

Intermediate Course

Study Material

(Modules 1 to 2)

Paper : 4

Cost and Management Accounting

**(Relevant for May, 2025 and
onward Examinations)**

Module – 1



BOARD OF STUDIES
THE INSTITUTE OF CHARTERED ACCOUNTANTS OF INDIA

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BEFORE WE BEGIN....

In contemporary business environment, existence of an entity depends on the way it faces the challenges posed by the competitive market conditions and deals with the same. Cost leadership being one of the competitive strategies, gives an added advantage to the entity. Cost being an important aspect for survival and growth in business, requires a mandatory awareness about the cost control and cost reduction methods. Fourth industrial revolution, also known as Industry 4.0, lays more emphasis on the digitization of information for effective decision-making, which enables an entity in keeping ahead in competition. Cost and Management accounting, a discipline of accounting, enables an entity in taking timely decisions by provisions of cost, profitability and other relevant information.

Chartered Accountants, as a global business solution provider, play an important role in business, have an onus by helping an entity to achieve its long-term objectives. In this direction, Cost and Management Accounting helps Chartered Accountants in taking timely and informed business decisions. In view of nobility of the objective to provide quality academic inputs to the students of CA course, the Board of Studies (BoS) of ICAI has decided to bring forth Study Material of Cost and Management Accounting. This Study Material contains all relevant and contemporary topics like *Digital Costing, Government e-Marketplace (GeM) Process of tender and quotation, Direct Expenses, Various Short-term decisions, Budgets and motivation, Feedback and Feedforward controlling in budgeting as detailed out in the syllabus.*

Under the Revised Scheme of Education and Training, at the Intermediate Level, students are expected not only to acquire professional knowledge but also to develop the ability to apply the knowledge in real life business situations. The process of learning should also help the students in imbibing professional skills, i.e., the intellectual skills and communication skills, necessary for achieving the desired professional competence.

The entire syllabus has been divided into fifteen chapters. The chapters have been grouped into two modules:

Module-1 Consisting of seven chapters namely:

Chapter-1: Introduction to Cost and Management Accounting

Chapter-2: Material Cost

Chapter-3: Employee Cost and Direct Expenses

Chapter-4: Overheads-Absorption Costing Method

Chapter-5: Activity Based Costing

Chapter-6: Cost Sheet

Chapter-7: Cost Accounting Systems

Module-2 Consisting of eight chapters namely:

Chapter-8: Unit & Batch Costing

Chapter-9: Job Costing

Chapter-10: Process & Operation Costing

Chapter-11: Joint Products & By Products

Chapter-12: Service Costing

Chapter-13: Standard Costing

Chapter-14: Marginal Costing

Chapter-15: Budget and Budgetary Control

The content for each chapter at the Intermediate level has been structured in the following manner –

1. **Comprehensive Learning Outcomes:** Learning outcomes which you need to demonstrate after learning each topic have been detailed in the first page of each chapter. Demonstration of these learning outcomes would help you to achieve the desired level of technical competence.
2. **Chapter Overview:** As the name suggests, this chart/table would give a broad framework of the contents covered in the chapter.
3. **Introduction:** A brief introduction is given at the beginning of each chapter, which would help you get a feel of the topic.
4. **Content:** In each chapter, the topics have been covered following 'step by step' approach. The concepts are explained in student-friendly manner with the aid of Examples/illustrations/diagrams/flow charts/Pictorials as per requirement. These value additions would help you develop conceptual clarity and to get a good and quick grasp of the topic. Diagrams, Pictorials and Flow charts would help you understand the concepts in a better manner. Illustrations would help you understand the application of concepts/ provisions. More illustrations/

Practical questions in Test Your Knowledge section have been added to enable a thorough practice of variety of questions. The flow of content in chapter have been reviewed and changed to make it more student friendly.

5. **Illustration with Answers:** Illustrations and examples has been included in the Study Material systematically, after discussion on each topic, so that application of the concept can be understood very clearly. This would also enable you to learn and sharpen your application skills and test your understanding.

6. **Multiple Choice Questions (MCQ):** In the New Scheme of education and training, assessment for 30 marks in each paper at the intermediate and final level would be by way of case scenario based MCQs. Questions in this segment would comprise of a case scenario followed by a few MCQs based on the case scenario. All case scenario based MCQs would be application oriented. There would be 4 options in each MCQ, out of which the student has to choose the correct option. In the subject of Cost and Management Accounting, a student has to apply the Cost and Management Accounting concepts learnt in solving the MCQs based on the case scenario. In order to hone the application and analytical skills of students, independent MCQs have been included in every chapter of this Study Material. Solving these MCQs will enhance your conceptual clarity and sharpen your analytical skills.

7. **Summary:** A summary of the chapter is given at the end to help you revise what you have learnt. It would especially help you to revise the chapter(s) quickly the day before the examination.

