricing the issues arises only when large quantities of materials purchased at different prices remain in the stock for a period of time making it difficult to identify which unit of material was purchased at what price and hence which price is to be charged for which issue. The pricing of issues only deals with the assigning of pricing to the issues. It has nothing to do with the actual physical movement of materials. The objective of material pricing are:

1. To provide satisfactory basis for the evaluation of closing stock to prepare the final accounts.
2. To charge the cost of material used for measuring the cost of production and cost of sales. When materials are issued from the stores to the various production departments, the pricing of the issued materials can be done according to different methods. Each method has

its own area of suitability depending on the nature of materials, price trends and the management policy.



### **FIRST IN FIRST OUT (FIFO):**

Under this method, issues are priced on the assumption that materials purchased first are issued first. The actual physical movement may or may not follow this pattern. Materials issued are priced at the oldest price recorded in stores lodger for materials in stock. So the closing stock of material is valued at the price of the latest purchases.

The method is particularly suitable in case of perishable materials and in the period of falling prices. The issues are priced at oldest prices which are higher and hence facilitate the recovery of higher costs. The closing stock is valued at the latest prices which are lower. These results in lower value of closing stock and hence lower book profits thereby lower tax liability. In case of rising prices, the effect is the reverse.

### **Advantages:**

1. Most suitable in Perishable product as pricing method more or less corresponds with actual movement of Materials.
2. Simple to understand.
3. All issues are priced at cost price, hence entire cost of materials are recovered.
4. The method results in lower book profits and hence lower tax liability during the period of falling prices.
5. The value of closing stock is realistic as it is valued at the price of latest purchases.

### **Disadvantages:**

1. The issue price differs for different issues of the same quality of raw material at the same time. Therefore cost comparisons get distorted.

2. During the period of rising prices, it results in higher book profits and therefore high tax liability. This is because closing stock appearing on the credit side is valued at higher prices and the cost of production appearing on the debit side is valued lower prices.
3. For pricing one material requisition more than one price may be involved and hence leads to higher probability of clerical errors.

**LAST IN FIRST OUT (LIFO):**

Under this method, issues are priced on the assumption that material purchased last are issued first, though the actual physical movement of materials may not follow this pattern. Issues are priced at the price of latest purchases of materials remaining unissued as per records. As a result the closing stock gets priced at the price of the earliest purchases of materials lying unutilized as per records. The method is particularly useful in the case of rising prices. The production is charged at the price of latest purchases while the closing stock at the earliest prices which are lower. This leads to lower book profit and hence less tax liability. In case of falling prices the effect is reverse.

**Advantage:**

1. Method gives good matching of sales and cost of sales.
2. Method is simple to understand.
3. Issues are priced at cost and hence entire cost of material used is recovered from production.
4. It results in lower book profits and hence lower tax.

**Disadvantages:**

1. The issue price differs in different issues and hence distorts cost comparison.
2. During the period of falling prices this method gives high profits and higher tax liability.
3. For pricing one material requisition more than one prices may be involved and hence higher probability of clerical errors in calculations.

**AVERAGE COST METHOD:**

Average costs methods are based on the assumptions that the material purchased in different lots are stored together and their identity gets lost. Therefore these materials should be charged to production at an average price. *This issue price can be calculated either on the basis of simple average method or on the basis of weighted average method.*

$$\text{Simple average Price} = \frac{\text{Total of different prices of Materials in the stock from which the materials are}}{\text{No. of prices used in calculating total value.}}$$

The method is very simple but is unscientific and can offer highly misleading and absurd results. This method can also result in large under absorption or over absorption of material cost. Therefore, this method is generally not used except when all the purchases made are more or less

in equal lot size. *In such situations, simple average method will give the same result as weighted average method.*

$$\text{Weighted average Price} = \frac{\text{Total Cost of material in the stock as on the issue date}}{\text{Total quantity of material in the stock}}$$

This method considers the prices as well as the quantity of different lots of material in stores. Before each issue new weighted price is calculated.

**Advantages:**

- The method is systematic and not subject to manipulations.
- The method recovers full cost of materials from the production.
- It smoothensthe fluctuations in the issue prices. So different material requisitions will be charged almost the same price.
- The issue price is generally close to market price.

**Disadvantages:**

- Fresh rate needs to be calculated after every fresh receipt of materials, which generally comes in fraction.
- Issue price is different from the actual cost of materials for the individual’s issues and so some nominal profit or loss will appear simply because of the use of average method.

**Illustration 15:**From the following transaction prepares stores ledger account using FIFO:

2016			Receipts		2016			Issues	
July1	opening balance		2000units	@Rs10	July 3	SRN 160	800unit		
July4	purchases GRN 75		3000units	@Rs11	July 6	SRN 168	1500unit		
July8	purchases GRN 82		2500units	@Rs13	July 11	SRN 181	1700unit		
July15	purchases GRN 91		1500units	@Rs15	July 13	SRN 187	1200unit		
July16	purchases GRN 93		1000units	@Rs16	July 17	SRN 194	1800unit		
July18	purchases GRN 96		1200units	@Rs17	July 19	SRN 197	2200unit		
July24	purchases GRN 112		4000units	@Rs19	July 21	SRN 201	500unit		
					July 27	SRN 210	2900unit		

**Solution:**

**Stores ledger account (FIFO)**

Receipts					Issue					Balance		
Date	Ref.	Qty	Rate	Amount	Date	Ref.	Qty	Rate	Amount	Qty	Rate	Amount
2016		Unit	Rs.	Rs.	2016		Unit	Rs.	Rs.	Unit	Rs.	Rs.
July 1	Bal. b/d	-	-	-	-	-	-	-	-	2000	10	20000
-	-	-	-	-	July 3	SRN 160	800	10	8000	1200	10	12000
July 4	GRN75	3000	11	33000	-	-	-	-	-	1200	10	12000
-	-	-	-	-	-	-	-	-	-	3000	11	33000
-	-	-	-	-	July 6	SRN 168	1200	10	12000	2700	11	29700
-	-	-	-	-	-	-	300	11	3300	-	-	-
July 8	GRN 82	2500	13	32500	-	-	-	-	-	2700	11	29700
-	-	-	-	-	-	-	-	-	-	2500	13	32500
-	-	-	-	-	July 11	SRN 181	1700	11	18700	1000	11	11000
-	-	-	-	-	-	-	-	-	-	2500	13	32500
-	-	-	-	-	July 13	SRN 187	1000	11	11000	2300	13	29900
-	-	-	-	-	-	-	200	13	2600	-	-	-
July 15	GRN 91	1500	15	22500	-	-	-	-	-	2300	13	29900
-	-	-	-	-	-	-	-	-	-	1500	15	22500
July 16	GRN 93	1000	16	16000	-	-	-	-	-	2300	13	29900
-	-	-	-	-	-	-	-	-	-	1500	15	22500
-	-	-	-	-	July 17	SRN 194	1800	13	23700	1000	16	16000
-	-	-	-	-	-	-	-	-	-	500	13	6500
July 18	GRN 96	1200	17	20400	-	-	-	-	-	1500	15	22500
-	-	-	-	-	-	-	-	-	-	1000	16	16000
-	-	-	-	-	-	-	-	-	-	1200	17	20400
-	-	-	-	-	July 19	SRN 197	500	13	6500	800	16	12800
-	-	-	-	-	-	-	1500	15	22500	1200	17	20400
-	-	-	-	-	-	-	200	16	3200	-	-	-
-	-	-	-	-	July 21	SRN 201	500	16	8000	300	16	4800
-	-	-	-	-	-	-	-	-	-	1200	17	20400
July 24	GRN 112	4000	19	76000	-	-	-	-	-	300	16	4800
-	-	-	-	-	-	-	-	-	-	1200	17	20400
-	-	-	-	-	-	-	-	-	-	4000	19	76000
-	-	-	-	-	July 27	SRN 210	300	16	4800	2600	19	49400
-	-	-	-	-	-	-	1200	17	20400	-	-	-
-	-	-	-	-	-	-	1400	19	26600	-	-	-

**Illustration 16.** Prepare stores ledger account materials on LIFO from the information given in Illustration 15.

**Solution:**

**Stores Ledger Account (LIFO)**

Receipts					Issue					Balance		
Date	Ref.	Qty	Rate	Amount	Date	Ref.	Qty	Rate	Amount	Qty	Rate	Amount
2016		Unit	Rs.	Rs.	2016		Unit	Rs.	Rs.	Unit	Rs.	Rs.
July 1	Bal. b/d	-	-	-	-	-	-	-	-	2000	10	20000
-	-	-	-	-	July 3	SRN 160	800	10	8000	1200	10	12000
July 4	GRN75	3000	11	33000	-	-	-	-	-	1200 3000	10 11	12000 33000
-	-	-	-	-	July 6	SRN 168	1500	11	16500	1200 1500	10 11	12000 16500
July 8	GRN 82	2500	13	32500	-	-	-	-	-	1200 1500 2500	10 11 13	12000 16500 32500
-	-	-	-	-	July 11	SRN 181	1700	13	22100	1200 1500 800	10 11 13	12000 16500 10400
-	-	-	-	-	July 13	SRN 187	800 400	13 11	10400 4400	1200 1100	10 11	12000 12100
July 15	GRN 91	1500	15	22500	-	-	-	-	-	1200 1100 1500	10 11 15	12000 12100 22500
July 16	GRN 93	1000	16	16000	-	-	-	-	-	1200 1100 1500 1000	10 11 15 16	12000 12100 22500 16000
-	-	-	-	-	July 17	SRN 194	1000 800	16 15	16000 12000	1200 1100 700	10 11 15	12000 12100 10500
July 18	GRN 96	1200	17	20400	-	-	-	-	-	1200 1100 700 1200	10 11 15 17	12000 12100 10500 20400
-	-	-	-	-	July 19	SRN 197	1200 700 300	17 15 11	20400 10500 3300	1200 800 -	10 11 -	12000 8800 -
-	-	-	-	-	July 21	SRN 201	500	11	5500	1200 300	10 11	12000 3300
July 24	GRN 112	4000	19	76000	-	-	-	-	-	1200 300 4000	10 11 19	12000 3300 76000
-	-	--	-	-	July 27	SRN 210	2900	19	55100	1200 300 1100	10 11 19	12000 3300 20900

**Illustration 17:** Prepare stores ledger account by simple Average Method and Weighted Average Method from following information:

Receipts			Issued		
<b>2016</b>			<b>2016</b>		
July1	GRN30	4000units @Rs5	July 4	MRN 101	1200unit
July5	GRN 37	2000units @Rs6	July 7	MRN 112	1800unit
July11	GRN 42	1000 units @Rs11	July 12	MRN 119	1600 unit
July15	GRN 46	1500 units @Rs14	July 17	MRN 127	900unit
July20	GRN 51	3000 units @Rs13	July 21	MRN 132	2800unit
July25	GRN 56	2500 units @Rs13	July 28	MRN 138	2600unt

**Solution:**

**Stores Ledger Account (Simple Average Method)**

Receipts					Issue					Balance		
Date	Ref.	Qty	Rate	Amount	Date	Ref.	Qty	Rate	Amount	Qty	Rate	Amount
2016		Unit	Rs.	Rs.	2016		Unit	Rs.	Rs.	Unit	Rs.	Rs.
July 1	GRN 30	4000	5	20000	-	-	-	-	-	4000	5	20000
	-				July 4	MRN 101	1200	5	6000	2800	5	14000
July 5	GRN 37	2000	6	12000	-	-	-	-	-	2800	5	14000
	-	-	-	-						2000	6	12000
	-	-	-	-	July 7	MRN 112	1800	5.5 (5+6) /2	9900	1000	5	(26000- 9900)= 16100
										2000	6	
July 11	GRN 42	1000	11	11000	-	-	-	-	-	1000	5	16100
	-	-	-	-						2000	6	
	-	-	-	-	July 12	MRN 119	1600	7.33 (5+6+11) /3	11728	1000	11	11000
										1400	6	(27100- 11728)= 15372
July 15	GRN 46	1500	14	21000	-	-	-	-	-	1000	11	
	-	-	-	-						1500	14	21000
	-	-	-	-	July 17	MRN 127	900	10.33 (6+11+14) /3	9297	500	6	(36372- 9297)= 27075
										1000	11	
July 20	GRN 51	3000	13	39000	-	-	-	-	-	1500	14	
	-	-	-	-						3000	13	39000
	-	-	-	-	July 21	MRN 132	2800	11 (6+11+14+13) /4	30800	200	14	(66075- 30800)= 35275
										3000	13	
July 25	GRN 56	2500	13	32500	-	-	-	-	-	200	14	35275
	-	-	-	-						3000	13	
										2500	13	32500
					July 28	MRN 138	2600	13.33 (14+13+13) /3	34658	600	13	(67775- 34658)= 33017
										2500	13	

Simple Average Method is considered unscientific and can lead to absurd results:

- (a) On July 7, 1800 units are issued at the simple average price of 5.5  $((5+6)/2)$  at the issue amount of 9900 i.e.  $(1800*5.5)$ . The total purchase value of materials on the same day is 26000  $(2800*5+2000*6)$ . The question arise, that if we suppose FIFO along with simple

average then the cost of these 1800 units is 9000 (1800\*5) while we are charging 9900 according to the method. So the units are overcharged by 900.

- (b) The cost of the units remained in the balance are of the value of 17000 (1000\*5+2000\*6) but the balance has been written as 16100 (26000-9900) according to the mathematical formula. Hence, the balance of materials in the store ledger as on July 7<sup>th</sup> is undervalued by 900.

These disadvantages have been discussed only on the basis of assumption that oldest stock has been issued first. This weakness of over valuation/undervaluation will be there in all the methods in which the price is derived from the actual prices paid for the purchases.

### Stores Ledger Account (Weighted Average Method)

Receipts					Issue					Balance		
Date	Ref.	Qty	Rate	Amount	Date	Ref.	Qty	Rate	Amount	Qty	Rate	Amount
2016		Unit	Rs.	Rs.	2016		Unit	Rs.	Rs.	Unit	Rs.	Rs.
July 1	GRN 30	4000	5	20000	-	-	-	-	-	4000	5	20000
	-				July 4	MRN 101	1200	5	6000	2800	5	14000
July 5	GRN 37	2000	6	12000	-	-	-	-	-	4800	5.4167	26000
-	-	-	-	-	July 7	MRN 112	1800	5.4167 (26000/4800)	9900	3000	5.4167	16250
July 11	GRN 42	1000	11	11000	-	-	-	-	-	4000	6.8125	27250
-	-	-	-	-	July 12	MRN 119	1600	6.8125 (27250/4000)	10900	2400	6.8125	16350
July 15	GRN 46	1500	14	21000	-	-	-	-	-	3900	9.5769	37350
-	-	-	-	-	July 17	MRN 127	900	9.5769 (37350/3900)	8619	3000	9.5769	28731
July 20	GRN 51	3000	13	39000	-	-	-	-	-	6000	11.2885	67731
-	-	-	-	-	July 21	MRN 132	2800	11.2885 (67731/6000)	31607	3200	11.2885	36124
July 25	GRN 56	2500	13	32500	-	-	-	-	-	5700	12.0392	68624
					July 28	MRN 138	2600	12.0392 (68624/5700)	31302	3100	12.0392	37321

### SELECTION OF PRICING METHOD:

All the methods of pricing of issues have advantages and disadvantages and are suited under different situations. An appropriate method is one which gives good matching of costs against revenues and produces meaningful cost figures for effective cost control and analysis. No single method can be appropriate under all circumstances. The choice of the method depends upon the following factors:

1. Nature of materials
2. Management desire.
3. Fluctuation in the prices of materials.
4. Frequency of purchases and issues.
5. Nature and size of business.



Generally, if prices are falling FIFO is preferred. If prices are rising, LIFO is preferred while if prices are fluctuating, weighted average price method is preferred.

### ***Knowledge Assessment – III***

Which of the following is “True” or “False”

1. Pricing of issue of materials is closely connected with the actual physical movements of units of material.
2. Issue prices have an impact on book profits of the firm.
3. Issue prices fluctuate more in the case of weighted price method than under LIFO and FIFO.
4. Method of pricing issues aims at charging material cost to production.
5. Pricing of issue of raw material do not have any impact on the valuation of stock.
6. Under FIFO book profits are higher than under LIFO of pricing under the period of rising prices.
7. FIFO does not generally give a good match between the cost incurred and cost charged to the product.
8. Under FIFO method, units purchased first are physically issued first.
9. LIFO gives higher value of closing stocks during Inflationary period than that if FIFO method of pricing issues is used.
10. Simple average may give higher, lower or equal value of closing stock when compared to the weighted average method of valuing the closing stock.
11. FIFO is generally suitable for perishable products.
12. As per LIFO method of pricing, issues are close to current economic values.
13. Re- order level means the quantity to be ordered.
14. Purchase order is an order to a stores department to issue materials.
15. Valuation of stock under FIFO and LIFO are same.

***Ans: (1)( False),(2) (True),(3)(False),(4)(True),(5)(False), (6) (True),(7) (True), (8) (True),(9)(False),(10) (True),(11) (True), (12)(True), (13)(False),(14) (False), (15)(False)***

### **KEYWORDS**

1. **Bill of Material:**A schedule of materials needed for the job or a unit of production.
2. **Bin card:**The card hung outside each bin recording the physical movement of inflows and outflows of material and hence showing the balance of quantity after every transaction.
3. **Direct Material:** Materials that can be conveniently and wholly identified with specific units of output/ product/Job/ contract/ process/ or operations. These become a part of the finished product itself.
4. **Economic Order Quantity:**The most economical size of the order at which the total ordering cost and total carrying cost are equal and minimum.

5. **Indirect Material:** Materials that cannot be classified as direct are called as indirect materials. Indirect materials do not physically constitute a part of the final product.
6. **Material Control:** Material Control is a system which ensures provision of material in the right quantity, of the right quality, at the right time with minimum investment.
7. **Material Requisition:**A formal request by the user department to the store keeper for the issue of material.
8. **Material Return Note:**It is a note initiated by department returning the material and duly acknowledged by the store keeper.
9. **Material Transfer Note:** It is a note initiated by the department transferring the material and duly acknowledge by the receiving department.
10. **Periodic Inventory System:** A system which computesthe stock periodicallyby relying on physical count without keeping daily records of units sold or in hand.
11. **Perpetual Inventory System:**A system that keeps a running, continuous record that tracks inventories and cost of goods sold on a transaction to transaction basis.
12. **Pricing the Issues:** When the materials are purchased at different prices, the decision as to which price to be charged for the issue of materials.
13. **Purchase Order:** It is the legal authorization to the supplier of the goods to deliver the goods as per the description and terms and condition mentioned therein.
14. **Quantity Discount:** The discount allowed by the supplier for the bulk purchases. Larger orders give the economies of scale, which is passed on to the purchaser.
15. **Stores Ledger:** It is the ledger of materials maintained by the store keeper showing the purchases, issue, and balance after every transaction both in quantity and value.
16. **Trade Discount:** The allowance which is allowed by the seller to a buyer who has to resell the articles. It is allowed as a matter of trade policy. This is allowed to compensate cost of storage, breaking bulk and selling and delivering in small quantities.
17. **Valuation of Stock:**It is the valuation of the closing stock will differ depending on the price of issue. This will differ under different methods of pricing.

### SUMMARY

1. Material is the basic substance that is transformed into a useable product.
2. Semi-finished material are those materials which are not 100% finished or completed in all respects.
3. Finished components are those which can either be consumed or used as raw material for manufacturing of the final product.
4. Material Control is a system which ensures the provision of material in the right quantity, of the right quality, at the right time with minimum investment.
5. The steps for evolving a sound MCS are Material Planning, Material Purchasing, Material Receiving, Material Inspection, Material storage and Material Issue.
6. The purchase process starting with the purchase requisition, invitation of tenders and placing the purchase order.
7. The system provides for proper procedure for Receipt of material, Inspection of materials and then transfer to either the stores department or directly to the production department.

8. For a good store keeping, different documents like Bin Card, Bill of Material, Material Requisition and Stores Ledger has to be maintained.
9. Stores keepers use different techniques of material control by maintaining different stock levels.
10. Economic order quantity is that size of order at which ordering cost and total carrying cost are equal and the total of two is least.
11. The pricing of materials issued are based on different assumptions leading to different method of issues. Example: FIFO, LIFO, Simple Average and Weighted Average Methods.

### **EXERCISE QUESTIONS**

#### **Short Answer Questions:**

1. What do you mean by Material?
2. What do you mean Direct Material Cost?
3. What do you mean by Indirect Material Cost?
4. Define Material Control.
5. List all the steps required for an efficient Material Control System.
6. Write short on the following
  - a. Economic order quantity
  - b. Average method of pricing issues
  - c. Reordering level
  - d. Bin card with its specimen
  - e. Material transfer note
  - f. Minimum stock level
7. Differentiate between:
  - a. Purchase requisition and purchase order
  - b. Bin card and stores ledger
  - c. Bill of material and stores requisition
  - d. Material requisition and Material transfer note.
8. Explain the nature of problem of Pricing of issues. Why does this problem arise?
9. What are the advantages of FIFO and LIFO?
10. Under the conditions of rising prices, which of the method LIFO or FIFO would you recommend and why?
11. Explain any two demerits each of FIFO and LIFO Method of pricing the issues?
12. What factors have to be considered while selecting a method of pricing the issues?
13. Discuss the circumstances under which average method of pricing the issues are preferred and why?

#### **Long Answer Questions:**

1. What is Material Control Process? State its advantages.
2. State the basic requirements and of objectives of Material Control.
3. What do you mean by economic order quantity? Discuss its assumptions.
4. What are the different stock levels? Explain each of them briefly.

5. What is importance of dividing the Material in direct and indirect when both the cost has to be taken while finding out the cost of production? Comment.
6. Describe the meaning, objectives and basic principles of material control system.
7. What is reordering level? Explain its relationship with minimum and maximum stock level.
8. Discuss the functions and advantage of centralized purchasing.
9. What do you mean by Inventory control? Discuss the various objectives of Material control.
10. Discuss the meaning and treatment of “quantity, trade and cash discount”.
11. “Ordering cost and carrying cost are equal at EOQ level” Discuss.
12. “Problem of pricing the issues only deals with assigning of prices to the issues. It has nothing to do with actual physical Movement of materials.” Discuss.
13. Explain two considerations which should be taken into account while selecting a proper method of pricing the issues.
14. Discuss the Important systems of pricing material issues to production.
15. Explain the FIFO and LIFO method of valuation of material issues. Discuss the effects of rising and falling prices on these two methods of pricing the material issues.
16. Under the condition of rising prices, which of the following two methods of pricing material issues would you recommend and why?
17. Write short notes on:
  - a. LIFO vs. FIFO
  - b. Simple average vs. Weighted average method of charging issue of material.

### Numerical Questions:

1. From the following information calculate the Economic Order Quantity and the number of orders to be placed, in one quarter of the year.
  - (i) Quarterly consumption of material 2000kg.
  - (ii) Cost of placing one order Rs50
  - (iii) Cost per unit Rs40
  - (iv) Storage and carrying cost 8% on average inventory.

*(Answer. EOQ=500Kg. No. of orders=4)*
2. Following data relate to material ‘Y’. Find (a) Re- Order Level, (b) Minimum Level, and (c) Maximum Level.
 

Normal usage 450 units per week	Re-Order Quantity 3,200 units
Maximum usage 750 units per week	Re-Order Period 3-5 weeks
Minimum usage 300 units per week	

*(Answer. (a) 3,750 units (b) 1,650 units (c) 6,050 units)*
3. About 50 items are required everyday for a machine. A fixed cost of Rs. 50 per order is incurred in placing the order. The inventory carrying cost per item amount to Re. 0.02 per day. The lead period is 32 days. Compute (a) Economic Order Quantity, (b) Re-Order Level.

*(Answer. (a) 500 items, (b) 1,600 items)*

4. Maya Aids Co. manufactures a special product 'B'. The following particulars were collected for the year 2016.
- (a) Monthly demand of 'B' 1,000 units
  - (b) Cost of placing an order Rs100
  - (c) Annual carrying cost per unit Rs15
  - (d) Normal usage 50 units per week
  - (e) Minimum usage 25 units per week
  - (f) Maximum usage 75 units per week
  - (g) Re-order Period 4 to 6 weeks

Compute from the above:

- i. Re-order Quantity
- ii. Re-order Level
- iii. Minimum Level
- iv. Maximum Level
- v. Average Stock Level.

*(Answer. i. 186 units' ii. 450 units iii. 200 units iv. 536 units v. 368 units)*

5. Calculate the Minimum Stock Level, Maximum Stock Level and Re-ordering Level from the following information:
- i. Minimum consumption: 100 units per day
  - ii. Maximum consumption: 150 units per day
  - iii. Normal consumption: 120 units per day
  - iv. Re-order Period: 10-15 days
  - v. Re-order Quantity: 1500 units
  - vi. Normal Re-order Period: 12

*(Answer. 810 units, 2250units and 250 units)*

6. From the following data, calculate the (i) Maximum Level, (ii) Minimum Level and (iii) Re-ordering Level:

Re-order Quantity: 1500 units'      Minimum consumption: 250 units per week  
Re-order Period: 4-6 weeks      Normal consumption: 300 units per week  
Maximum consumption: 400 units per week

*(Answer. (i) 2,900 units (ii) 900 units (iii) 2,400 units)*

7. Two components 'X' and 'Y' are used as follows:

Normal usage: 50 units per week each

Re-order quantity: X 300 units, Y 500 units

Minimum usage: 25 units per week each

Re-order period: X 4 to 6 weeks, Y 2 to 4 weeks

Maximum usage: 75 units per week each

Calculate, for each component: (a) Re-order Level, (b) minimum Level, (c) Maximum Level and (d) Average Stock Level.

8. You are presented with the following information of Online engineering Ltd. relating to the first week of April 2016.

Days	Receipts(Rate per Unit)	Rate per Unit	Issue (Units)
1 <sup>st</sup>	40	15.00	-
2 <sup>nd</sup>	20	16.50	-
3 <sup>rd</sup>	-	-	30
4 <sup>th</sup>	50	17.10	-
5 <sup>th</sup>	-	-	20
6 <sup>th</sup>	-	-	40

Calculate the cost of material issued under (1) FIFO (2)LIFO Method (3) Weighted Average Method of issue of materials and value of closing stock under the methods aforesaid.

*(Answer: cost of issues 1443 and closing stock 20 units @ Rs 17.10 (ii) cost of issues 1485 and closing stock 20 units @ 15.00 (iii) Cost of issues Rs 1445 and closing Stock 20 units at Rs 330.)*

9. From the following particulars of material X, maintained the stores ledger according to FIFO and LIFO methods:

1.1.2016	Opening stock	10,000 units @5 each
3.1.2016	Purchased	9,000 units @5 each
10.1.2016	Issue	12,000 units
12.1.2016	Purchased	8,000 units @5 each
16.1.2016	Purchased	3,000 units @5 each
18.1.2016	Issue	4,000 units
20.1.2016	Issue	6,000 units
21.1.2016	Purchased	3,000 units @5 each
25.1.2016	Issue	4,000 units

*(Answer: Closing stock FIFO 4000 units @ Rs 6.00 and Closing stock LIFO 4000 units @ Rs 5.00)*

10. Show how the items given below relating to purchases and issue of raw materials will appear in the stores ledger card using weighted average method of issuing the materials.

1.2.2016	Opening stock	100 units @20 each
5.2.2016	Purchased	100 units @22 each
11.2.2016	Issue	150 units
22.2.2016	Purchased	200 units @23 each
24.1.2016	Issue	150 units

28.1.2016            Issue            50 units  
*(Answer:Rs 21; Rs22.67; Rs 22.67)*

11. Prepare a stores ledger using weighted average method of pricing the issue from the following transactions.

1.4.2016	Opening stock	50 units @5 each
3.4.2016	Issue	20 units
10.4.2016	Purchased	120units@Rs 5.50 each
15.4.2016	Issue	70 units
20.4.2016	Purchased	130 units @5.60 each
28.4.2016	Received back	10 units which were issued on 15th
30.4.2016	Issue	100 units

*(Answer: 20 units @ Rs5, 70 units @Rs 5.40, 100 units @Rs 5.516, closing stock 120 units @ Rs 5.516)*

12. From the following information for the year 2015-16, prepare the income statement of the year and show the value of the Closing stock on the basis of (i) FIFO (ii) LIFO (iii) weighted average method.

1. Opening Stock 1000 units @15 per unit.
2. Purchases during the year 30,000 units @ Rs 17 per unit.
3. Sales during the year 25,000 units @ Rs 20 per unit.

*(Answer: Closing Stock: FIFO:( 6000\*17)=1,02,000 LIFO:(1000\*15+500\*17)=1,00,000 Weighted average: (6000\*5,25,000/31000)=1,01,613)*

13. The stores ledger account of material C in books of Murli producer Ltd. revealed the following transactions for the month of December.

Dec. 1	Opening stock 200 kg @ Rs. 7.50 per kg
Dec. 5	Received from supplier S <sub>1</sub> 400 kg @Rs. 7.75 per kg (GRN No. 448)
Dec. 8	Issued to production department 240 Kg (S.R. No. 833)
Dec. 10	Issued to production department 160 kg (S.R. No. 897)
Dec. 12	Received from supplier S <sub>2</sub> 500 kg @ Rs.7.90 per kg (GRN No. 455)
Dec. 15	Issued to production department 400 kg (S.R. No. 912)
Dec. 16	Received from supplier S <sub>3</sub> 250 kg @ Rs. 8.00 per kg (GRN No. 461)
Dec. 19	Received from supplier S <sub>1</sub> 600 kg @ Rs. 8.25 per kg (GRN No. 469)
Dec. 21	Issued to production department 350 kg (S.R. No. 946)
Dec. 24	Issued to production department 260 kg (S.R. No. 959)
Dec. 27	Issued to production department 340 kg (S.R. No. 974)

Where GRN denote goods received notes. SR denotes stores requisition.

You are required to price the issue and draw out the closing balances in the stores ledger account under the pricing method suitable for anyone of the following two alternatives: (a) The closing balances should be closely related to the current prices. (b) The material cost charged to production should be closely related to current prices.

*(Answer Closing stock 200 units. FIFO Rs. 1,650; LIFO Rs. 1,500)*

(Hint. When FIFO method is used, the closing stock is closely related to current prices and when LIFO method is used, charge to production is closely related to current prices.)

14. Show the stores ledger entries as they would appear using:

(a) The weighted average method

(b) The LIFO method

of pricing issues in connection with the following transactions:

		<i>Units</i>	<i>Value Rs.</i>
March 1	Balance b/f	300	600
March 2	Purchased	200	440
March 4	Issued	150	-
March 6	Purchased	200	460
March 11	Issued	150	-
March 19	Issued	200	-
March 22	Purchased	200	480
March 27	Issued	250	-

In a period of rising prices such as above, what are the effects of each method?

*(Answer. Closing stock (a) Rs. 342; (b) Rs. 300)*

15. Yamani Ltd. has purchased and issued the material in the following order:

July 1	Purchased	3,000 units @ Rs. 3 per unit
July 4	Purchased	6,000 units @ Rs. 4 per unit
July 6	Issued	5,000 units
July 12	Purchased	7,000 units @ Rs. 4 per unit
July 17	Issued	8,000 units
July 22	Purchased	3,000 units @ Rs. 5 per unit
July 25	Issued	1,000 units

Ascertain the quantity of closing stock as on 31th July and state its value (in each case) if issues are made under the following method: (a) average cost (b) FIFO (c) LIFO.

*(Answer. 5,000 units; (a) Rs. 22,200; (b) Rs. 23,000; (c) Rs. 19,000)*



**UNIT: 3 - DIRECT LABOUR AND DIRECT EXPENSES**

<b>Unit Code 3</b>	<b>UNIT TITLE: DIRECT LABOUR AND DIRECT EXPENSES</b>			
<b>Location:</b>	Duration:			
Classroom	<b>SESSION 1: MEANING OF DIRECT LABOUR</b>			
	<b>Learning Outcome</b>	<b>Knowledge Evaluation</b>	<b>Performance Evaluation</b>	<b>Teaching and Training Method</b>
	1.Understanding about the meaning of direct labour.	1. Explain the meaning of direct labour.	1.Describe the relevance of studying direct labour.	<b>Interactive Lecture:</b> Introduction to direct labour  <b>Activity:</b> Conceptual Case discussion
	2.Clarity about the objectives of the studying direct labour.	2. Differentiate between direct labour and indirect labour.	2. Explain the relevance of separating of direct and indirect labour.	
3.Understanding about various departments to control over labour cost.	3. Name the departments to be established for controlling labour cost.	3. Explain the role of various departments to control over labour cost.		
<b>Location:</b>	<b>SESSION 2: LABOUR REMUNERATION</b>			
Class room or Factory Premises	1.Clarity about methods of providing labour remuneration.	1.Discuss various methods of wage payment. 2.Describe the advantages or disadvantages of using different methods of wage payment to an employee. 3.Describe the advantages or disadvantages of using different methods of wage payment to an employer.	1.Discuss various methods of wage payment under time wage system. 2.Discuss various methods of wage payment under piece wage system.	<b>Interactive Lecture:</b> Procedure of Wage payment  <b>Activity:</b> Preparation of wage abstract using industry data
	<b>SESSION 3: INCENTIVE PLANS ACCORDING TO VARIOUS WAGE METHODS</b>			
	1.Understanding of the various incentive plans according to different wage methods.	1.Define the concept of incentive plan. 2.Discuss incentive plan according to	1.Identify the incentive plans most prevalent in a particular industry or in	<b>Interactive Lecture:</b> Introduction to incentive plans offered to labour.

		the time wage system 3.Elaborate various incentive plans according to the piece wage system.	general.	
<b>SESSION 4: LABOUR TURNOVER AND DIRECT EXPENSES</b>				
	1.Understanding the concept of Labour Turnover.	1.Describe methods of measurement of labour turnover.	1.Explain the usefulness of measuring labour turnover in the industry.	<b>Interactive Lecture:</b> Procedure of determination of Labour Turnover
	2.Learned the formulae of determination of labour turnover.	2.Explain the methods of measurement of labour turnover.		<b>Activity:</b> Determination of labour turnover on Industry data

## UNIT: 3 - DIRECT LABOUR AND DIRECT EXPENSES

### *Learning Objectives:*

#### **After reading this unit, students will be able to:**

1. Understand the meaning of direct labour and its importance;
2. Understand the difference between direct and indirect labour;
3. Explain the meaning and causes of labour turnover and methods of its measurement;
4. Describe various methods of time keeping and time booking;
5. Understand the mechanism of calculating wages according to time rate and piece rate system of labour remuneration;
6. Discuss various incentive plans of labour remuneration and their effect on cost and profit; and
7. Explain the meaning of certain key terms.

Rapid development of the technology and invention of advanced machines has reduced the role of human resources in the modern business organizations; however, their intervention cannot be eliminated from manufacturing or the services industry, therefore, labour is the most critical component of any business organisation.

### **SESSION 1: MEANING OF DIRECT LABOUR**

Labour is the work force which contributes towards the completion of the manufacturing process of any organisation. Without manual horse power only machines cannot complete the process. Labour can be bifurcated in two parts; direct labour and indirect labour. Labour which is directly associated with a manufacturing process or his contribution is directly identifiable with a particular process will be called as direct labour while when the contribution of the labour cannot be associated with a particular manufacturing process or specifically not identifiable with a particular product or process is called as indirect labour. For example in a factory of readymade garments, wages paid to a tailor are direct wages.

While in some cases it is very complicated to differentiate between direct and indirect labour. A worker might be engaged in doing a particular work concerned with manufacturing commodity and after an hour the same worker might be placed on a different job say time-keeping, repairing etc. In aforementioned scenarios initial one hour will be treated as direct and later hours will be treated as indirect.

## CONTROL OVER LABOUR COST

Labour majorly contributes to the growth and development of any organisation. Without efficient and effective utilization of man power resources organisation cannot achieve the goal of profit maximization by reduction in cost and improvement in quality of the products. Generally, following five departments are established by the organisation to control cost.

1. Personnel Department
2. Engineering and Works Study Department
3. Time-Keeping Department
4. Pay- Master's Department
5. Cost Accounting Department

## PERSONNEL DEPARTMENT

The personnel department is responsible for hiring the right person at the right place at the right time. Role of personnel department is not over with the hiring of the workforce rather they have to train them before sending them to the workplace. Whenever a new worker is employed, the Personnel Department sends a notification to the time keeping department and paymaster department for their compensations.

Personnel department maintains following important records:

The personnel department first receives the following requisition slip from the concerned departments who are having need of the workforce. After receiving the requisition records will be checked by the personnel department about the availability of the employees in the required category. If required employees are not available in the organisation then action will be taken to recruit more employees. Following is the format of Labour Requisition Slip.

<b>LABOUR RECRUITMENT REQUISITION</b>					
<b>Department.....</b>					
<b>Requisition No.....</b>					
<b>Date.....</b>					
<b>Kindly arrange for workers of the following categories for my Department with effect from</b>					
<b>Number of employees requisitioned</b>	<b>Category</b>	<b>Job Specification</b>	<b>Description</b>	<b>Remarks</b>	
<b>Requisitioned by.....</b>					
<b>Approved by.....</b>					

## EMPLOYEE'S RECORD CARD

<b>Employee's Record Card</b>				
Name.....				
Clock Number.....				
Address.....				
Marital status.....				
Date of Birth.....				
Previous Experience.....				
Education.....				
Grade.....				
Date of Employment.....				
Starting Pay.....				
Department.....				
Engaged as.....				
Category.....				
Previous Employer.....				
Exit Date.....				
Reasons of Exit.....				
<b>PARTICULARS OF CHANGES IN PAY AND SERVICE</b>				
<b>Date</b>	<b>Occupation</b>	<b>Grade</b>	<b>Pay</b>	<b>Reasons for Change</b>

### ENGINEERING DEPARTMENT

This department is committed to provide congenial work environment to its employees also controlling over the production methods and processes followed in the various departments. This department is majorly involved in planning and conducting motion studies, work studies, time studies, job analysis and setting piece rates, providing safe and efficient working conditions, supervising production activities in various production departments.

#### Work Study

Work study may be defined as a technique of management which involves analytical study of jobs/operation with the object of determining the exact operations to be performed and measuring the work content of jobs. The object of work study is overall improvement by saving time, reducing loss of materials, developing new methods of work, etc..

## **Time Study**

Time study is helpful in determining the standard time for an operation on the basis of the observations of the ongoing operations. Its major motive is to control the labour time and cost also to run the operations smoothly.

## **Motion Study**

Motion study is conducted by recording the movement of the workers and machines on the job. The purpose of the motion studies is to replace the ineffective processes or methods of work by introducing effective, efficient and least tiring processes. Motion studies are conducted through observing various factors like use of both hands without undue straining, linking motions to each other in the most economical sequence, using equipment which would both speed up the work and make it easier to perform.

## **Job Analysis**

Job analysis is concerned with the preparation of job description. Job description refers to the skill set required to perform a particular job smoothly and efficiently.

## **Job Evaluation**

Job evaluation is done to analyze the worth of a particular job whether the job is useful for the organisation or not.

## **TIME-KEEPING DEPARTMENT**

The time-keeping department plays an important role in the accounting and controlling of labour cost. The main function of this department is to accurately record the time spent by each worker on the work place and it will be forwarded to the pay-master department then this department will process it further to prepare the compensations of the employees.

There are various methods of time keeping. Some most prevalent methods are as follows:

1. Attendance register
2. Token or disc method
3. Time-recording clocks
4. Biometric time clock

## **PAYROLL DEPARTMENT**

The payroll department is concerned with the compensation of the workers. This department takes data from the time keeping department and computes the salaries of the employees at the end of every month.

## **COST ACCOUNTING DEPARTMENT**

Cost accounting department is the final destination of the all types of costs related to labour be it direct cost or indirect cost. For the purpose of collecting the data it makes use of clock cards, daily or weekly time sheets, payroll sheets etc.

The cost accounting department collates, analyse and present a report reflecting the true picture of direct labour cost and indirect labour cost in front of management to take decision.