8. **Test Your Knowledge:** This comprises of Multiple-Choice Questions (MCQs), Theoretical Questions and Practical Problems with solutions which test the breadth and depth of your understanding of the topic.

9. **Skill Specification Assessment:** An indicative skill specification Assessment Grid has been incorporated in the study material for better understanding of the students. An effort has been made to arrange the questions/illustrations/exercise accordingly.

In this Study Material, formats of Financial Statements (i.e. Balance Sheet, Income Statements etc) and financial terms used are for illustrative purpose only. For appropriate format and applicability of various Standards, students are advised to refer the study material of appropriate subject (s).

Further the solutions/answers contained in the study material are based on certain assumptions and other logical alternative assumption/ approach/ presentation may be possible.

We have made every effort to make the Study Material student-friendly and to enable the students to have conceptual clarity on various topics of this subject.

Every effort has been made to remove typing errors (if any)/ clerical errors (if any)/ missing content (if any)/ formatting errors (if any), or any other error, so as to make Study Material error free, however if inadvertently any error is present and found by readers, they may send it to us immediately, so that it can be rectified at our end.

In case you need any further clarification/ guidance, you may send your queries through ICAI BoS App.

Happy Reading and Best Wishes!

SKILL SPECIFICATION ASSESSMENT GRID

Skill Level	Manner of Assessment of Skills	Illustrative verbs used to construct learning outcomes
Level-I: Knowledge and Comprehension	Understanding or grasping ability (Defining, stating, enlisting, identifying, and explaining concepts / provisions / theories / principles relating to the relevant subject area.)	List – Preparing a list of State – Mentioning clearly or fully the details of. Define – Explaining the exact meaning of. Describe – Giving detailed narration of something or key features. Distinguish – Mentioning or highlighting the difference between. Explain – Making the meaning of. Identify – Recognizing something. Illustrate – Explaining something with the help of an example. and similar verbs Combination of verbs: Comprehend and Explain; Identify and explain and similar verbs.

Level-II: Application and Analysis	Applying and analyzing the concepts learned during the grasping level. (Application: Applying concepts / provisions / theories / principles in problem solving in non-complex scenarios.)	Application: Apply – Putting theoretical knowledge for practical purpose. Calculate – Arriving at some value by following numerical/ analytical procedures. Compute - Arriving at some value by following numerical/ analytical procedures. Determine- Ascertain or establish exactly by calculation or workings. Find/ Find out- Ascertain or establish exactly by calculation or workings. Demonstrate – Proving something with certainty using practical means. Prepare – Making something ready for any use. Reconcile – Making or proving consistency/ compatibility. Solve – Find an answer or solution to something Tabulate – Exhibiting the required information in a tabular form.

		Combination of verbs: Compare and contrast and similar verbs.
	(Analysis: Applying, comparing and analysing concepts / provisions / theories / principles in problem solving in moderately complex scenarios.)	Analysis: Analyze - Examining something in detail. Categorize - Arranging something in a predefined group or class or division. Compare - Examining the differences or similarities between. Construct - Building or compiling. Discuss - Writing about or examining in detail. Interpret - Translating in intelligible or familiar or understandable terms. Combination of verbs: Analyse and apply and similar verbs.

SYLLABUS

PAPER – 4: COST AND MANAGEMENT ACCOUNTING

(One Paper- Three hours- 100 Marks)

Objectives:

- (a) To develop an understanding of the basic concepts and applications to establish the cost associated with the production of products and provision of services and apply the same to determine prices.
- (b) To develop an understanding of cost accounting statements.
- (c) To acquire the ability to apply information for cost ascertainment, planning, control and decision making.
- (d) To apply costing methods to determine the costs for different purposes.
- (e) To apply appropriate techniques to support short term decisions.

Contents:

1. Overview of Cost and Management Accounting

(i) Introduction to Cost and Management Accounting

- (a) Objectives and Scope of Cost and Management Accounting,
- (b) The users of Cost and Management accounting information, Functions of management accounting.
- (c) Role of cost accounting department in an organisation and its relation with other departments.
- (d) Installation of Costing System
- (e) Relationship of Cost Accounting, Financial Accounting, Management Accounting and Financial Management.
- (f) Cost terms and Concepts
- (g) Cost Reduction and Cost Control

- (h) Elements of Costs
- (i) Cost behavior pattern, Separating the components of fixed, variable, semi-variable and step costs.
- (j) Methods of Costing, Techniques of Costing.
- (k) Digital Costing.