## **TREATMENT OF IDLE TIME, HOLIDAY PAY, OVERTIME ETC. IN COST ACCOUNTS**

**Idle Time:** wastage of time during working hours is considered as idle time. Idle time may arise due to normal and abnormal reasons. Idle time affects the productivity of the labour. For controlling the cost of labour reduction in idle time is essential. The reasons behind the idle time must be identified and then steps should be taken to control them.

**Normal Reasons of Idle Time** It refers that any loss of time is inherent in every situation which cannot be avoided. Any cost which is associated with the normal idle time mostly fixed in nature. The normal idle time arises due to the following reasons:

- Time taken for personal affairs.
- Time taken for lunch tea breaks.
- Time taken for obtaining work.
- Time taken by the workers to walk between factory gate and place of work.

**Abnormal Reasons of Idle Time** it generally occurs because of shortage of raw material, machine break-down, lock-out, strikes etc. Abnormal idle time can be reduced and avoided by maintaining the operational efficiency in the organisation. Following are the major reasons of abnormal idle time:

- Improper planning.
- Lack of planning and co-ordination.
- Power failure.
- Time lost due to delayed instructions.
- Time lost due to inefficiency of workers.
- Time lost due to non-availability of raw materials, spare parts, tools etc.
- Time lost due to strikes, lock outs and lay-off.

### **Accounting Treatment:**

- Cost for normal reasons should be segregated under a separated standing order number and charged as an item of factory overhead.

- Cost for uncontrollable and normal reasons may be charged to the job by inflating the job rate.
- Cost because of abnormal reasons should be charged from costing profit and loss account.

## **OVER-TIME**

Over time refers to the extra time spent by the workers on the job than the normal or pre-fixed working hours. According to the Factories Act, 1949 workers are paid double wages for the over time. For paying the over-time wages strict monitoring mechanism of workers is required during working hours, so that they should not miss the stipulated hours in the leisure activities.

### **Effect of Over Time Payment on Productivity:**

Repercussions of over time payment on productivity of workers are as follows:

- (1) Cost of product would increase because of extra payment for over time spent by the workers.
- (2) Workers might not work efficiently during their normal working hours in lieu of earning extra money through overtime premium.

### **Treatment of Overtime Wages**

Over-time wages can be treated as direct as well as indirect it depends on the reason of over-time by the workers. If the over-time has been spent by the worker for the completion of a critical project on the demand of the customers and associated to a particular job only then it will be treated as direct expense. On the contrary, if over-time has been spent by the worker because of abnormal reasons like Machine break-down, shortage or raw material etc. should be treated as an abnormal expense and it will be charged to costing profit and loss account.

## **HOLIDAY PAY**

Worker are paid for the holidays on weekend, festivals or on gazetted offs. Their wages are treated as indirect cost and charged from the factory overheads account and thus it will be recovered from the production.



### ***Knowledge Assessment -I***

**State whether the following statements are True or False:**

1. Labour is the cost of hiring the human resources.
2. Labour cost which is not specifically incurred for or cannot be readily charged to or identified with a specific job, contract work order or any other unit of cost is called as direct labour.
3. Time for which employer pays to the labour but obtains no direct benefit is called as productive cost.
4. Time keeping and time booking cannot be used interchangeably.
5. Rate of change in labour force due to resignation, retirement or retrenchment is called as labour turnover.
6. Payment to workers for holidays and payment for overtime can be used interchangeably.

***Ans: 1(True), 2(False), 3(False), 4(True), 5(True), 6(False)***

## **SESSION 2: LABOUR REMUNERATION**

Remuneration refers to the compensation for the efforts made by the employees in the completion of a job. Various methods of wage payment are prevalent as per the requirement of the industry. In some industries time rate system is suitable while in others piece rate system is more suitable therefore according to reh

### **TIME WAGE PAYMENT SYSTEM**

Worker's remuneration is based on the hours spent by the workers on the job under time wage payment system. A major drawback of this system is that the workers are more concerned about completing their time on the job rather than the output on the job therefore, close supervision is required.

#### **Advantages of Time Wage Payment System**

- Workers are self motivated to stay on the work there is no need to force them.
- This system is easy to understand by the labour and easy to implement by the employer.
- Generally, under this system workers get fixed monthly, daily, hourly wage rates for smooth functioning of their life.
- This method is comparatively cheaper than the other methods.

## **Disadvantages of Time Wage Payment System**

- It is difficult to make distinction between efficient and inefficient workers.
- Workers concentrate more on hour's completion rather than work which hampers the productivity of the organisation.
- This system of wage payment restricts the flexibility of labour also even in case of no work is assigned to them but they are liable to complete the time.
- There is discontentment among the efficient workers for their efforts are not properly rewarded.
- It affects the efficiency of the employees. They become laggards over a period of time.

## **PIECE WAGE PAYMENT SYSTEM**

Under piece wage payment system, compensation is paid on the basis of units produced by the workers rather time spent by the workers on the workplace. Generally, workers are given a target for production if their performance is less than the target they are not paid, if performance is more than the target they will get the higher wages, if performance is upto the mark than they will get the standard rate.

**Wages = Number of units X per piece wage rate**

### **Suitability of Piece Wage System**

- Piece wage system is suitable where close supervision is not possible.
- This is also suitable in the highly demanding industries.
- This method is also suit in the industry where more emphasize is given on the quantity than quality.

### **Advantages of Piece Rate Wage System**

- Labours are self motivated to work and complete the targets.
- Labours get flexible work environment as employers are concerned with the output than the time consumed by the workers at work place.
- This method of wage payment increases the efficiency and productivity of the workers.

### **Disadvantages of Piece Rate Wage System**

- Sometimes, under this method, labours compromise with the quality of product in the hurry of completing the targets.
- Maintaining the record of production by each worker is difficult on the daily basis.
- Maintaining discipline in working regarding entry and exit time is also difficult under this system.

- In the anxiety of producing more and more goods labours may damage the machines and waste the raw material.

## **GROUP PIECE WORK**

Group or collective piece work system is that where the workers are paid remuneration on a group basis because they perform a particular job or operation after making collective effort. The workmen of a particular group can, afterwards, divide the earnings in any proportion. The basis of distribution is generally their basic time earnings.

(Hours spent on operation X Hourly basic rate or wages)

### **Advantages**

1. The system recognizes the merit and efficiency of workers and, therefore, can be regarded as more equitable than time wage system.
2. The workers are induced to work hard with the result that production is enhanced. This reduces the fixed overhead expenses per unit and, finally the total cost of production.
3. The total labour cost per unit or job is accurately ascertained if this system is employed.

### **Disadvantages**

1. Since the workers are paid for the quantity of units produced irrespective of the time they have spent, they take no precaution to improve the quality of products.
2. Rough use of tools and machine at the workplace by workers.
3. Speedy and excessive work, in a bid to earn more, proves injurious to the health of the worker.

### ***Knowledge Assessment - II***

**1. Under time wage system, wages are paid according to:**

- a) Quantity of output
- b) Time spent in the organisation
- c) Time and output both
- d) None of the above

**2. Under piece wage system, wages are paid according to:**

- a) Quantity of output
- b) Time spent in the organisation
- c) Time and output both
- d) None of the above

**3. Which of the following is not the advantage of piece wage system**

**3. Which of the following is not the advantage of piece wage system**

- a) Labours are self motivated to work and complete the targets.
- b) Labours get flexible work environment as employers are concerned with the output than the time consumed by the workers at work place.
- c) Sometimes, under this method, labours compromise with the quality of product in the hurry of completing the targets.
- d) This method of wage payment increases the efficiency and productivity of the workers.

**4. Piece wage system is suitable in which of the following situations**

- a) Piece wage system is suitable where close supervision is not possible.
- b) This is also suitable in the highly demanding industries.
- c) This method is also suitable in the industry where more emphasize is given on the quantity than quality.
- d) All of the above

**5. Which of the following is the disadvantage of the time wage system**

- a) It is difficult to make distinction between efficient and inefficient workers.
- b) Labour get flexible work environment as employers are concerned with the output than the time consumed by the workers at work place.
- c) Sometimes, under this method, labours compromise with the quality of product in the hurry of completing the targets.
- d) This method of wage payment increases the efficiency and productivity of the workers.

*Ans: 1(b), 2(a), 3(c), 4(d), 5(a)*

**SESSION: 3 INCENTIVE PLANS**

**MEANING OF INCENTIVE**

Incentive is additional wages paid to workers for improving their efficiency and to motivate them. Various incentive plans are available according to the need and suitability of the organisation. These plans are also helpful in overcoming the loopholes of both types of wage payment plans be it piece wage system or time wage system.

## Factors before Introducing Incentive Plans

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

**Stringent Quality Control Measures:** For introducing the incentive plans on the basis of production stringent quality control measures should be implemented in the organisation. In case quality assurance is not possible in the existing system then workers should be paid on time basis incentive plans should not be introduced.

**Stringent Quantity Measurement Techniques:** Where the quantity of work done cannot be measured precisely, incentive schemes cannot be offered.

**Fixation of Performance Standards:** Standard of performance should be precisely decided by the management and should be properly communicated to the employees before introducing the incentive plans. When this requires heavy expenditure, incentive schemes may be rather costly.

**No Discrimination:** With the introduction of incentive plans workers should not feel discrimination. If for instance, an incentive scheme makes it possible for unskilled workers to earn high wages, the wage rates for skilled workers must also be raised (if they are paid on time basis) to avoid dissatisfaction among them. In that event, the incentive scheme may raise labour cost instead of lowering it. If incentive plans are creating discrimination amongst the employees then it might badly affect the efficiency of the workers.

**Cost Benefit Analysis:** Before implementation incentive plans should be analyzed in terms of cost and benefit received to the organisation from the same. Benefits accruing to the firm should be more than the cost incurred in its implementation.

## INCENTIVE PLANS

**Taylor's Differential Piece Work System**—This method was introduced by F.W. Taylor's for wage payment by which the goal of maximum output may be achieved. Differential Piece Rate System aims at rewarding efficient workers by providing increased piece rate beyond certain level of output. Under this system two widely differing piece rates are prescribed for each job. The low rate is 83% of the normal piece rate and the high rate is 125% of the normal piece rate. In other words the high rate is 150% of the low rate. The low rate is given to a worker when his efficiency level is less than 100%. The high rate is offered at efficiency level of either 100% or more. Due to the existence of the two piece rates, the system is known as differential piece rates system.

### Advantages

1. It is simple to understand and operate.
2. The incentive is very good and attractive for efficient workers.
3. It has a beneficial effect where overheads are high as increased

production has the effect of reducing the incidence per unit of production.

### Disadvantages

1. This system is quite harsh to workers.
2. A slight reduction in output may result in a larger reduction in the wages of the workers.
3. This system is no longer in use in its original form.

### Illustration 1 (Calculation of Earnings under Taylor's Differential Piece Rate System)

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

Standard time per piece	20 minutes
Normal rate per hour (in an 8 hours day)	9.00
Amar produced	23 units
Akbar produced	24 units
Ali produced	30 units

### Solution:

Wages of worker Amar, Akbar and Ali under Taylor's plan will be as follows:

	Amar	Akbar	Ali
Standard output per day (in units) (8 hours X 60 minutes)/20 minutes	24	24	24
Actual output per day (in units)	23	24	30
Efficiency % $= \frac{\text{Actual Output}}{\text{Standard Output}} \times 100$	95.83%	100%	125%
Earning rate per unit	83% of piece rate	125% of piece rate	125% of piece rate
Earning rate per unit (*Refers to working note)	2.49	3.75	3.75
Earnings (Rs.)	2.49 X 23 = 57.27	3.75 X 24 = 90	3.75 X 30 =112.5
Under Taylor's Differential Piece Rate System, two widely different price rates are prescribed for each job. The lower rate is 83% of the normal piece rate and is applicable if efficiency of the worker is below 100%. The higher piece rate is 125% of the normal piece rate and is applicable if work completed is at efficiency level of 100% and above.			

### Merrick Differential Piece Rate System

Under this system three piece rates for a job are fixed. None of the fixed rates is below the normal. These three piece rates are as below:

Efficiency Levels	Piece Rate Applicable
Efficiency Upto 83%	Normal Rate
Above 83% and upto 100%	10% above normal rate.
Above 100%	20% or 30% above normal rate.

This system is an improvement over Taylor's Differential Piece Rate System but this method also does not guarantee for the minimum wages is major drawback of this method. The general criticism leveled against Taylor's plan also applies to it except that it lessens the punitive character of Taylor's plan.

### Illustration 2 (Calculation of Earnings Under Merrick Differential Piece Rate System)

Standard Output	150 units per day of 8 hours
Piece Rate	0.20 per unit
Output of A 100 units, B 135 units and C 180 units.	

Calculate the earnings of A, B and C workers under Merrick's Differential Piece Rate System

#### Solution:

	A	B	C
Standard output per day (in units) (8 hours X 60 minutes)/20 minutes	150	150	150
Actual output per day (in units)	100	135	180
Efficiency % $= \frac{\text{Actual Output}}{\text{Standard Output}} \times 100$	$\frac{100}{150} \times 100$ = 66.67%	$\frac{135}{150} \times 100$ = 90%	$\frac{180}{150} \times 100$ = 120%
Rate applicable per unit	.20 per unit (Normal Rate)	.20 X 110% = Rs. 0.22	0.20 X 120% = Rs. 0.24
Earnings (Rs.)	100 units X Rs. 0.20 = 20	135 units X Rs. 0.22 = 29.70	180 units X Rs. 0.24 = 43.20

**Gantt Task and Bonus System:** This system provides

combination of time and piecework system. In this incentive plan, guaranteed payment will be made according to the time and if the standards are achieved or exceeded, the payment to the concerned worker is made at a higher piece rate.

Thus, even if the worker does not attain the standard he will get the guaranteed wages as time rate. Wage calculations under this plan are as follows:

Efficiency Levels	Rate Applicable
Output below standard	Guaranteed time rate.
Output at standard	Time rate + bonus of 20% (usually) of time rate.
Output above standard	High piece rate on worker's whole output. It is so fixed, so as to include a bonus of 20% of the time rate.

### Advantages

1. It motivates the workers by protecting their minimum wages in any situation and also provides incentive to the efficient workers.
2. It is simple to understand and operate.
3. It encourages better supervision and planning.

### Disadvantages

1. Minimum guaranteed time rate may provide leverage to the workers and they might be lethargic.

### Illustration 3 (Calculation of wages under the Gantt System)

In a factory the standard time allowed for completing a given task (50 units), is 8 hours. The guaranteed time wages are 20 per hour. If a task is completed in less than the standard time, the high rate of 4 per unit is payable. Calculate the wages of a worker, under the Gantt system, if he completes the task in

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

### Solution

(i)	When the worker performs the task in 10 hours, his earnings will be at the time wage rate i.e. $10 \text{ hours} \times 20 \text{ per hour} = 200$ .
(ii)	When the worker performs the task in standard time i.e. in 8 hours, his earnings will be: $8 \text{ hours} \times 20 = 160$ Bonus @ 20% of time wages = 32 Total earnings 192
(iii)	When the worker performs the task in less than the standard time his earnings will beat



piecerate <i>i. e.</i> 50units × 4perunit = 200
The comparative rate of earnings per hour under the above three situations is:
(i) Rs.200/10hrs.=20perhour
(ii) Rs.192/8hrs.=24perhour
(iii)Rs.200/6hrs.=33.33perhour

**Emerson's Efficiency System:** Under this system minimum time wages are guaranteed. But beyond a certain efficiency level, bonus in addition to minimum day wages is given.

A worker who is able to attain efficiency, measured by his output equal to 2/3<sup>rd</sup> of the standard efficiency, or above, is deemed to be an efficient worker deserving encouragement.

The scheme thus provides for payment of bonus at a rising scale at various levels of efficiency, ranging from 66.67% to 150%.

Efficiency Levels	Rate Applicable
Below 66.67%	Only time rate
Above 66 2/3% to 100%	Bonus varies between 0.01% and 20%.
Above 100%	Bonus of 20% of basic wages plus 1% for each 1% increase in efficiency is admissible.

### Advantages

- It motivates the comparatively slow workers to work at least beyond a certain level to be eligible for the bonus.
- It also releases stress of the workers by not expecting high degree of average performance.
- Wages on time basis are guaranteed.

### Illustration 4

Standard output in 8 hours	60 units
Actual output in 8 hours	72 units
Time rate	Rs. 2 per hour
Calculate the earnings under Emerson's plan.	

### Solution 4

Efficiency in % = $\frac{72}{60} \times 100 = 120\%$	
Bonus % = 20% + 20% = 40%	
Total wages in 8 hours @ Rs. 2	= 16.00
Add: Bonus 40% of 16	= 6.40
Total Earnings	Rs. 22.40

### Points Scheme or Bedeaux

**System:** Under this scheme, firstly the quantum of work that a worker can perform is expressed in Bedeaux points or B's. These points represent the standard

time in terms of minutes required to perform the job. The standard numbers of points in terms of minutes are ascertained after a careful and detailed analysis of each operation or job. Each such minute consists of the time required to complete a fraction of the operation or the job, and also an allowance for rest due to fatigue.

Workers who are not able to complete tasks allotted to them within the standard time are paid at the normal daily rate. Those who are able to improve upon the efficiency rate are paid a bonus, equal to the wages for times saved as indicated by excess of B' earned (standard minutes for work done) over actual time. Workers are paid 75% of the times saved.

**Hayne's System:** Under this system, also the standard is set in minutes. The standard time for the job is expressed in terms of the standard man-minutes called as "*MANIT*". In the case of repetitive work the times saved is shared between the worker and the foreman in the ratio 5:1. If the work is of non-repetitive nature, the worker, the employer and the foreman share the value of times saved in the ratio of 5:4:1. Each worker is paid according to hourly rate for the time spent by him on the job.

**Premium Bonus Methods:** Under these methods, standard time is established for performing a job. The worker is guaranteed his daily wages (except in Barth System), if his output is below and up to standard. In case the task is completed in less than the standard time, the worker will get the bonus for the time saved.

**Halsey and Halsey Weir Systems:** Under **Halsey System** a standard time is fixed for each job or process. If there is no saving on this standard time allowance, the worker is paid only his day rate. He gets his time rate even if he exceeds the standard time limit, since his day rate is guaranteed. If, however, he does the job in less than the standard time, he gets a bonus equal to 50 percent of the wages of times saved; the employer benefits by the other 50 percent. This scheme also is sometimes referred to as the Halsey fifty percent plan.

Formula for calculating wages under **Halsey System**

$$= \text{Time Taken} \times \text{Time Rate} + 50\% \text{ of Time Saved} \times \text{Time Rate}.$$

The **Halsey Weir System** is the same as the Halsey System except that the bonus paid to workers is 30% of the times saved i.e.

$$= \text{Time taken} \times \text{Time rate} + 30\% \text{ of times saved} \times \text{Time rate}.$$

### **Advantages**

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

### **Disadvantages**

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

### Illustration 5

Standard time fixed	20 hours
Time Taken	16 hours
Hourly Rate	Rs. 2 per hour
Calculate the total earnings of the worker under Halsey Plan	

### Solution 5

Minimum wage = Time taken x Hourly rate = 16 x Rs. 2 = Rs. 32
Amount of Bonus = Time Saved x Rate x 50%
= (Standard time – Actual time) x Rate x 50%
= (20 – 16) x 2 x 1/2
= 4
Total Earnings = Rs. 32 + Rs. 4 = Rs. 36

**Rowan System:** According to this system a standard time allowance is fixed for the performance of a job and bonus is paid on the times saved. Formula for calculating wages under Rowan system is as follows:

$$= \text{Time taken} \times \text{Rate per hour} + \frac{\text{Time allowed} - \text{Time taken}}{\text{Time allowed}} \times \text{Time allowed} \times \text{Rate per hour}$$

### Advantages

1. It is claimed to be a fool-proof system inasmuch as a worker can never double his earning even if there is bad rates setting.
2. It is admirably suitable for encouraging moderately efficient workers as it provides a better return for moderate efficiency than under the Halsey Plan.
3. The sharing principle appeals to the employer as being equitable.

### Disadvantages

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

### Knowledge Assessment -III

1. **Good incentive plan must consists which of the following characteristics:**
  - a) It should automatically assist supervision and, when necessary, aid team work.
  - b) It should have employee's support and in no way should it be paternalistic.
  - c) It should not be used temporarily and dropped in recession times as means of wage reduction.
  - d) All of the above



## SESSION 4: LABOUR TURNOVER AND DIRECT EXPENSES

Labour Turnover may be defined as "the rate of changes in labour force, i.e., the percentage of changes in the labour force of an organization during a specific period. Frequent and higher labour turnover rate will affect the efficiency of the workers and operational efficiency of the firm as well. In case of high labour turnover rate cost of recruitment and training will increase and at end will impact to the overall profitability of the firm. The determinant result of labour turnover is expressed in terms of percentage.

### Methods of Measurement of Labour Turnover

There are three methods of measurement of labour turnover. The details of the methods are as follows:

1. **Separation Method:** In this method, percentage of people left or discharged from the organisation over average number of workers in the organisation will be considered for measuring the labour turnover.

$$\text{Labour Turnover} = \frac{\text{No. of employees separated during a period}}{\text{Average Number of workers during the period}}$$

2. **Replacement Method:** Under this method, labour turnover will be measured by taking into consideration the number of employees replaced during a period over average workers during the period.

$$\text{Labour Turnover} = \frac{\text{No. of employees Replaced during a period}}{\text{Average Number of workers during the period}}$$

3. **Flux Method:** In this method, labour turnover will be measured by taking into consideration both the number of employees separated and replaced during a period over average workers during the period.

$$\text{Labour Turnover} = \frac{\text{No. of employees separated} + \text{No. of employees Replaced}}{\text{Average Number of workers during the period}}$$

### Illustration 6

The following information relates to the personnel department of a factory for the month of April, 2005:

Number of employees on April 1, 2005	950
Number of employees on April 30, 2005	1,050
Number of workers who quit the factory in April	10
Number of workers discharged in April	30
Number of workers engaged in April (Including 120 on account of expansion scheme)	140
Calculate the labour turnover rate and equivalent annual rate under the different methods	

## Solution

### (1) Replacement Method

No. of Replacement = 20 workers

$$\text{Average No. of Workers} = \frac{950+1050}{2} = 1,000$$

$$\text{Labour Turnover} = \frac{\text{No. of replacements}}{\text{Average Number of workers}} \times 100$$

$$\frac{20}{1000} \times 100 = 2\%$$

$$\text{Equivalent Annual Turnover Rate} = \frac{2 \times 365}{30} \times 100 = 24.33\%$$

### (2) Separation Method

$$\text{Labour Turnover} = \frac{\text{No. of Separations}}{\text{Average Number of workers}} \times 100$$

$$= \frac{10+30}{1000} \times 100 = 4\%$$

$$\text{Equivalent Annual Turnover Rate} = \frac{4 \times 365}{30} \times 100 = 48.67\%$$

### 3. Flux Method

$$\text{Labour Turnover} = \frac{\text{No. of Employees Separated} + \text{No. of Employees Replaced}}{\text{Average Number of Workers during the Period}}$$

$$\text{Labour Turnover} = \frac{40+20}{1000} \times 100 = 6\%$$

$$\text{Equivalent Annual Turnover Rate} = \frac{6 \times 365}{30} \times 100 = 73\%$$

### Causes for Labour Turnover:

The causes for labour turnover can be classified into two categories:

- (1) Avoidable Causes
- (2) Unavoidable Causes.

#### Avoidable Causes

1. Problem in the work environment.

2. Worker's dissatisfaction with the job or the boss.
3. Dissatisfaction with salary and incentives.
4. Lack of proper appraisal system.
5. Biased attitude of the supervisors.

### **Unavoidable Causes**

1. Exit of employee due to death or retirement.
2. Employees left the job because of relocation.
3. Dismal or discharged due to inefficiency or disciplinary ground.
4. Employees may exit the organisation because of their Personal reasons.
5. If employees is getting better opportunity then also they will exit the organisation.

### **DIRECT EXPENSES**

Direct expenses are the expenses which can be directly allocated to a particular product or cost unit. It includes expenses other than material and wages. These expenses are directly chargeable to a particular unit. For instance

- (i) Cost of hiring machinery or plant
- (ii) Cost of special moulds design and patterns
- (iii) Cost of transport to the site of the job or operation.
- (iv) Cost of defective work e.g. where several trial castings are necessary before an appropriate one is obtained.
- (v) Cost of hiring experts and technicians for a particular product.
- (vi) Sub-contracting expenses.

### **Features of Direct Expenses**

1. Direct expenses are useful to a specific production process or a single work order.
2. Direct expenses are included under prime cost of a product or service.
3. Allocation of direct expenses to cost centre is complete. There is direct charge and question of their apportionment does not arise.

### ***Knowledge Assessment -IV***

**State whether the following statements are True or False:**

1. Labour turnover and labour retrenchment can be use used interchangeably.
2. Direct expenses can be directly associated with a particular product.
3. Direct expenses are not included under prime cost of a product or service.
4. Flux method only takes into consideration the number of employees separated.
5. Worker's dissatisfaction with the job or the boss is the unavoidable cause of labour turnover.

***Ans: 1 (False), 2 (True), 3 (False), 4(False), 5(False)***

## KEYWORDS

- **Labour Cost:** the cost incurred on human resources or workers in any manufacturing process. Labour is the most important component of total cost of a product.
- **Direct Labour:** an employee which can be directly associated or identifiable with a particular product or manufacturing process.
- **Wage Abstract:** synopsis of the wages incurred on the individual jobs.
- **Idle Time:** the time spent by the workers in the non-productive activities at the work place.
- **Time Study:** helpful in determining the standard time for an operation on the basis of the observations of the ongoing operations.
- **Motion Study:** conducted by recording the movement of the workers and machines on the job. The purpose of the motion studies is to replace the ineffective processes or methods of work by effective, efficient and least tiring processes.
- **Labour Turnover:** percentage of change in labour work force during a particular period.
- **Overtime:** the extra time spent by the workers on the job than the normal working hours.

## SUMMARY

- Labour refers to the work force which contributes towards the completion of the manufacturing process of any organisation.
- Labour which is directly associated with a manufacturing process or his contribution is directly identifiable with a particular process will be called as direct labour.
- Worker's remuneration is based on the hours spent by the workers on the job under time wage payment system. Under this system workers are more concerned about completing their time on the job rather than the output on the job.
- Under piece wage payment system compensation is paid on the basis of units produced by the workers. Time spent by the workers on the workplace is irrelevant for the wage calculation under this method.
- Incentive plans are used by the employers to motivate the workers and for improving their efficiency at the work place. These plans are also helpful in overcoming the loopholes of both types of payment plans be it piece wage system or time wage system.
- Labour Turnover is defined as the rate of change in labour force or the percentage of change in the labour force in an organization during a specific period. Higher rate of labour turnover indicates that labour is not stable and there are frequent changes in the labour force in the organization. It will affect the efficiency of the workers and overall profitability of the firm.
- Direct expenses are the expenses which can be directly allocated to a particular product or cost unit. It includes expenses other than material and wages. These expenses are directly chargeable to a particular unit.



## EXERCISES QUESTIONS

### Short Answer Questions

1. What do you mean by direct labour?
2. Differentiate direct and indirect labour.
3. Explain the term job evaluation.
4. What is motion study?
5. Explain the utility of motion study.
6. What is idle time?
7. What are the causes of idle time?
8. Name any two types of costs which are associated with labour turnover.
9. Differentiate job evaluation and merit rating.
10. What is time wage system?
11. What do you understand by piece wage system?
12. What is the use of 'Wage Abstract'?
13. Explain overtime premium.
14. Name any two non-monetary incentives.

### Long Answer Questions

1. What do you mean by direct labour and indirect labour? What is relevance of separating the direct and indirect labour in an organisation?
2. Explain 'Labour Turnover'. What are the major reasons of labour turnover and how can it be measured and controlled?
3. What is the time wage system? Explain its advantages and disadvantages to the employees and employers.
4. What is the piece wage system? Explain its advantages and disadvantages to the employees and employers.
5. Discuss the treatment of overtime in cost accounting.
6. Describe the following methods of wage payment
  - (i) Taylor's Different Piece Rate System
  - (ii) Rowan Scheme

(iii) Emerson's Efficiency Plan

7. Discuss various incentive plans under time wage system. Also elaborate their advantages and disadvantages.
8. Elaborate various incentive plans under piece wage system. Also elaborate their advantages and disadvantages.
9. What do you mean by direct expenses? State the features of direct expenses and also differentiate it with the indirect expenses.
10. What is idle time? Explain the causes leading to idle time and its treatment in cost accounting.
11. What is overtime? Explain the impact of overtime on the productivity of the workers.

### Numerical Questions

Q1 What will be the earnings of a worker at re 0.55 per hour when he takes 140 hours to do volume of work for which the standard time allowed is 200 hours? The plan of payment of hours is on a sliding scale as under:

Within the first 10% saving in standard time	Bonus is 40% of time saved.
Within the second 10% saving in time	Bonus is 50% of time saved.
Within the third 10% saving in standard time	Bonus is 60% of time saved
Within the fourth 10% saving in standard time	Bonus is 70% of the time saved.
For the rest	bonus is 75% of the time saved

Q2

Standard time fixed	25 hrs
Time taken	16 hours
Hourly rate	Rs 2 per hour
Calculate total earning by Halsey Plan.	

Q3 With the help of the following information you are required to ascertain the wages paid to worker Somu and Balu Taylors differential piece rate system:

Standard time allowed	40 units per hour
Simple time wages	Rs 4 per hour
Differential rates to be applied :	
75% of piece rate when below standard.	
125% of piece rate when above the standard .	
The workers have produced in a day 8 hours as follows:	
Somu 240 units and Balu 400 units.	

Q4 A worker, whose daily work wages is Rs. 2.50 an hour, received production bonus under the Rowan Plan. He carried out the following works in a 48 hours week.

Job 1	1,500 items at 4 hours per 1000
Job 2	1,800 items at 3 hours per 1000
Job 3	9,000 items at 6 hours per 1000
Job 4	1,500 items for which no "Standard Time" was fixed and it was arranged that the worker would be paid a bonus of 25%. Actual time taken on the job was 4 hours
Job 5	2,000 items at 8 hours per 1,000 each items was estimated to be half finished

Job No. 2 was carried out on a machine running at 90% efficient and an extra allowance of 1/9<sup>th</sup> of actual time was given to compensate the worker. 4 hours were lost due to power cut. Calculate the earning of the worker, clearly stating your assumptions for the treatment given by you for the hours last due to power cut.

(Ans: Total Wages: Rs. 158.73)

Q5 Following information has been given for calculating the wages of the workers under various plans:

Hourly wage rate	Rs. 7.50
Piece rate per unit	Rs. 3.00
Normal time taken per piece	20 minutes
Normal output per week	120 pieces
Actual output for the week	150 pieces
Differential piece rate	80% of piece rate output below normal and 120% of piece rate when output above normal.
Weekly working hours	48

Calculate the wages of a worker under below mentioned plans:

- Straight Piece Rate
- Differential Piece Rate
- Halsey Premium Scheme (50% sharing)
- Rowan Premium Scheme

(Ans: (a) Rs. 450 (b) Rs. 540 (c) Rs. 367.50 (d) Rs. 374.40)

Q6 In a factory under bonus system, bonus hours are calculated to the employee in a the proportion of time taken which time saved bears to time allowed. Jobs are carried forward from

one week to another. Now overtime is worked and payment is made in full for all units worked on, including those subsequently rejected. From the following information, you are required to calculate for each employee:

- (a) Bonus hours and amount of bonus earned.
- (b) Total wages cost.
- (c) Wages cost of each unit produced.

<b>Employee</b>	<b>A</b>	<b>B</b>	<b>C</b>
Basic wage rate per hour	Rs. 5	Rs. 8	Rs. 7.5
Units issued for production	2,500	2,200	3,600
Time allowed for 100 units	2H 36 M	3 H	1H
Time taken	52 H	75 H	48 H
Rejections	100 Units	40 Units	400 Units

**(Ans: Wages per unit for product A: Rs. 0.13, B: 0.28, C: 0.125)**

Q7 Calculate Labour Turnover Rate by applying following methods with the given information:

- (a) Flux Method
- (b) Replacement Method
- (c) Separation Method

No. of workers on the payroll:

At the beginning of the month	500
At the end of the month	600

During the month, 5 workers left, 20 persons were discharged and 75 workers were recruited. Of these, 10 workers were recruited in the vacancies of those leaving and while the rest were engaged for an expansion scheme.

**(Ans: (a) 6.36% (b) 1.82% (c) 4.54%)**

#### UNIT 4: OVERHEADS – GENERAL

<b>Unit Code:</b>	<b>UNIT TITLE: OVERHEADS - GENERAL</b>			
<b>4</b>	Duration:			
<b>Location:</b>	<b>SESSION 1: CLASSIFICATION OF OVERHEADS</b>			
Classroom	<b>Learning Outcome</b>	<b>Knowledge Evaluation</b>	<b>Performance Evaluation</b>	<b>Teaching and Training Method</b>
	1. Overhead classification	1. Identify the different basis of classifying overheads	1. Summarise the classification of overheads with respective explanation	<b>Interactive Lecture:</b> Basic Overview of classification of overheads
	2. Sources of information	1. Elucidate the various sources from which overhead information can be gathered	1. Enumerate the sources of overhead information	<b>Interactive Lecture:</b> Discussion of collection of overhead information from different sources
	<b>SESSION 2: COMMENT ON DIFFERENT ITEMS OF OVERHEADS IN COST ACCOUNTING</b>			
	1. Items of factory overheads	1. Explain the various items under factory overheads	1. Describe the different factory overheads	<b>Interactive Lecture:</b> Explain the basics of items of factory overheads
	2. Office and Administrative overheads	1. Identify the various costs covered under office and administrative overheads along with their treatment	1. Explain the different office and administrative overheads	<b>Interactive Lecture:</b> Discuss the different office and administrative overheads
3. Selling and Distribution overheads	1. Explain the various items under Selling and Distribution overheads	1. Classify and elucidate the Selling and Distribution overheads	<b>Interactive Lecture:</b> Deliberate upon the Selling and Distribution overheads	

## **UNIT – 4: OVERHEADS - GENERAL**

### ***Learning Objectives:***

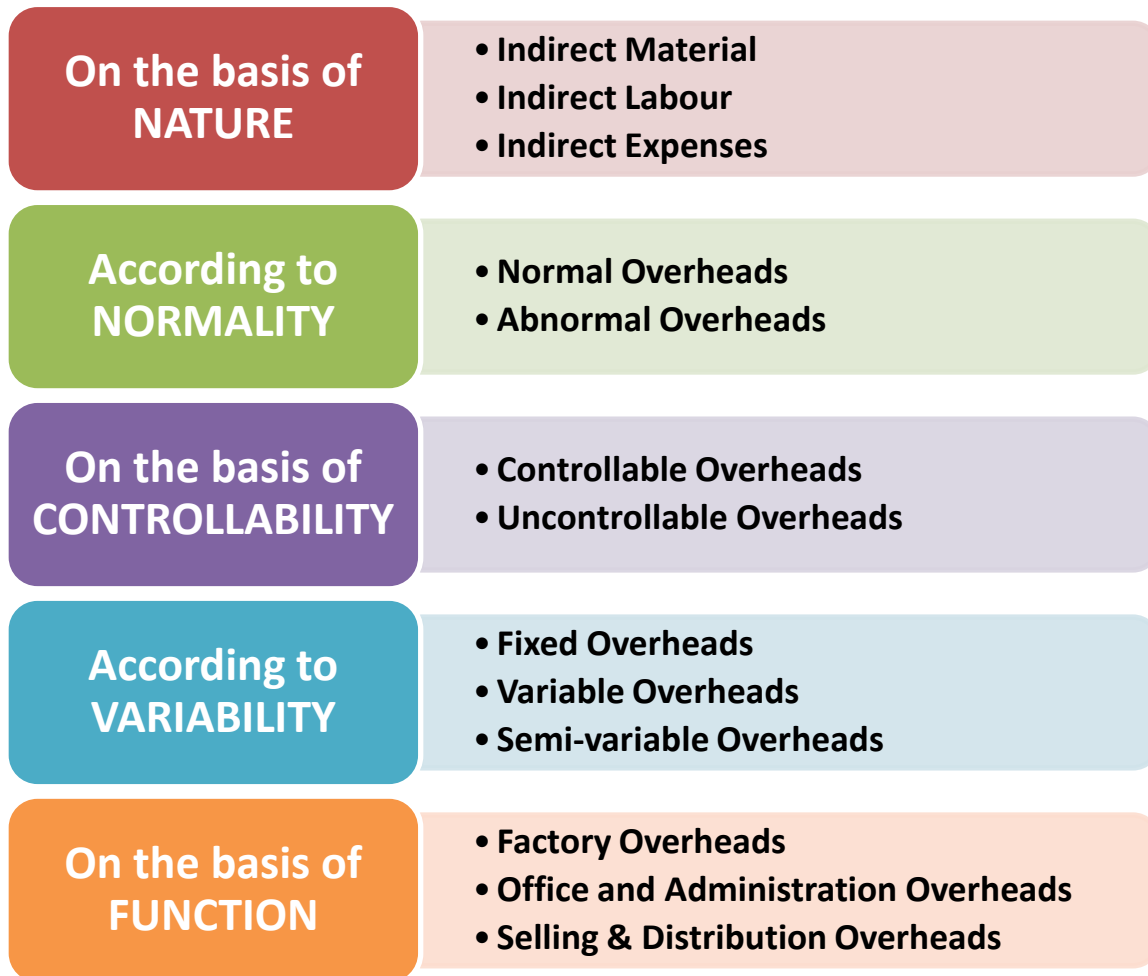
**After reading this unit, the students will be able to:**

1. Classify the overheads on different basis,
2. State the inclusions under factory, office & administration and selling overheads;
3. Comprehend the treatment of different items of overheads and
4. Explain the meanings of certain keywords.

### **SESSION 1: CLASSIFICATION OF OVERHEADS**

Overheads, also termed as indirect or supplementary costs, are those costs which cannot be identified with a particular cost center or cost unit. Overheads are the aggregate of indirect material, indirect labour and indirect expenses. These indirect costs are incurred not for one product unit or cost center, but for multiple cost units or cost centers. The cost of overheads should be appropriately apportioned to these multiple cost units or cost centers at the time of determination of the total cost of different products.

Overheads may be classified on the basis of their nature, variability, function and other characteristics. A summary of the classification can be depicted as follows:



The above summary can be explained as follows:

1. **On the basis of NATURE or ELEMENTS**

- a) **Indirect Material** refers to that category of materials which do not form a part of the finished product or cannot be identified to the product conveniently. For example: consumable stores, loose tools, nuts, bolts, lubricating oil, threads, fuel, stationery
- b) **Indirect Labour** refers to the cost of labour which is not engaged directly for production of goods and services. For example: salary of supervisor, electrician, works manager, watchman

- c) **Indirect Expenses** are costs other than indirect materials and indirect labour which cannot be directly identified with a job or product. For example: rent, repairs, taxes, depreciation, insurance.

## 2. According to NORMALITY

- a) **Normal Overheads** are overheads which are expected to be incurred in attaining a given level of output in the normal course of business, and are thus, included in the cost of production.
- b) **Abnormal Overheads** are generally not expected to be incurred in attaining a given level of output in the normal course of business, and are thus, charged to costing profit and loss account.

## 3. On the basis of CONTROLLABILITY

- a) **Controllable Overheads** are those which can be controlled by executive action at the point of their occurrence.
- b) **Uncontrollable Overheads** are those indirect expenses which are beyond the control of the management. Examples; factory rent, office salaries, depreciation and legal expenses.

For example, cost of power used in a particular department can be controlled by the departmental manager but the share of general lighting costs in the factory cannot be controlled by him.

## 4. According to VARIABILITY

- a) **Fixed Overheads**, also called period costs or capacity costs, remain fixed or constant in total despite changes in the volumes of production or sale. These costs are not affected during a given period by a change in output provided such change in output is not substantial in nature. For example: rent, interest.
- b) **Variable Overheads** vary proportionately i.e. in the same ratio with the production and sales volume. They increase in total with the increase in volume and vice versa. For example, sales commission
- c) **Semi-variable Overheads** are neither completely fixed nor entirely variable. They vary disproportionately with the change in the volume of output. For example, depreciation will increase due to wear and tear of machine if output is doubled, but the increase in depreciation will not be proportionate to the increase in the output.

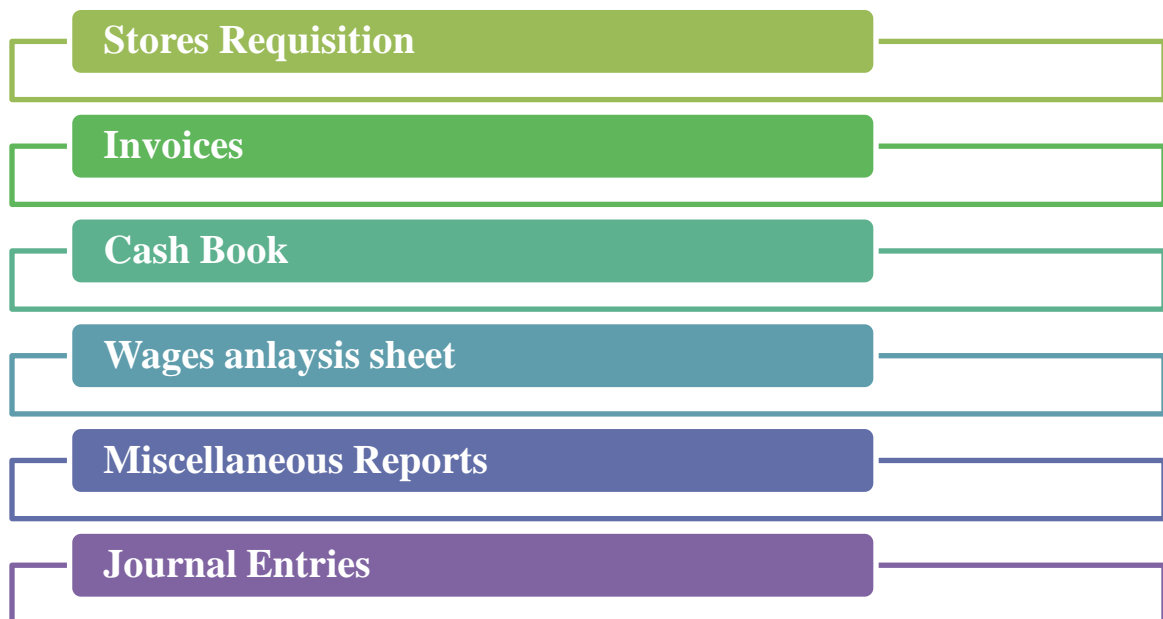
## 5. On the basis of FUNCTION



- a) **Factory Overheads**, also known as production or works or manufacturing overheads, are indirect expenses incurred in converting raw material into finished goods. For example, power, factory rent, factory insurance
- b) **Administration Overheads** are incurred in connection with the general administration of the company. For example, office salaries, office rent, printing and stationery, telephone expenses
- c) **Selling & Distribution Overheads**
  - **Selling Overheads** are incurred for creating demand, attracting potential customers and retaining old customers. For example, free gift, advertisement
  - **Distribution Overheads** are incurred in maintaining stocks and delivering the goods to customers. For example, carriage and freight out, warehouse expenses

This functional classification is a conventional method of classifying overheads so as to ascertain the cost of each function for controlling costs.

## SOURCES OF OVERHEAD INFORMATION



Information regarding overheads can be collected from any or all of the above sources like cost of stores can be computed from the invoices for store purchases with the purchase department and wages analysis sheet will give a fair picture of the indirect wages incurred.

### ***Knowledge Assessment – I***

Fill in the blanks with appropriate words:

1. Overheads are also termed as \_\_\_\_\_ or \_\_\_\_\_.
2. Overheads can be classified as \_\_\_\_\_ and \_\_\_\_\_ on the basis of normality.
3. \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_ overheads are included under functional classification.
4. Overheads incurred for creating demand, attracting potential customers and retaining old customers are known as \_\_\_\_\_.
5. \_\_\_\_\_ are incurred for converting raw material into finished goods.

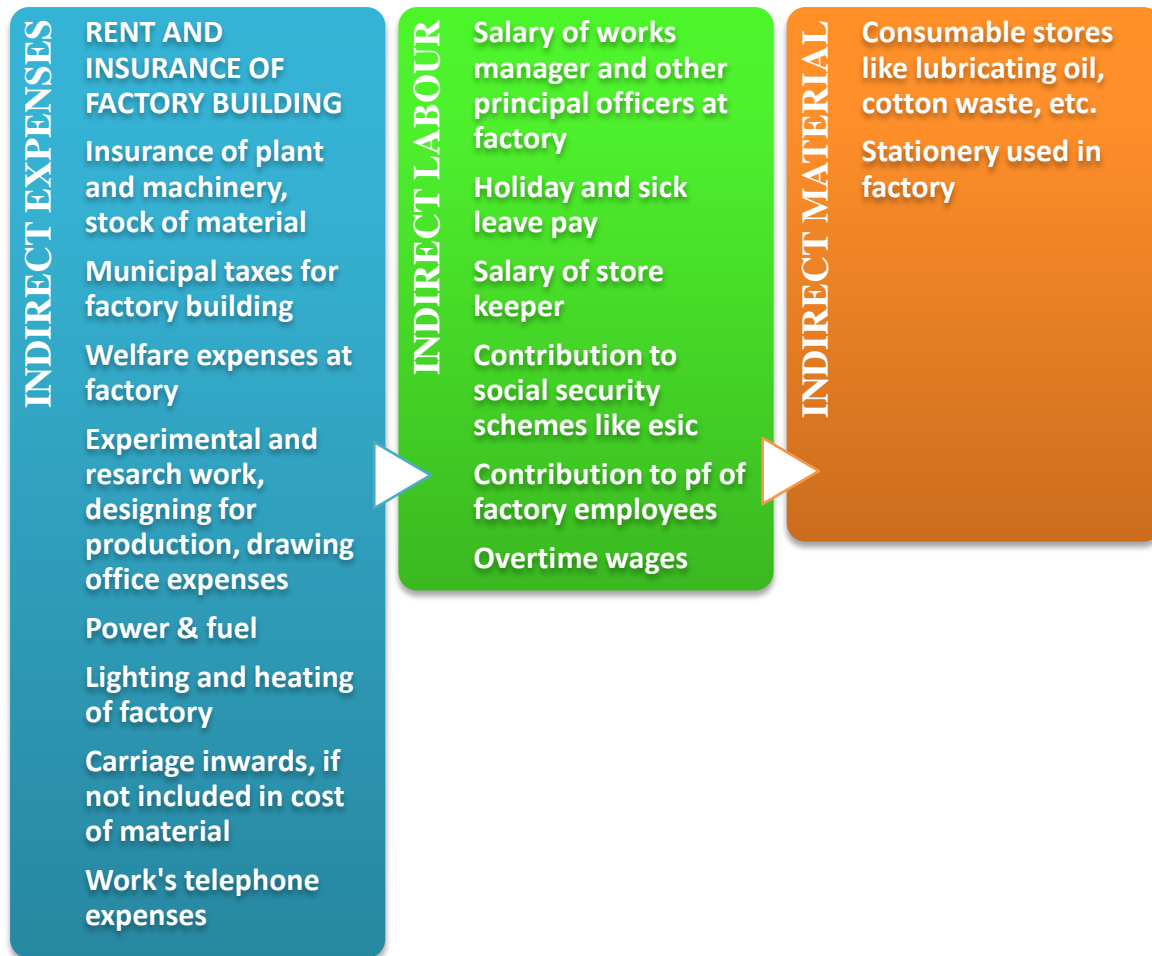
***Ans: (1) (indirect costs, supplementary costs), (2) (normal overheads, abnormal overheads), (3) (Factory, Office and Administration, Selling & Distribution), (4) (selling overheads), (5) (Factory Overheads)***

## **SESSION 2: DIFFERENT ITEMS OF OVERHEADS IN COST ACCOUNTING**

Before understanding the treatment of various items of overheads, it is imperative to identify the inclusion of these items under respective categories of overhead. Firstly, factory overheads and their treatment have been elucidated.

### **FACTORY OVERHEADS**

Works overheads or manufacturing overheads refer to indirect factory-related costs that are incurred when a product is manufactured. They consist of :



Some factory overheads have been discussed in detail as follows:

### 1. DEPRECIATION

Depreciation implies diminution in value of fixed asset arising as a result of wear and tear because of its usage &/or lapse of time. In cost accounts, to find the true cost of manufacturing product, depreciation must be charged.

Some methods of charging depreciation are:

- **Fixed Installment Method** wherein a fixed amount of depreciation, calculated using original cost, scrap value and expected life, is charged year after year.
- **Machine Hour Rate Method** wherein the life of the asset is estimated in terms of hours. The rest is same as the previous method. The original cost less scrap value is divided by the life of the asset to calculate the amount of depreciation.
- **Diminishing Balance Method** charges depreciation at a fixed rate on the reducing balance (i.e. cost less depreciation) every year.

As compared to above methods, diminishing value method charges higher amount of depreciation in initial years.

- **Revaluation Method** calculates depreciation by comparing the value of the asset at the beginning of the year with that at the end of the year. It is usually used in case of livestock, loose tools etc.
- **Replacement Cost Method** charges depreciation at affixed rate on the replacement value of the asset so as to provide for market value of asset on expiry of useful life and consider the current costs of production.

*Note: In case an asset's depreciation value ceases to exist even if the asset is in good working condition, it is advisable to charge a reasonable amount of depreciation in cost accounts and this charge should be transferred to costing profit and loss account like other abnormal profit or loss. Also, if a machine is discarded before the expiry of its useful life because of its premature obsolescence, then the difference between book value and value realized on sale should be considered as abnormal loss and transferred to costing profit and loss account.*

## **2. COST OF DEFECTIVE WORK**

Defectives are said to be normal when they are inherent in the nature of manufacturing process. In case of normal defectives, the cost of their rectification should be spread over the entire output. In other words, it is included in cost of production. If the number of defectives is more than the normal limit or there are abnormal defectives, then the cost their rectification is directly transferred to the Costing Profit and Loss Account.

## **3. PROVISION FOR OBSOLESCENCE**

A company may envision that the commercial life of the plant or machinery might be less than the estimated life used for calculating depreciation, then provision for obsolescence can be made. In such a case, this provision is treated as additional depreciation and included in factory overheads. If it is only a precautionary measure, then it should be excluded from cost accounts as it is an appropriation of profits.

## **4. EXPENSES ON REMOVAL AND/OR ERECTION OF MACHINE**

Such expenses are neither recurring expenses nor are a normal feature of working. Thus, they cannot be treated as cost of production.

The expenses of installation or erection of a new machine are capitalised and absorbed in the cost of production through depreciation. In case of dismantling and re-erection of machine due to change of location, such expenses may be treated as overhead.

If a machinery has been permanently dismantled before the expiry of its life because of its inadequacy or redundancy so as to accommodate new asset, then the difference between the cost and written off depreciation should be treated as abnormal loss. This loss after deducting therefrom any amount realised from the sale of machinery may be charged either in the same year or spread to the balance of the life of the machinery.

If such expense is incurred in any other case apart from those stated above, then such expense should be debited to costing profit and loss account.

#### **5. EXPERIMENTAL EXPENSES**

In case a company has incurred experimental expenses for particular job or order, they should be charged directly to that job or order while if the same have been incurred for the organization as a whole, then they should be added to works overhead.

#### **6. RENT FOR FACTORY BUILDING**

When a factory building is owned by the company, financial accounts do not record any amount as rent while in cost accounts, a reasonable charge should be included in works overhead so as to facilitate comparison.

#### **7. IDLE FACILITIES/CAPACITIES**

Firstly, it is important to understand the difference between idle facility and idle capacity. The former refers to idle plants, machines or services while the latter refers to that part of the capacity of the plant or equipment which is not actually or effectively utilized for production purposes, because of unavoidable reasons like lack of demand, non-availability of resources or avoidable faulty planning.

Idle facilities or capacities do not reduce the fixed cost burden like rent, insurance, etc. The treatment of such costs can be done as follows:

- a) If idle time of plant is due to unavoidable reasons, such costs should be included in works overheads and charged to utilized capacity by using a supplementary rate.
- b) If the facilities are idle due to abnormal reasons like trade depression, then consequent costs should be charged to costing profit and loss account.
- c) In case reasons are avoidable, such costs should be charged to costing profit and loss account.

#### **8. INTEREST ON CAPITAL**

The treatment of interest on capital in cost accounts is a controversial issue.

#### **Arguments in Favour of Inclusion of Interest in Expenses:**

(a) Interest cost is similar to cost of wages. Wages are paid for the use of labour while interest is paid for the use of capital. So, while determining the total cost, both wages and interest should be included in the cost of production.

(b) Comparison of cost will give misleading results if interest is not taken into consideration. For example, a timber merchant may buy standing trees and season the timber himself, waiting a number of years before he can use or sell it while another merchant may buy his timber already seasoned and, therefore, ready for use or sale. The second merchant will pay a much higher

price. For the purpose of cost comparison, the former merchant should add interest for the waiting period.

(c) It is impossible to compare profits on different jobs requiring different amounts of capital or requiring different periods for completion without including interest. For example, Job 1 completes in three months with Rs. 10,000 capital yielding Rs. 1500 as profit, while Job 2 requires Rs. 25,000 capital and is completed in four months yielding Rs. 2000 profit. Charging interest at 12 per cent, the profit on the first job is reduced to Rs. 1200 and on the second job to Rs. 1250. This facilitates better comparison.

(d) Decision regarding replacement of human labour by machinery or replacement of an existing machine by a new one will not be appropriate without adequate consideration of interest.

(e) Comparison of cost of articles with substantial value difference will be inappropriate without inclusion of interest as amount of capital required for each article will be significantly different.

(f) Interest inclusion is important in case of heavy and fluctuating stocks as they require different amounts of capital to maintain.

(g) While submitting tenders or quoting prices, interest on money required to undertake the job should be given due importance otherwise the price quoted may leave little margin as may be sufficient to pay interest only, leaving no profit.

#### **Arguments Against the Inclusion of Interest in Expenses:**

(a) Payment of interest is a matter of internal finance as it depends purely on the company's financial policies. A firm may work mostly with proprietor's capital or have more borrowed capital. The amount of interest would differ in each case and inclusion of such interest may give erroneous results.

(b) Identifying the amount of capital on which interest should be calculated is difficult. According to some people, interest should be allowed only on the fixed capital, as working capital is fluctuating. If interest has to be allocated to the various departments, the process becomes very tedious as it will require maintenance of complete and accurate records of capital invested, both fixed and working, in each department periodically.

(c) It is also difficult to determine a proper rate of interest, as it varies depending on a host of factors such as risk, period of maturity, bank rate, industry, nature of work, etc.

(d) Allowing interest on capital which is not borrowed will inflate the cost of production leading to over valuation of stock. However, reserves can be maintained against the unrealised profit.

(e) Inclusion of interest is not advisable when turnover is rapid and cost of each unit produced is small.

**Conclusion:** Inclusion of interest is theoretically sound but considering the associated practical difficulties, interest should be excluded from costing records, even the amount actually paid.

However, due consideration should be given to interest on capital while taking managerial decisions.

### 9. RESEARCH AND DEVELOPMENT COSTS

“Research cost is the cost of seeking new or improved products, applications of materials or methods. Development cost is the cost of the process which begins with the implementation of the decision to produce a new or improved product or to employ a new or improved method, and ends with the commencement of formal production of that product or by that method.” As defined by CIMA, London.

Research may be of two types, viz, fundamental or basic research and applied research.

- **Fundamental research** is done to investigate possibilities of technological developments and improving stock of basic knowledge in the know-how of technical process. It aims at increasing the knowledge of the technicians. Costs involved in basic research are recurring in nature. Expenses incurred on such fundamental researches are treated as manufacturing overheads.

- **Applied research** is concerned with application of basic research knowledge for introduction for the introduction or improvement of products, production methods or techniques.

PURPOSE OF EXPENSES ON APPLIED RESEARCH	TREATMENT
<b>Improvement in the existing products and/or methods of production</b>	-If incurred for a particular period, treated as manufacturing overhead of that period  -If ear-marked for specific product, charge directly to the product
<b>Searching new products or new methods of production</b>	- Allocate directly to specific research project - If the research project is a failure, debit such cost to Costing Profit and Loss Account  - If the research project is a success, debit to development cost

The development costs may be charged to specific products as revenue expenditure of the period in which they are incurred. In case of heavy costs, they can be charged as deferred revenue expenditure over a period, generally not exceeding three years. If product is abandoned at a later stage, the balance not written off may be charged to costing profit and loss account.

### 10. PRE-PRODUCTION COSTS

These costs are incurred in making trial production run before formal production, generally when a new product line is taken up or factory is new and in process of setting up. Such costs are

treated as deferred revenue expenditure and charged to future cost of production (*except those which have been capitalized*) as no formal or established production exists.

### ***11. ROYALTY AND PATENT FEES***

Royalties and patent fees have to be included in expenses. If they are based on quantity of output, then they will be part of manufacturing cost as a direct charge while if they are based on sales, they will form part of selling expenses. This is applicable on excise duty as well.

### ***12. MAINTENANCE AND REPAIRS***

The cost of maintenance and repairs can be known with ease if they are carried out by outside firms but quite often big manufacturers maintain their own repairs and maintenance department. For ascertaining the amount in such a case, an account for each repair job undertaken has to be separately opened under distinctive number for series known as “Service Orders”.

Works manager sanctions the repairs to be undertaken and then costing is done. The aggregate of material, labour and a proportionate charge for factory expenses is included in the factory expenses. Alternatively, the cost of repairs and maintenance facilities can be charged to various departments according to machine hours run.

### ***13. FUEL AND POWER***

The total charges for power consumed can be easily ascertained if electricity is bought from some outside authority. But for companies having their own generating stations, the cost of materials used, wages of working in the power house, other direct expenses and an equitable share of other overheads such as for general factory administration, stores etc. will be included in factory overheads as “fuel and power”. Such cost should then be apportioned to production departments according to the horse power of machinery installed.

### ***14. TOOL COSTS***

Tools can be small or large. Cost of large tools is generally capitalized and appropriate depreciation is charged in cost accounts as factory overheads. Small tools are mechanical appliances used in a work shop. Cost of small tools is generally charged to all departments on the basis of actual issues. Small tools can also be capitalized and depreciation thereon can be charged if their life can be ascertained or revaluation method of depreciation may be used to know the amount of depreciation to be charged as factory overheads. But this basis is not very desirable.

### ***15. INSURANCE***

The treatment of insurance differs from case to case.

- a) Insurance of plant and machinery, buildings and equipment should be allocated to particular departments or cost centres as items of overhead costs.
- b) Insurance expenses on warehouse stock are treated as distribution overhead.



- c) Insurance premium at the time of purchase may be added either in the value of raw materials or asset purchased.
- d) Insurance expenses on stock of raw materials are charged to manufacturing overhead.
- e) Insurance premium paid for safeguarding from burglary etc. is treated as administration overhead.
- f) Insurance premium paid on the fixed assets should be directly allocated. If not, then it may be apportioned on the basis of number or area or values or cubic capacity.
- g) Accident insurance expenses should be apportioned on the basis of total wages, by assigning appropriate weights to cost centres which are more prone to accidents.

### ***16. INCENTIVES TO INDIRECT WORKERS***

Direct workers are given incentives for better performance and efficiency. Similarly, indirect workers, i.e. those who are not directly engaged in production process, should also be provided with suitable monetary incentives. This compensation to indirect workers will be considered under factory overheads.

### ***17. LEAVE TRAVEL ASSISTANCE***

Cost of leave travel assistance provided to direct workers should be charged to direct labour cost while the same offered to indirect workers will be charged to factory, office & administration or selling & distribution overheads as the case may be.

### ***18. CARRIAGE AND CARTAGE EXPENSES***

Such expenses are incurred in the process of movement of materials and goods from one place to another. Their treatment can be explained as follows:

- a) If incurred specifically for certain raw materials, then they should be treated as direct charge. However, if they cannot be conveniently identified to specific raw materials, then they are charged as works overheads.
- b) If incurred for indirect material, they are charged as works overheads.
- c) If incurred for distribution of finished goods, they are treated as distribution overheads.
- d) If incurred under abnormal situations, then they are charged to costing profit and loss account.

### ***19. ANNUAL BONUS***

The amount of payment of bonus under legal provisions is considered as cost of production while if the same has been paid voluntarily by the company, then it is charged to costing profit and loss account.

### ***20. FRINGE BENEFITS***

Fringe benefits are payments in addition to normal wages and other allowances to increase employees' morale, loyalty and stability. Such cost cannot be allocated direct to the cost units

but may be allocated to the particular department or cost centre in which the employees are working. If cost of fringe benefits is substantial, they should be charged to production by way of a supplementary wage rate in case of direct workers. Else, they are taken as part of overheads.

### ***21. TRAINING EXPENSES***

Training costs are apportioned to different cost centres on the basis of number of trainees or direct wages. If the trainees perform productive work, a part of estimated cost is charged to the production order concerned. If the training expenses are incurred on office and administration or selling and distribution, then such expense should be charged to the respective overheads.

### ***22. COST OF PATTERNS AND DYES***

Cost of patterns and dyes are treated as direct charge if they are incurred for a particular job/order. In other cases, the annual depreciation is calculated and the same is included in factory overheads.

### ***23. LABOUR WELFARE EXPENSES***

The company should record all labour welfare expenses like canteen, hospital, etc. under Welfare Department costs and then apportion the same to production cost centres on the basis of total wages or number of employees.

### ***24. FINES REALISED FROM WORKERS***

Fines realised from workers cannot be treated as income for the concern and should be credited to a separate account as per provisions of the Payment of Wages Act to be utilised for the welfare of the workers. The receipt and expenditure from this fund are excluded from cost accounts.

### ***25. TOWNSHIP MAINTENANCE COST***

Costs incurred by companies located in rural or isolated places for the purpose of providing residential, communication, marketing or other facilities are termed as township maintenance costs. These costs are apportioned between administrative and staff welfare costs.

### ***26. MATERIAL HANDLING COST***

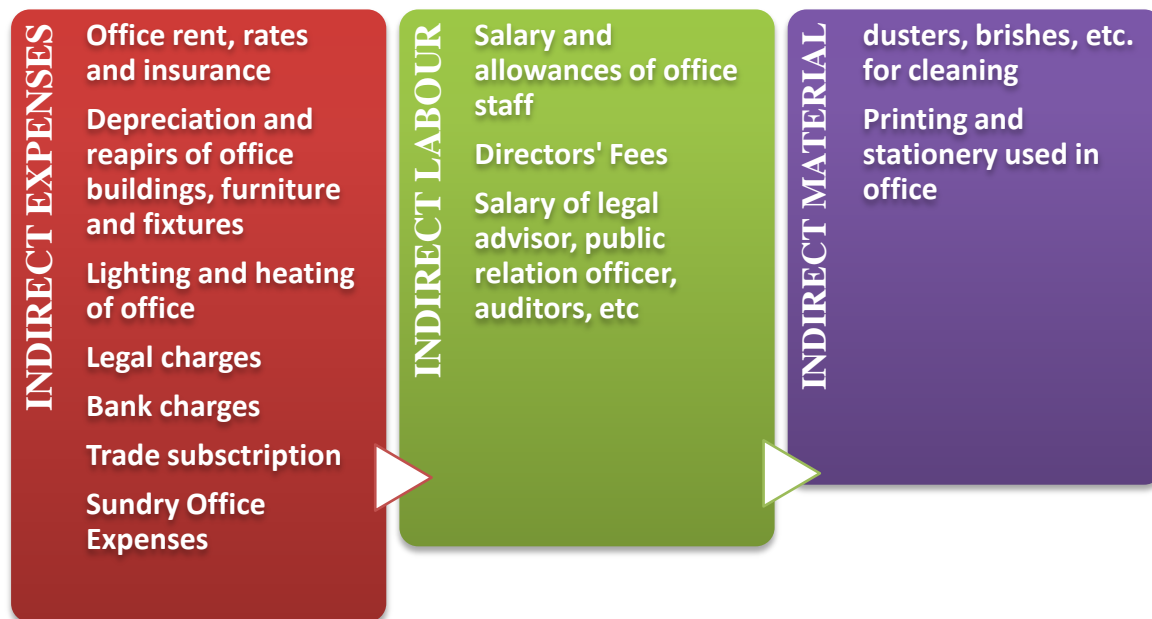
Expenses incurred for handling materials and for their movement from arrival to delivery for production, like inspection costs, etc. expenses for weighing of materials at different stages etc. are included in material handling cost.

When such cost is incurred for a specific material, then it is treated as a part of material cost while if the incurrence covers a large number of materials, then it is treated as an item of production overhead, to be apportioned on the basis of value, weight and value of materials or number of material requisitions handled.

In other cases, this expense should be treated as works overhead and should be apportioned on the basis of value, volume, weight, or number of requisitions handled.

## OFFICE AND ADMINISTRATION OVERHEADS

Office and administration overheads refer to costs relating to formulating the policy, directing the organisation and controlling operations. They consist of:



Some office and administration overheads have been discussed in detail as follows:

### ***1. AUDIT FEES***

Fees paid to auditors, statutory or internal is included in office and administration overheads. Even accrued expenses are to be taken as overheads.

The degree of fluctuation in office expenses is much less than that of works expenses. They can be estimated easily on the basis of last year's profit and loss account after making due allowance for known or anticipated changes.

## ***2. FINANCING CHARGES FOR ACQUISITION OF FIXED ASSETS***

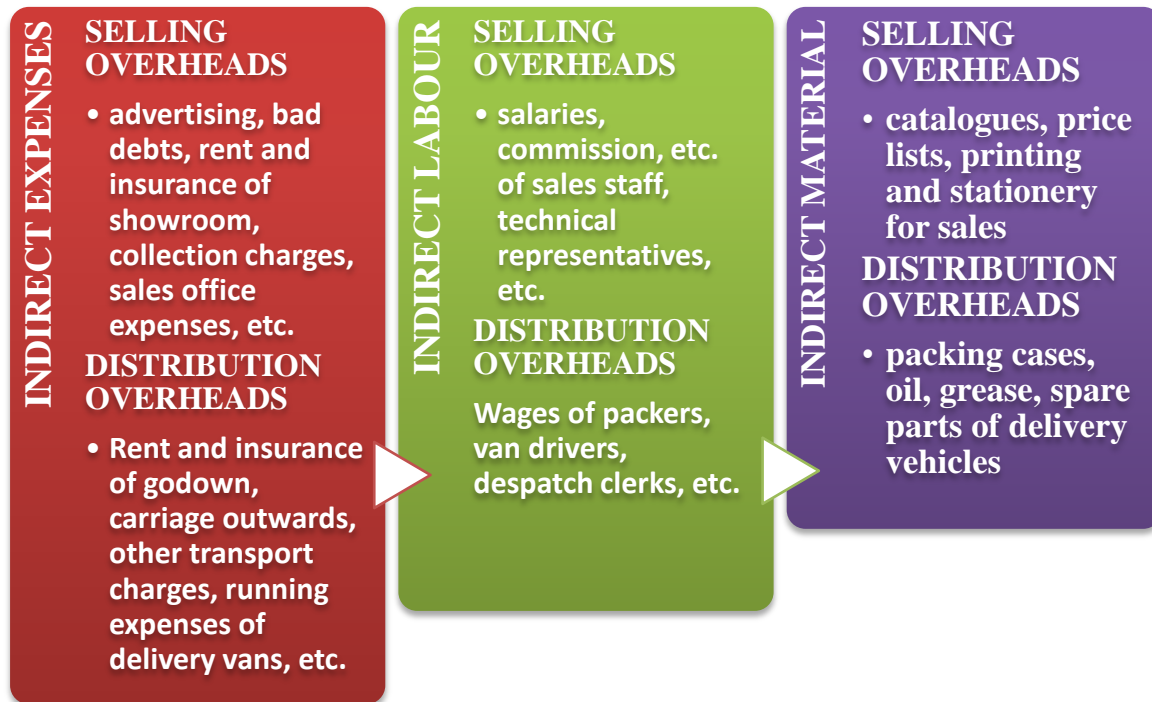
Interest on loan, debentures, etc. payable for acquisition of fixed assets are termed as the financial charges. These charges, being purely financial in nature can be excluded from cost accounts. The company may also decide to include them as part of cost. If these charges have been incurred for purchasing materials to be stored for a long time like for seasoning, then this cost should be taken as cost of materials. Notional interest on owned capital and actual interest paid on borrowed funds will be taken as office and administration overheads.

## ***3. NOTIONAL SALARY FOR PROPRIETOR'S SUPERVISION***

Cost accounts records both actual and notional charges. Notional salary means amount that would have been paid to another person if the proprietor was not working in the organization himself. This notional salary should be included in office and administration overheads.

## **SELLING AND DISTRIBUTION OVERHEADS**

Selling overheads include the cost incurred in promoting sales and retaining customers, while the distribution overheads constitute the cost of the process which begins with making the packed product available for dispatch and ends with making the reconditioned returned empty packages available for re-use. They consist of:



Some selling and distribution overheads have been discussed in detail as follows:

**1. CATALOGUES AND PRICE LISTS**

The cost of printing catalogues and price lists should be transferred to a separate account and charged evenly over the period during which they are used.

**2. BAD DEBTS**

Credit sales, inherently, result in some amount of bad debts. Expected bad debts upto a certain extent are included in selling overheads. If the amount is abnormal and substantially large, it should be written off to costing profit and loss account.

**3. PERIODICAL EXHIBITIONS EXPENSES**

Such expenses are treated as selling overheads and in case the benefit accruing from such expenses spans the period between two exhibitions, then it should be treated as deferred revenue expenditure and apportioned over the expected life of benefit.

**4. MARKET RESEARCH**

Cost of market research done for a specific product is included in the cost of that product and treat it as deferred revenue expenditure over the years during which its benefit is expected to accrue. If expense has been incurred to study market conditions and identify potential of market, it should be apportioned over different products on the basis of sales.

#### **5. PACKAGING COSTS**

The cost of container without which the product cannot be sold is included in direct material cost. For example, without bottle, perfume cannot be sold. If packaging has been done for attractiveness, they are treated as advertising and thus included in selling overheads while if the same has been done for safe delivery of goods, it is distribution overheads..

#### **6. DISCOUNTS AND REBATES**

Discount can be trade discount or cash discount. Trade discount is deducted from the cost of purchase or sales, as the case may be while cash discount being purely financial in nature is excluded from cost accounts. Rebate is generally given for early payment and is thus included in cash discounts.

#### **7. SUBSCRIPTIONS AND DONATIONS**

Subscriptions are normally done to welfare schemes or institutions while donations generally refer to charity. Subscription is treated as works overhead if it is for welfare agencies from which workers derive benefit while trade subscription or subscription to mercantile agencies helping in finding the financial position of prospective customers are treated as selling overheads.

#### **8. AFTER SALES SERVICE COSTS**

These costs should be charged to different products on the basis of sales achieved.

### ***Knowledge Assessment – II***

State whether the following statements are True or False:

1. Works overheads are indirect costs related to office that are incurred when a product is worked upon.
2. In case of abnormal defectives, the cost their rectification should be transferred to the Costing Profit and Loss Account.
3. Expenses on removal of machine are treated as cost of production.
4. The cost of idle facilities due to abnormal reasons costs should be charged to costing profit and loss account.
5. Interest on capital should not be excluded from costing records
6. Cost of large tools is generally capitalized.
7. Fines realised from workers cannot be treated as income.
8. Auditors' fees should be included in office and administration overheads.
9. Abnormal amount of bad debts should be included in selling overheads.
10. Cost of packaging is always included in advertising cost.

***Ans: (1) (False), (2) (True), (3) (False), (4) (True), (5) (False), (6) (True), (7) (True), (8)(True), (9)(False), (10)(False)***

### **KEYWORDS**

1. **Normal Overheads:**Overheads expected to be incurred in the normal course of business for attaining a given level of output.
2. **Variable Overheads:**Costsvarying in the same ratio with the production and sales volume.
3. **Selling Overheads:**Costs incurred for creating demand, attracting potential customers and retaining old customers.
4. **Distribution Overheads:**Overheads incurred in maintaining stocks and delivering the goods to customers.
5. **Idle facilities:** Idle plants, machines or services.
6. **Idle capacity:** That part of the capacity of the plant or equipment which is not actually or effectively utilized for production purposes.
7. **Research cost:** The cost of seeking new or improved products, applications of materials or methods.

8. **Development cost:**The cost of the process which begins with the implementation of the decision to produce a new or improved product or to employ a new or improved method, and ends with the commencement of formal production of that product or by that method.

### **SUMMARY**

1. Overheads may be classified on the basis of their nature, variability, function and other characteristics.
2. Nature based classification of overheads comprises of indirect materials, indirect labour and indirect expenses.
3. Factory overheads, administration overheads and selling & distribution overheads are included under functional classification of overheads.
4. Information regarding overheads can be extracted from stores requisition, invoices, cash book, wages analysis sheet, miscellaneous reports, journal entries.

### **EXERCISE QUESTIONS**

#### **Short Answer Questions**

1. How are small tools treated in cost accounts.
2. Explain the treatment of bad debts in costing.
3. How do you deal with fringe benefits offered by the company.
4. Financing charges for acquisition of machinery require special treatment. Comment.
5. Enumerate the sources of overhead information.
6. Name the basis which can be used to classify overheads.
7. Differentiate between controllable and uncontrollable overheads.

#### **Long Answer Questions**

1. Explain the various overheads as per different classification basis.
2. Discuss the functional classification of overheads in detail.
3. Explain the treatment of depreciation in cost accounts.
4. Interest on capital is included in cost accounts. Is it true. State reasons for your answer.
5. How will you treat the following in cost accounts:
  - a. After sales service cost
  - b. Periodical exhibition cost
  - c. Royalty
  - d. Installation expenses
6. Distinguish between idle facilities and idle capacity. Explain the treatment of both in cost accounts.
7. What are research and development costs. How are they treated in cost accounts.



## UNIT 5: OVERHEAD DISTRIBUTION

<b>Unit Code</b> 5	<b>UNIT TITLE:OVERHEAD DISTRIBUTION</b>			
<b>Location:</b>	Duration:			
Classroom	<b>SESSION 1: INTRODUCTION AND STAGES OF OVERHEAD DISTRIBUTION</b>			
	<b>Learning Outcome</b>	<b>Knowledge Evaluation</b>	<b>Performance Evaluation</b>	<b>Teaching and Training Method</b>
	1. Understanding about the meaning and Stages of Overhead Distribution	1. Explain the Stages of Overhead Distribution	1. Describe the Stages of Overhead Distribution	<b>1. Interactive Lecture:</b> Introduction to distribution of Overhead. <b>2. Activity:</b> Conceptual Case discussion
	2. Clarity about the purpose of overheads distribution	2. Differentiate allocation and apportionment	2. Discuss the various methods of collection of overheads.	
3. Awareness about the Usefulness of overheads distribution	3. Elaborate the utility of apportionment of overheads.	3. Discuss the various methods of codification of overheads expenses.		
<b>Location:</b>	<b>SESSION 2: APPORTIONMENT AND RE-APPORTIONMENT OF OVERHEADS</b>			
Class room or Factory Premises	1. Clarity about procedure and equitable basis used for apportionment of overheads.	1. Discuss various methods of apportionment. 2. Differentiate apportionment and re-apportionment.. 3. Discuss various methods of re-apportionment.	1. Describe the procedure of apportionment and re-apportionment of overheads using various methods.	<b>Interactive Lecture:</b> Procedure of apportionment of overheads to production department only <b>Activity:</b> Apportionment or re-

				distribution of overheads using industry data
<b>SESSION 3: ABSORPTION OF OVERHEADS</b>				
	1. Understanding of the concept of absorption of overheads	1. Define the concept of absorption of overheads. 2. Explain the objectives of absorption of overheads 3. Differentiate allocation and apportionment and absorption.	1. explain the utility of absorption of overheads	<b>Interactive Lecture:</b> Introduction to Absorption of overheads <b>Activity:</b> Discussion of brief cases from industries in absorption of overheads is required.
<b>SESSION 4: UNDER OR OVER ABSORPTION OF OVERHEADS</b>				
	1. Understanding the concept of under-absorption and over absorption of overheads.	1. Describe under recovery or over recovery of overheads.	1. Explain the reasons of under absorption or over absorption of overheads.	<b>Interactive Lecture:</b> Procedure of calculating under or over absorption
	2. Learned to calculate amount under recovered or over recovered.	2. Explain the methods of accounting treatment of under or over absorbed overheads.		<b>Activity:</b> Determination of under or over recovery of overheads on Industry data

## UNIT 5: OVERHEAD DISTRIBUTION

### *Learning Objectives:*

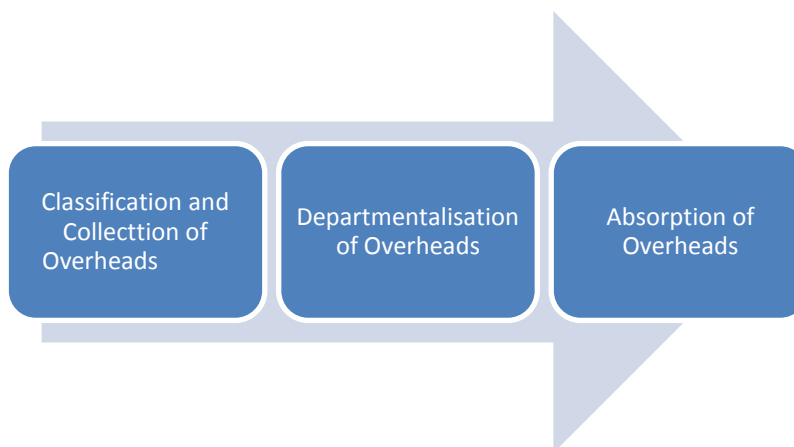
**After reading this unit, the students will be able to:**

- understand the stages involved in the overhead distribution;
- comprehend the meaning difference between allocation, apportionment and absorption;
- describe the process and methods of distribution of factory overheads, administrative overheads and selling overheads;
- explain the concept of under-absorption and over-absorption of overheads;
- understand the accounting treatment in case of under and over-absorption;
- describe the meaning of certain key terms.

## MEANING OF OVERHEAD DISTRIBUTION

Overhead distribution is the most complex task in the cost accounting because there is no clear base is available to distribute the overheads. Overhead distribution means assigning the cost of indirect material, indirect labour and indirect expenses to a production department or service department. There are three stages involved in the distribution of overheads, which are explained in session I.

### SESSION 1: STAGES OF OVERHEAD DISTRIBUTION



- 1. Classification and Collection of Overheads:** Classification and codification is the pre-requisite for collecting the overheads. After classifying overheads as factory, office and selling, items covered by each category will be grouped under suitable account headings. Collection of overheads can be done from the following sources:
  - a) For collecting the expenses of rent, insurance and other expenses invoice can be used.
  - b) Journal entries are also a source of collecting the overheads.
  - c) Store requisitions are used to collect the indirect materials.
  - d) Wage sheets are used to collect the indirect labour.

Allotment of codes to individual heads of expense is termed as codification of overheads. Short description will be given to the lengthy heads. Codes are useful in the computerized system of accounting. Codification can be done with the help of following methods:

- (i) Numerical Method (ii) Alphabetical Method (iii) Alphabetical-cum-numeric method
- 2. Departmentalization of Overheads:** it is the process of allocation and apportionment of different overheads to various departments or cost centers. Departments majorly are divided in two types namely production and services.

#### **Difference between Allocation and Apportionment**

<b>Allocation</b>	<b>Apportionment</b>
Assignment of particular cost to a particular department or cost center is called as allocation.	These costs are common to various departments and cannot be charged to a particular department or cost center.
Allocation deals with whole items of costs.	Apportionment deals with proportions of items of costs.
No base is required for allocation of cost to a department, it is a direct process.	A equitable base is required for apportionment of cost to the production or services department.

- 3. Absorption of Overheads:** it is the process of charging of overheads of a cost centre to different cost units in such a way that each cost unit bears an appropriate portion of its share of overheads. This is done by means of overhead rates.

#### ***Knowledge Assessment – I***

State whether the following statements are True or False:

1. Allocation and apportionment of overheads is one and the same thing.
2. Overheads are also known as indirect expenses
3. Overhead distribution means assigning the cost of indirect material, indirect labour and indirect expenses to a production department or service department.
4. Apportionment is required when costs of production can be easily assigned to a particular department.
5. Allocation of overheads to a particular department is a direct process.

## SESSION 2: APPORTIONMENT AND RE-APPOTIONMENT OF OVERHEADS

### Production and Service Department

Departments which are involved in the manufacturing the goods from raw material are called as the production departments like; Spinning department, weaving department, Finishing etc. while services departments are involved in rendering services to the production departments like purchasing department, stores department, security department, etc.

### Principles of Apportionment

Apportionment should be based on the following principles:

1. Potential benefit taken by the department.
2. Ability to pay method
3. Direct or specific criteria method
4. Survey method

### Basis of Apportionment

Overhead Cost	Basis of Apportionment
Rent Lighting and heating Fire precaution service Air conditioning	Floor Area or Volume of the department
Fringe Benefits Labour welfare expenses Time keeping Personnel office Supervision	No. of Workers
Compensation to workers Holiday pay ESI and PF contribution	Direct Wages
Depreciation of plant and machinery Repairs and maintenance of plant Insurance of inventory	Capital value
Power/ steam consumption Managerial salaries	Technical advice by the experts
Electric power	Horse power of machine, or number of machine hours, or value of machines

**Note:** The above table of basis of apportionment is according to the prevalent practice in the industry. More than one basis also can be used for the apportionment of the overhead cost. It is based on the judgment of the authorities.

**Illustration 1** There are five departments in ABC Ltd. V, W, X, Y are manufacturing departments and department Z provides the services. The actual costs for a period are as follows:

Cost	Rs.	Cost	Rs.
Repairs	2,000	Insurance	1,500
Rent	2,500	Lighting	1,800
Depreciation	1,200	Employer's liability insurance	600
Supervision	4,000		

The information available regarding various departments are as follows:

	Deptt V	Deptt W	Deptt X	Deptt Y	Deptt Z
Area (sq. ft)	140	120	110	90	40
No. of Workers	25	20	10	10	5
Total Wages	Rs. 10,000	8,000	5,000	5,000	2,000
Value of Plant	Rs. 20,000	18,000	16,000	10,000	6,000
Value of Stock	Rs. 15,000	10,000	5,000	2,000	

Calculate the cost apportioned to various departments.

**Solution:**

Expenses	Basis	Total (Rs.)	Manufacturing Departments				Service Deptt
			V	W	X	Y	Z
Total Wages	Actual	2,000	-	-	-	-	2,000
Repairs	Plant Value	2,000	571	514	457	286	172
Rent	Area	2,500	700	600	550	450	200
Depreciation	Plant Value	1,200	343	309	274	171	103
Supervision	No. of workers	4,000	1,430	1,143	571	571	285
Insurance	Stock value	1,500	703	469	234	94	-
Lighting	Area	1,800	504	432	396	324	144
Employer's Liability Insurance	Total wages	600	200	160	100	100	40
	Total	13,600	4,451	3,627	2,582	1,996	2,994

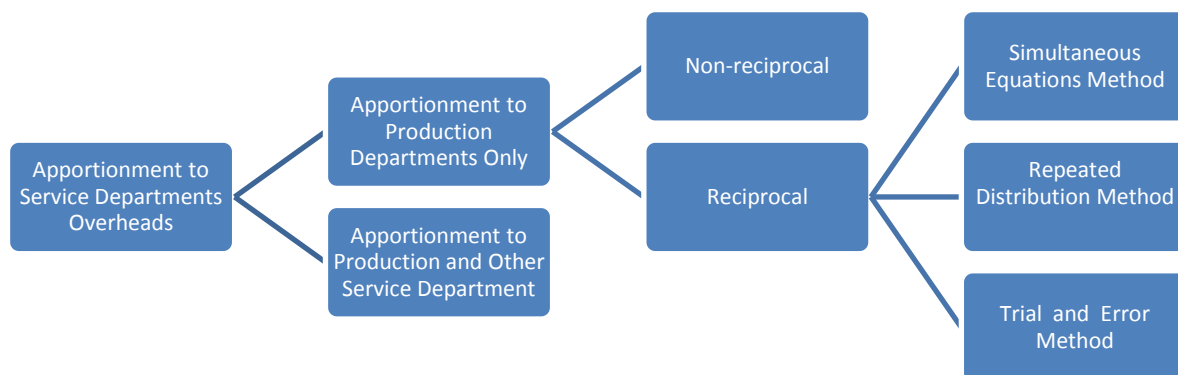
## RE-APPORTIONMENT OF SERVICE DEPARTMENT COSTS (SECONDARY DISTRIBUTION)

Once overheads are allocated and apportioned to the production and service department then totaled overheads allocated to the service department should be allocated to the cost center or production department. Ultimately costs is to be charged to the production department only, this process of distributing overheads of services department in the production department is called Re-apportionment.

The method of re-apportionment of service department costs is similar to apportionment of overheads discussed earlier. Some of the important bases of apportionment of service department costs to production departments are as follows:

Service Department	Basis of Apportionment
Store keeping department	Number of material requisitions, or value/quantity of materials consumed in each department
Purchase department	Value of materials purchased for each department, or number of purchase orders placed
Time-keeping department and payroll department	Number of employees, or total labour or machine hours
Canteen, welfare and recreation services	Number of employees, or total wages
Maintenance department	Number of hours worked in each department
Internal transport service	Value or weight of goods transported, or distance covered.
Inspection department	Direct labour hours or machine operating hours
Drawing office	No. of drawings made or man hours worked

Thus, the cost of service departments are apportioned on the basis of service rendered, the benefits received by the beneficiary departments.



### Apportionment of Production Departments Only

In this case, cost of each service department is apportioned only to production departments without apportioning it to other service departments.

**Illustration 2 Data of three months have been extracted from a manufacturing company given below:**

Items	Production Deptts.			Service Deptt.	
	X	Y	Z	A	B
Direct wages (Rs.)	2,000	3,000	4,000	1,000	2,000
Direct Materials (Rs.)	1,000	2,000	2,000	1,500	1,500
Staff (Nos.)	100	150	150	50	50
Electricity (Kwh)	4,000	3,000	2,000	1,000	1,000
Light Points (Nos.)	10	16	4	6	4
Asset Value (Rs.)	60,000	40,000	30,000	10,000	10,000
Area Occupied (Sq. Yds.)	150	250	50	50	50

**Overhead expenses for the period were:**

Expenses	Amount	Expenses	Amount
Motive Power	550	Depreciation	15,000
Lighting Power	100	Repairs and Maintenance	3,000
Stores Overhead	400	General Overheads	6,000
Amenities to Staff	1,500	Rent and Taxes	275

Apportionment of expenses of service department A proportionate to 'Direct Wages' and those of services department B in the ratio of 5:3:2 to department X, Y and Z respectively.

**Solution:**

	Production Deptt.			Services Deptt	
	X	Y	Z	A	B
Direct Wages	-	-	-	1,000	2,000
Direct Material	-	-	-	1,500	1,500
Motive Power@5 paise per kwh	200	150	100	50	50
Lighting power @ Rs. 2.50 per unit	25	40	10	15	10
Stores overhead @5% of direct material	50	100	100	75	75
Amenities to staff @ Rs. 3 per employee	300	450	450	150	150
Depreciation @ 10% of the value	6,000	4,000	3,000	1,000	1,000
Repairs and Maintenance @ 2% of value	1,200	800	600	200	200
General Overheads @50% of direct	1,000	1,500	2,000	500	1,000



wages					
Rent and Taxes @0.50 per sq. yd.	75	125	25	25	25

### Rates of Overhead Absorption:

$$\text{Production Department X} = \frac{12,443}{2,000} \times 100 = 622.15\%$$

$$\text{Production Department Y} = \frac{10,523}{3,000} \times 100 = 350.77\%$$

$$\text{Production Department Z} = \frac{9,859}{4,000} \times 100 = 246.47\%$$

### Apportionment to Production as well as Service Departments

Apportionment of expenses of service departments only to production departments is not sufficient because in reality services departments also provide services to the other service departments. For example; electricity department provides power not only to the production departments but also to services department like canteen, maintenance department and to other non-production departments. Apportionment can be done on the reciprocal as well as non-reciprocal basis:

#### Apportionment on Non-reciprocal Basis

When a department is only providing services to the other departments but not receiving any kind of services from the service provider department or when services are not inter-dependent.

#### Apportionment on Reciprocal Basis

When a department is not only providing services to the other departments but also receiving services from the service provider department or when services are inter-dependent on each other

For apportionment on reciprocal basis three methods are available:

1. Simultaneous equation method
2. Repeated distribution method
3. Trial and error method

1. **Simultaneous Equation Method:** according to this method the amount of overhead of each production department is obtained by solving simultaneous equations. It is explained with the help of following illustration.

### Illustration 3

ABC Ltd. has extracted the data overheads from its three department namely A,B and C. Calculate production hour rate from the given information:

Particulars	Total	Production Deptt.			Services Deptt	
		A	B	C	D	E
Rent	1,000	200	400	150	150	100
Electricity	200	50	80	30	20	20
Fire Insurance	400	80	160	60	60	40
Plant Depreciation	4,000	1,000	1,500	1,000	300	200
Transport	400	50	50	50	100	150
Estimated Working Hours		1,000	2,500	1,800		

Expenses of the service departments D and E are apportioned as under:

	A	B	C	D	E
<b>D</b>	30%	40%	20%	-	10%
<b>E</b>	10%	20%	50%	20%	-

**Solution:**

Particulars	Total	Production Deptt.			Services Deptt	
		A	B	C	D	E
Rent	1,000	200	400	150	150	100
Electricity	200	50	80	30	20	20
Fire Insurance	400	80	160	60	60	40
Plant Depreciation	4,000	1,000	1,500	1,000	300	200
Transport	400	50	50	50	100	150
Total (Rs.)	6,000	1,380	2,190	1,290	630	510
Service department D (apportioned)		224	299	149	-747*	75
Rs.	6,000	1,604	2,489	1,439	-117	585
Service department E (apportioned)		59	117	292	117	-585*
	6,000	1,663	2,606	1,731	-	-
Estimated Working Hours		1,000	2,500	1,800		
Overhead Rates Per Hour		1.663	1.0424	0.9617		

**\*Note.** The overheads of the services departments D and E are to be apportioned to each other also. The total cost of the respective departments may, therefore, be ascertained by means of a simultaneous equation.

Let D = Total expenses of service department 'D' to be apportioned

Let E = Total expenses of service department 'E' to be apportioned

We get equation:

$$D = 630 + .2E$$

$$E = 510 + .1D$$

$$\text{Or } D - .2E = 630$$

$$-.1D + E = 510$$

On multiplying equation (i) by 5 and (ii) by 1

$$5D - E = 3,150$$

$$-.1D + E = 510$$

On adding (iii) and (iv)

$$4.9 D = 3,660$$

$$D = 747$$

On substituting the value of 'D' in equation (iv)

$$-75 + E = 510$$

$$\text{Or } E = 510 + 75 = 585$$

**2. Repeated Distribution Method:** according to this method cost service department should be apportioned to other service departments, production as well as service, according to prefixed percentage. The process is repeated until the total costs of the service departments are exhausted or the figures become too small to matter.

#### Illustration 4

Taking the illustration 3, apportion the costs of service departments according to repeated distribution method

Items	Production Deptt.			Service Deptt.	
	A	B	C	D	E
Total Departmental Expenses	1,380	2,190	1,290	630	510
<b>I Distribution:</b> Overheads of service Department D apportioned (Rs. 630)	189	252	126	-630	63
<b>II Distribution:</b> Overheads of service Department E apportioned (Rs. 510 + 63)	57	115	286	115	-573
<b>III Distribution:</b>					

Overheads of service Department D apportioned (Rs. 115)	35	46	23	-115	11
<b>IV Distribution:</b> Overheads of service Department E apportioned (Rs. 11)	1	2	6	2	-11
<b>V Distribution:</b> Overhead of service Department D apportioned	1	1	-	-2	-
Total Overheads	1,663	2,606	1,731	-	-

**3. Trial and Error Method:** this method is useful where two or three interlocked service cost centre involved. In case of this method the cost of one service cost centre is apportioned to another service cost centre. The cost of another service centre plus the share received from the first cost centre is again apportioned to the first cost centre. The process is repeated till the amount to be apportioned becomes negligible.

### Illustration 5

Taking the illustration 3, apportion the costs of service departments according to Trial and Error Method.

Items	Production Deptt.			Service Deptt.	
	A	B	C	D	E
Total Departmental Expenses	1,380	2,190	1,290	630	510
<b>I Distribution:</b> Overheads of service Department D apportioned to E (10% of Rs. 630)					63 573
<b>II Distribution:</b> Overhead of service Department E apportioned to D (20% of Rs. 573)				115	
<b>III Distribution:</b> Additional cost of service Department D apportioned to ERs. 630 already apportioned					12
<b>IV Distribution:</b> Additional cost of Service Department E apportioned Rs. 573 already apportioned (20% of Rs. 12)				2	
	1,380	2,190	1,290	747	585
90% of total overheads of Deptt. D charged to Deptt. A, B, C (the remaining 10% has already been charged to Deptt. E and is included in Rs. 585) in the given ratio i.e. 30:40:20	224	299	149		
80% of total overheads of Deptt. E charged to Deptt. A, B and C (the remaining 20% has already been charged to the Deptt. D) in the given ratio i.e., 10:20:50	59	117	292		

### ***Knowledge Assessment – II***

State whether the following statements are True or False:

1. Apportionment of overheads on reciprocal basis is known as step ladder method.
2. Assignment of whole items of overheads to cost centres is known as allocation.
3. A service department only provides services to the other services departments under reciprocal method of apportionment.
4. Process of distributing overheads of services department in the production department is called Re-apportionment.
5. Expenses of time-keeping department and payroll department should be apportioned according to the number of employees.

***Ans: (1) (False),2(True),3(False),4(True),5(True)***

## **SESSION 3 ABSORPTION OF OVERHEADS**

Once the overheads are allocated and apportioned to a particular department, then cost will be absorbed by the products produced in the department. Absorption refers to the process of recovering allocated cost to a particular cost centre by the units produced in that cost centre.

### **Overhead Rate**

The apportionment of overhead expenses is done by adopting suitable basis such as output, materials, prime cost, labour hours, machine hours etc. In order to determine the absorption of overhead in costs of jobs, products or process, a rate is calculated and it is called as "Overhead Absorption Rate" or "Overhead Rate." The overhead rate can be calculated as below:

$$\text{Overhead Absorption Rate} = \frac{\text{Overhead Expenses}}{\text{Total Quantity or Value}}$$

### **Methods of Absorption of Production Overheads**

Direct Material Cost Percentage Rate	
Direct Labour Cost Percentage Rate	
Prime Cost Percentage Rate	
Direct Labour Hour Rate	
Machine Hour Rate	
Rate Per Unit of Output	

- 1. Direct Material Cost Percentage Rate:** It is a percentage of overheads over direct material cost. Formula for calculating Direct Material Cost Percentage Rate is as follows:

$$\text{Direct Material Cost Percentage Rate} = \frac{\text{Total Overheads}}{\text{Direct Material Cost}} \times 100$$

- 2. Direct Labour Cost Percentage Rate:** It is a percentage of overheads over direct labour cost. Formula for calculating Direct Labour Cost Percentage Rate is as follows:

$$\text{Direct Labour Cost Percentage Rate} = \frac{\text{Total Overheads}}{\text{Direct Labour Cost}} \times 100$$

- 3. Prime Cost Percentage Rate:** It is a percentage of overheads over prime cost. Formula for calculating Prime Cost Percentage Rate is as follows:

$$\text{Direct Prime Cost Percentage Rate} = \frac{\text{Total Overheads}}{\text{Prime Cost}} \times 100$$

- 4. Direct Labour Hour Rate:** This is a rate per hour and not a percentage rate. It is obtained by dividing the total production overheads by the total number of direct labour hours for the period:

$$\text{Direct Labour Hour Rate} = \frac{\text{Production Overheads}}{\text{Direct Labour Hours}}$$

- 5. Machine Hour Rate:** Machine hour rate is the overhead cost of running a machine for one hour. This rate is obtained by dividing the amount of factory overheads apportioned to a machine by the number of machine hours for the period under consideration.

$$\text{Direct Material Cost Percentage Rate} = \frac{\text{Total Overheads}}{\text{No. of Machine hours}}$$

- 6. Rate Per Unit of Output:** This is the simply the total overheads of a department over number of units produced.

$$\text{Direct Material Cost Percentage Rate} = \frac{\text{Total Overheads}}{\text{No. of Units Produced}}$$

**Illustration6** A new machine has been installed in a factory for carrying out production process smoothly. The expenses for installing the machine are as follows:

Particulars	Amount
Cost of machine	2,40,000
Installation cost	68,000
Salary of supervisors (Per annum)	80,000
Rent for the factory (for six months)	36,000
Insurance for the special machine (per quarter)	6,000
Factory lighting (per month)	4,000
Scrap value of the machine at the end of its life	20,000
Power consumption =8 units per hour @ Rs. 3 per unit	
Annual Maintenance of the special machine (estimated)	1,20,000
Estimated half-yearly consumption of stores	30,000

Estimated life of the machine in years is 12. The factory is expected to work 300 days in a year, 8 hours per day, and the capacity utilization of machine is estimated 80%. The machine occupies 20% of the factory area and the supervisor devotes one-eighth of his time on the machine.

Compute the machine hour rate for the machine.

**Solution:**

<b>Particulars</b>	<b>Rs.</b>
Depreciation: Purchase cost	2,40,000
Freight, Insurance and erection	68,000
<b>Total</b>	<b>3,08,000</b>
Scrap Value	20,000
<b>Net cost for depreciation</b>	<b>2,88,000</b>

Machine life is 12 years

Depreciation = Rs. 2,88,000/12 Years = Rs. 24,000 per annum

Working hours per annum = 300 days X 8 hours X 80% = 1,920 hours

Power cost = 8 units X Rs. 3 = Rs. 24 per hour

<b>Items</b>	<b>Expenses (Rs.)</b>	<b>Period</b>	<b>Expenses per annum (Rs.)</b>	<b>Share of Machine (%)</b>	<b>Machine Expenses (Rs.)</b>
Depreciation					24,000
Supervisor's Salary		Annual	80,000	12.50	10,000
Rent	36,000	Half Yearly	72,000	20	14,400
Insurance	6,000	Quarterly	24,000	100	24,000
Lighting	4,000	Monthly	48,000	20	9,600
Power	24 per hour	1920 hours	46,080	100	46,080
Maintenance	1,20,000	Annual	1,20,000	100	1,20,000
Consumables stores	30,000	Half Yearly	60,000	100	60,000

$$\text{Machine Hour Rate} = \frac{\text{Total Overheads}}{\text{Working Hours}}$$

$$\text{Machine Hour Rate} = \frac{3,08,080}{1920} = \text{Rs. } 160.46 \text{ per hour}$$



**Illustration 5** Deepa enterprises has three manufacturing departments and one service department. X, Y, Z are manufacturing departments and T is the service department.

Particulars	Total (Rs.)	X	Y	Z	T
Electricity	1,100	200	300	360	240
Salary of supervisors	2,000	30%	30%	20%	20%
Rent	500				
Employee Welfare	600				
Others	1,200	200	400	400	200
No. of Labours		30	40	20	10
Floor area in sq.		600	800	600	500
Service rendered by service department to production departments		50%	30%	20%	

Compute labour hour rate for the production departments from the given data.

### Computation of Labour Hour Rate

	Production Deptt.			Services Deptt.
	X	Y	Z	T
Electricity	200	300	360	240
Salary of supervisors	600	600	400	400
Rent	120	160	120	100
Employee Welfare	180	240	120	60
Others	200	400	400	200
<b>Total</b>	<b>1,300</b>	<b>1,700</b>	<b>1,400</b>	<b>1,000</b>
Share of service department	500	300	200	1000
Total Overheads	1,800	2,000	1,600	
Labour Hours	6,000	8,000	4,000	

$$\text{Labour Hour Rate} = \frac{\text{Total Overheads}}{\text{Labour Hours}}$$

$$\text{Labour Hour Rate (Deptt. X)} = \frac{1,800}{6,000} = \text{Rs. } 0.30$$

$$\text{Labour Hour Rate (Deptt. Y)} = \frac{2,000}{8,000} = \text{Rs. } 0.25$$

$$\text{Labour Hour Rate (Deptt. Z)} = \frac{1,600}{4,000} = \text{Rs. } 0.40$$

## TYPES OF OVERHEAD RATES

Various types of overheads rates are applied according to the nature, objective of the business organisation:

### 1. Actual and Predetermined Rates:

Overheads can be calculated only when expenses actually incurred. Actual data available regarding overheads is called as actual overheads. Actual overheads can be calculated as follows:

$$\text{Actual Overheads Rate} = \frac{\text{Actual Overheads}}{\text{Actual base}}$$

On the other hand, when rate or overhead is based on the estimated overheads is called pre-determined overhead rate. Pre-determined overheads can be calculated as follows:

$$\text{Pre – determined Overheads Rate} = \frac{\text{Budgeted Overheads for the Period}}{\text{Budgeted base for the period}}$$

Pre-determined rates are helpful in the preparation of tenders, quotations and deciding the selling price of the products.

### Blanket and Multiple Rates

Blanket overhead rate is a common rate for the entire factory. This can be calculated as follows:

$$\text{Blanket Overheads Rate} = \frac{\text{Total Overheads for the Factory}}{\text{Total Number of Units of Base for the Factory}}$$

### Multiple Overhead Rates

Multiple overhead rate refers to the calculation of various rates for different departments or cost centre etc.

### Illustration 8

ABC Ltd. Is manufacturing pumps which pass through three departments- Foundry, Machine and Assembling:

	Foundry (Rs.)	Machine Shop (Rs.)	Assembling (Rs.)	Total (Rs.)
Direct Wages	10,000	50,000	10,000	70,000
Works Overhead	5,000	90,000	10,000	

The factory cost of manufacturing 'X' type of pump is prepared by the company as follows:

Material	(Rs.)16
Labour – Foundry-2	
Machine Shop-4	
Assembling- 2	8
Factory Overheads	12
<b>Total Cost</b>	<b>36</b>

It seems that there is some fallacy. Try to correct it.

**Solution:**

It is clear that the company has charged factory overheads as a % of wages on the basis of blanket (Single rate) computed as follows:

$$= \frac{\text{Total works overheads}}{\text{Total direct wages}} \times 100$$

$$= \frac{1,05,000}{70,000} \times 100 = 150\%$$

And here lies the fallacy. When information is available regarding various departments, overhead absorption rates should always be computed separately for each department. This will produce more accurate costs. The overhead rates for each of the department will be as follows:

<b>Foundry</b>	$= \frac{5,000}{10,000} \times 100 = 50\%$
<b>Machine shop</b>	$= \frac{90,000}{50,000} \times 100 = 180\%$
<b>Assembly</b>	$= \frac{10,000}{10,000} \times 100 = 100\%$

#### Revised Cost Sheet

	(Rs.)	(Rs.)
<b>Material Cost</b>		16.00
<b>Direct Wages</b>		
Foundry	2	
Machine Shop	4	
Assembly	2	8.00
<b>Prime Cost</b>		<b>24.00</b>
<b>Factory Overheads:</b>		
Foundry – 50% of direct wages of Rs. 2	1.00	
Machine Shop- 180% of direct wages of Rs. 4	7.20	
Assembly – 100% of direct wages of Rs. 2	2.00	10.20
<b>Total Cost</b>		<b>34.20</b>

### ***Knowledge Assessment – III***

**1. When the common rate for the entire factory is applicable it is called as:**

- a) Unit overhead rate
- b) Machine hour rate
- c) Multiple overhead rate
- d) Blanket overhead rate

**2. Pre-determined rates are useful in**

- a) The preparation of tenders.
- b) Preparation of quotations.
- c) Deciding the selling price of the products.
- d) All of the above

**3. The following balances appear in the books on 31<sup>st</sup> December, 2012**

Under absorbed overheads - Rs. 450

Cost of Sales - Rs. 9,40,000

Work-in-progress – Rs. 30,000

Finished stock - Rs. 25,000

The most appropriate method to treat under-absorbed overhead is to

- a) Transfer it to costing P&L A/C
- b) Pro-rata between work-in-progress and finished goods.
- c) Pro-rata it between work-in-progress, finished goods and cost of sales

**4. Absorption refers to**

- a) The process of recovering allocated cost to a particular cost centre by the units produced in that cost centre.
- b) The process of apportioning cost to production departments.
- c) Absorption is the process of allocation and apportionment of cost to the services department.
- d) All of the above

***Ans:1(d), 2(d), 3(a), 4(a)***

When the overhead cost recovered is less than the cost incurred in actual, called as under absorption. While, when the amount of overheads recovered from the production is more than the actual it is called over-absorption. Reasons for over-recovery or under-recovery may be as follows:

- Faulty estimation of overheads.
- Seasonal fluctuations in the amount of overheads in the certain industries.
- Wrong estimation of units produced or number of hours worked.
- Under utilization or over-utilization of production capacity.

### Accounting Treatment of Under and Over-Absorption

Three methods of accounting treatment of under absorption and over absorption are as follows:

1. **Use of Supplementary Rates:** the supplementary rate is adopted when the amount of under or over absorbed overheads is quite large, a supplementary rate may be found out. The cost of each job, order or process may be adjusted by applying this supplementary rate. The rate may be calculated as follows:

$$\text{Supplementary Rate} = \frac{\text{Amount of over or under – absorbed overheads}}{\text{Actual Base}}$$

In case of under absorbed overheads the rate is considered as positive, while in case of over-absorption of overheads, it is termed as negative. In case of under-absorption the cost of the job or product is increased by adding it to overheads charged on the basis of a positive supplementary rate and in case of over-absorption the cost of the job or product is decreased by deducting the extra amount of overheads charged by applying a negative supplementary rate.

2. **Carrying Over of Overheads:** The amount of over or under absorption is carry forward to the next year. This method may be adopted in situation where the normal business cycle extends for more than one year. This method is not very prevalent in the industry.
3. **Writing off to Costing Profit and Loss Account:** In case the amount of under or over-absorbed overhead is very small it is not worthwhile to use supplementary may be written off to Costing Profit and Loss Account. If due to some abnormal factors, the amount of under or over absorbed is large it should be transferred to Profit and Loss Account.

### Illustration 9

Western Textile Company has capacity to manufacture 84,000 units of cloths. The normal capacity is 85% of the ideal capacity, but the company expects to sell 70,000 units in the forthcoming year. Budgeted fixed overheads amount to Rs. 4,72,500. Variable overheads at an output level of 84,000 units amount to Rs. 2,10,000.

A total of 60,000 units were produced during a year and overheads incurred as budgeted.

- (i) Determine total overheads (fixed and variable) recovery rate per unit
- (ii) Calculate under-or over absorption of overheads.

**Solution:**

Ideal capacity (units)	84,000
Normal capacity 85% (units)	71,400
Expected Capacity (units)	70,000
Budgeted fixed overheads (Rs.)	4,72,500

$$\text{Budgeted Fixed Overheads Rate Per Unit} = \frac{4,72,000}{70,000} = \text{Rs. } 6.75$$

$$\text{Budgeted Variable Overheads Rate Per Unit} = \frac{2,10,000}{84,000} = \text{Rs. } 2.50$$

$$\text{Total Overheads Recovery Rate} = \text{Rs. } 9.25$$

Particulars	Rs.
Recovered Cost = 60,000 units X Rs. 6.75	4,05,000
Actual Overheads	4,72,500
Under-recovery of overheads	67,500

**Illustration 10**

The total overhead expenses of a factory are Rs. 4,50,628. Taking into account the normal working of the factory overhead was recovered from production at Rs. 1.25 per hour. The actual hours worked were 2,93,104. How would you proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work-in-progress. On investigation it was found that 50% of the unabsorbed overhead was on account of increase in cost of indirect material and indirect labour and other 50% was due to factory's inefficiency.

<b>Unabsorbed Overheads:</b>	
Overheads recovered from production (2,93,104 hrs. X Rs. 1.25)	3,66,380
Actual Overheads	4,50,608
<b>Under Absorbed Overheads</b>	<b>84,228</b>

Out of the total unabsorbed overheads of Rs. 84,228, 50% was due to increase in the cost of indirect material and labour. The amount of Rs. 42,114 (50% of 84,228) should, therefore, be charged to units produced by means of supplementary rate.

<b>Supplementary Rate:</b>	<b>(Rs.)</b>
Unabsorbed overheads	42,114
Units produced (7800+200)	8,000
Supplementary Rate is 5.264 per unit (42,114/8,000)	

### **Apportionment of Overheads**

The amount of overheads of Rs. 42,114 will be apportioned between cost of sales, finished goods and work-in-progress as follows:

Cost of Sales A/c (7,000 X 5.264)	36,849.75
Finished Goods A/c (800 X 5.264)	4,211.40
Work-in-Progress A/c (200 X 5.264)	1,052.85

The balance of Rs. 42,114 (50% of 84,228) which represents unabsorbed overheads on account of factory's inefficiency (an abnormal factor) should be transferred to costing profit and loss account.

### ***Knowledge Assessment - IV***

#### ***Multiple Choice Questions***

1. Under absorption arises when
  - a) Budgeted overheads are more than the actual overheads.
  - b) Budgeted overheads are less than the actual overheads.
  - c) Budgeted overheads are equal to the actual overheads.
  - d) All of the above
  
2. Under absorption of overheads due to faulty management should be treated through
  - a) Supplementary rate
  - b) Carry forward to the next year
  - c) Costing and P/L account
  - d) None of the above
  
3. The supplementary rate is adopted when the amount of under or over absorbed overheads is
  - a) Small
  - b) Negligible
  - c) Large
  - d) None of the above

4. Amount of overheads should be written off to Costing Profit and Loss Account in case of
- Small
  - Large
  - Negligible
  - Any of these
5. When the normal business cycle extends for more than one year which of following accounting treatment of under or over absorbed overheads is suitable
- Supplementary rate
  - Carry forward to the next year
  - Costing and P/L account
  - None of the above
6. Which of the following are the reasons for over-recovery or under-recovery of overheads:
- Faulty estimation of overheads.
  - Seasonal fluctuations in the amount of overheads in the certain industries.
  - Wrong estimation of units produced or number of hours worked.
  - All of the above

*Ans: 1(b), 2(c), 3(c), 4(a), 5(b), 6(d)*

### KEYWORDS

- **Allocation:** is assignment of cost directly to a cost centre.
- **Apportionment:** is the allotment of proportions of items of cost to cost centres or cost unit.
- **Absorption:** of overheads is the process of charging to the product or output all the overhead expenses which have been allocated and apportioned to it. The purpose behind absorption is that overheads should be absorbed in the cost of the output of the given period. Absorption is also as recovery or application of overheads.
- **Under-absorption** means that the amount of overheads absorbed is less than the amount of overheads actually incurred.
- **Over-absorption** is just opposite of under-absorption. It means that the amount of overheads absorbed is more than the amount of actual overheads.
- **Pre-determined Overhead Rate:** a rate calculated by dividing the budgeted overheads for an accounting period by the budgeted base for the year.



## SUMMARY

- Overhead cost includes all indirect costs, i.e., indirect materials, indirect labour and indirect expenses.
- It is very difficult to associate overhead cost with an individual cost unit because this is common cost for all the units into consideration. Therefore, distribution of overheads to a particular cost unit is a topic of importance in cost accounting.
- Following steps need to be undertaken for distribution of overheads: (i) collection and classification of overheads; (ii) Allocation and apportionment of overheads to production and services departments. (iii) Re-apportionment of total overheads of each service department to production departments; and (iv) Absorption of overheads.
- Allocation refers to the allotment of a complete item to the cost centre or cost unit.
- Apportionment refers to the distribution of a cost item proportionately to a production or service department.
- Absorption refers to the charging to the product or output all the overhead expenses which have been allocated or apportioned to it. The purpose behind absorption is that overheads should be absorbed in the cost of the output of the given period. Absorption is also known as recovery or application of overheads.

## EXERCISE QUESTIONS

### Short Answer Questions

1. What is apportionment of overheads?
2. Explain the objectives of apportionment.
3. Differentiate between allocation and apportionment.
4. What is absorption?
5. What are the causes of over-absorption?
6. What are the causes of under-absorption?
7. Explain the supplementary rate.
8. What do mean by blanket overhead rate?
9. Explain re-appropriation.

### Long Answer Questions

1. What do you understand by overhead distribution? Define allocation, apportionment, and absorption.
2. Differentiate allocation, apportionment, and absorption.
3. Explain the concept of under and over absorption of overheads. Also describe the reasons of under and over absorption of overheads.
4. Briefly explain the methods of absorption of factory overheads.

5. Describe the methods of accounting treatment of over and under absorption of overheads.
6. What are the bases of apportionment of overhead expenses among departments?
7. Discuss the procedure to calculate the machine hour rate.

### Numerical Questions

**Q1** Overhead costs incurred in a machine shop for six months with corresponding machine hours:

Machine	Hours	Overhead Cost (Rs.)
January	2,000	300
February	2,200	320
March	1,700	270
April	2,400	340
May	1,800	280
June	1,900	290

Analyze the overhead cost which is semi-variable into fixed and variable elements.

**Q2** The following data were obtained from the books of Automobile engineering company for half year ended on 30<sup>th</sup> September, 2014. Calculate the departmental overhead rates for each of the production departments assuming that the overheads are recovered as a percentage of direct wages:

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Direct Wages(in Rs.)	7,000	6,000	5,000	1,000	1,000
Direct Materials(in Rs.)	3,000	2,500	2,000	1,500	1,000
Employees (Nos.)	200	150	150	50	50
Electricity (Kwh)	8,000	6,000	6,000	2,000	3,000
Light Points (Nos.)	10	15	15	5	5
Asset Value (in Rs.)	50,000	20,000	20,000	10,000	10,000
Area Occupied (Sq. yds.)	800	600	600	200	200

The expenses for six months were:

	(Rs.)
Stores Overhead	400
Motive Power	1,500
Electric Lighting	200
Labour Welfare	3,000
Depreciation	6,000
Repairs and Maintenance	1,200

General Overheads	10,000
Rents and Rates	600

Apportion the expenses of Department X in the ratio of 4:3:3 and that of Department Y, in proportion to Direct Wages, to Department A, B and C respectively.

*(Ans: Total Overheads Deptt A – Rs. 8,340, Deptt B – Rs. 6,220, Deptt C – Rs. 5,100)*

Q3 Calculate the overhead allocable to production departments A and B from the following: There are two service departments X and Y, X renders service to A and B in the ratio of 3:2 and Y renders service to A and B in the ratio of 9:1. Overhead as per primary overhead distribution summary is:

A- Rs. 49,800, B- Rs. 29,600, X- Rs. 15,600 and Y- Rs. 10,800.

*(Ans: Total Overheads Deptt A – 68,880, Deptt B – 36,920)*

Q4 Modern Machine Ltd. Have three production departments A, B and C and two service departments D and E. from the following figures extracted from the records of the company. Calculate the overhead rate labour per hour:

Particulars	Total (Rs.)	Production Deptt			Service Deptt	
		A	B	C	D	E
Direct Materials	60,000	20,000	10,000	19,000	6,000	5,000
Direct Wages	40,000	15,000	15,000	4,000	2,000	4,000
Value of Machinery	2,50,000	60,000	1,00,000	40,000	25,000	25,000
Floor Area	50,000	15,000	10,000	10,000	5,000	10,000
Horse power of machine	150	50	60	30	5	5
No. of light points	50	15	10	10	5	10
Labour hours	15,000	5,000	5,000	2000	1,000	2,000

Expenses are as follows:	Rs.
Indirect Materials	15,000
Indirect Wages	10,000
Depreciation on Machinery	25,000
Depreciation on Building	5,000

Rent, Rates and Taxes	10,000
Electric Power of Machine	15,000
Electric Power of Lighting	500
General Expenses	15,000

The expenses of service departments D and E are to be apportioned as follows:

	A	B	C	D	E
D	40%	20%	30%	-	10%
E	30%	30%	40%	-	-

*(Ans: Labour Overheads Rate Per Hour Deptt A – 8.45, Deptt B –8.03, Deptt. C-15.04)*

- Q5 A company has three production departments A, B and C two service departments X and Y. the expenses incurred by them during the month of April, 2014 are:  
A: Rs. 80,000, B; Rs. 70,000; C Rs. 50,000; X Rs. 23,400; Y Rs. 30,000

The expenses of service departments are apportioned to the production departments on the following basis:

	A	B	C	X	Y
Expenses of Deptt. X	20%	40%	30%	-	10%
Expenses of Deptt. Y	40%	20%	20%	20%	-
No. of Units Produced	1,000	850	650		

Show how expenses of X and Y would be apportioned to A, B and C and cost per unit of each department.

*(Ans: Cost Per Unit Deptt A – 99.23, Deptt B –104.21, Deptt. C-100.91)*

- Q6 The following is the budget of S engineering works for the year 2014:

Factory Overheads	Rs. 62,000
Direct Labour Cost	Rs. 98,000
Direct Labour Hours	15,500 Hours
Machine Hours	50,000 Hours

From the above figures, prepare the overhead application rates using the following methods:

- (i) Direct Labour Hour (ii) Direct Labour Cost, and (iii) Machine Hour.

Prepare a comparative statement of cost showing the result of application of each of the above rates of Job from the under mentioned data:

Direct Material Cost	Rs. 45
Direct Labour Wages	Rs. 40
Direct Labour Hours	40
Machine Hours	30

**Ans** ((i) *Direct Labour Hour: Rs. 4* (ii) *Direct Labour Cost: Rs. 63.26%* (iii) *Machine Hour Rate: Rs. 1.24*)

Q7 Compute the Machine Hour Rate from the following data:

Cost of Machine	1,00,000
Installation Charges	10,000
Estimated scrap value after the expiry of its life (15 years)	5,000
Rent and rates for the shop per month	2,000
General lighting for the shop per month	3,000
Insurance premium for the machine per annum	2,960
Repairs and maintenance expenses per annum	2,000
Power consumption 10 units per hour	
Rate of power per 100 units Rs. 20	
Estimated working hours per annum 2200.	
This includes setting up time of 200 hours.	
Shop supervisor's salary per month Rs. 600	
The machine occupied $\frac{1}{4}$ of the total area of the shop. The supervisor is expected to devote $\frac{1}{5}$ of his time for supervising this machine.	

**(Ans: Hourly Rate 16.20)**

- Q8 Sweet Dreams Ltd. Uses a historical cost system and absorbs overheads on the basis of pre-determined rate. The following data re-available for the year ended on 31<sup>st</sup> March, 2015:

<b>Manufacturing overheads:</b>	Rs.
Amount actually spent	1,70,000
Amount absorbed	1,50,000
Cost of goods sold	3,36,000
Stock of finished goods	96,000
Work-in-progress	48,000

Using two methods of disposal of under-absorbed overheads, show the implication on the profits of the company under each method.

- Q9 During the year ended 31<sup>st</sup> March, 2014 the factory overhead costs of three production departments of an organisation are as under:

Department X	Rs. 48,950
Department Y	89,200
Department Z	64,500

The basis of apportionment of overheads is given below:

Department X	Rs. 5 per machine hour for 10,000 hours
Department Y	75% of direct labour cost of Rs. 1,20,000
Department Z	Rs. 4 per piece for 15,000 pieces

Calculate departmentwise under or over-absorption of overheads and present the data in a tabular form.