(ii) Elements of Cost and Preparation of Cost Sheets

- (a) Functional classification and ascertainment of cost
- (b) Preparation of Cost Sheets for Manufacturing sector and for Service sector

2. Ascertainment of Cost and Cost Accounting System

(i) Material Cost

- (a) Introduction to procurement procedures. Valuation of receipts, issue and closing stock of Material, Stock verification.
- (b) Material requirement analysis through digital costing including Government e-Marketplace (GeM). Introduction to Costing through Enterprise Resource Planning (ERP). Process of tender and quotation.
- (c) Inventory control-
 - Techniques of fixing level of stocks- minimum, maximum, re-order point, safety stock, determination of optimum stock level,
 - Determination of Optimum Order quantity- Economic Order Quantity (EOQ),
 - Techniques of Inventory control- ABC Analysis, Fast, Slow moving and Non moving (FSN), High, Medium, Low (HML), Vital, Essential, Desirable (VED), Just-in-Time (JIT)- Stock taking and perpetual inventory system, use of inventory control ratios, Digital Inventory control
- (d) Treatment of Normal/Abnormal Losses w.r.t. waste, scrap, spoilage, defective, obsolescence.

(ii) Employee Cost

- (a) Introduction to Attendance and Payroll procedures
- (b) Elements of wages- Basic pay, Dearness Allowance, Overtime, Bonus, Holiday and leave wages, Allowances and perquisites.
- (c) Employee Cost Control
- (d) Employee Turnover- Methods of calculating employee turnover, causes of employee turnover, effects of employee turnover.
- (e) Remuneration systems and incentive schemes- Premium Bonus Method (Halsey Plan and Rowan Plan)

(iii) Direct Expenses

Identification of direct expenses with the main product or service and its treatment.

(iv) Overheads

- (a) Functional analysis- Factory, Administration, Selling, Distribution, Research and Development.
- (b) Behavioral analysis- Fixed, Variable and Semi- Variable.
- (c) Allocation and Apportionment of overheads using Absorption Costing Method.
- (d) Factory Overheads- Primary and secondary distribution,
- (e) Administration Overheads- Method of allocation to cost centres or products,
- (f) Selling & Distribution Overheads- Analysis and absorption of the expenses in products/ customers, impact of marketing strategies, cost effectiveness of various methods of sales promotion.
- (g) Treatment of Research and development cost in cost accounting.

(v) Concepts of Activity Based Costing (ABC)**(vi) Integration of cost and financial data**

- (a) Recording of financial data and its segregation.
- (b) Introduction to Non- integrated and Integrated Accounting system.

- (c) Items included in cost accounts only but financial accounts and vice versa.
- (d) Reconciliation of profit as per Cost and Financial Accounts (under Non-Integrated Accounting System).

3. Methods of Costing

(i) Single Output/ Unit Costing

(ii) **Job Costing:** Job cost cards and databases, collecting direct costs of each job, attributing overheads to jobs, Application of job costing.

(iii) **Batch Costing:** Determination of optimum batch quantity, Ascertainment of cost for a batch, Preparation of batch cost sheet, Treatment of spoiled and defective work.

(iv) Process/ Operation Costing

- (a) Process cost recording, Process loss, Abnormal gains and losses, Equivalent units of production, Inter-process profit, Valuation of work in process.
- (b) Joint Products- Apportionment of joint costs, Methods of apportioning joint cost over joint products,
- (c) By-Products- Methods of apportioning joint costs over by-products, treatment of By-product cost.

(v) Costing of Service Sectors

Determination of Costs and Prices of services.

4. Cost Control and Analysis

(i) Standard Costing

- (a) Setting up of Standards, Types of Standards, Standard Costing as method of performance measurement.
- (b) Calculation and Reconciliation of Material Cost, Labour cost, Variable Overhead, Fixed Overhead

(ii) Marginal Costing

- (a) Basic concepts of marginal costing, Contribution margin, Break-even analysis, Break –even and profit volume charts, Contribution to sales ratio, Margin of Safety, Angle of Incidence, Cost-Volume-Profit Analysis (CVP),

- (b) Determination of Cost of a product/ service under marginal costing method, determination of cost of finished goods, work-in-progress,
- (c) Comparison of Marginal costing with absorption costing method- Reconciliation of profit under both the methods,
- (d) Short term decision making -
 - Make or buy decision
 - Discontinuation decision
 - Multiproduct break-even analysis
 - Limiting factor (key factor)

(iii) Budget and Budgetary Control

- (a) Meaning of Budget, Essentials of Budget, Budget Manual, Budget setting process, Preparation of Budget and monitoring procedures.
- (b) The use of budget in planning and control
- (c) Flexible budget, Preparation of Functional budget for operating and non- operating functions, Cash budget, Master budget,
- (d) Introduction to Principal/ Key budget factor, Zero Based Budgeting (ZBB), Performance budget, Control ratios and Budget variances.
- (e) Budgets and motivation
- (f) Feedback and Feedforward controlling in budgeting.

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INTRODUCTION TO COST AND MANAGEMENT ACCOUNTING

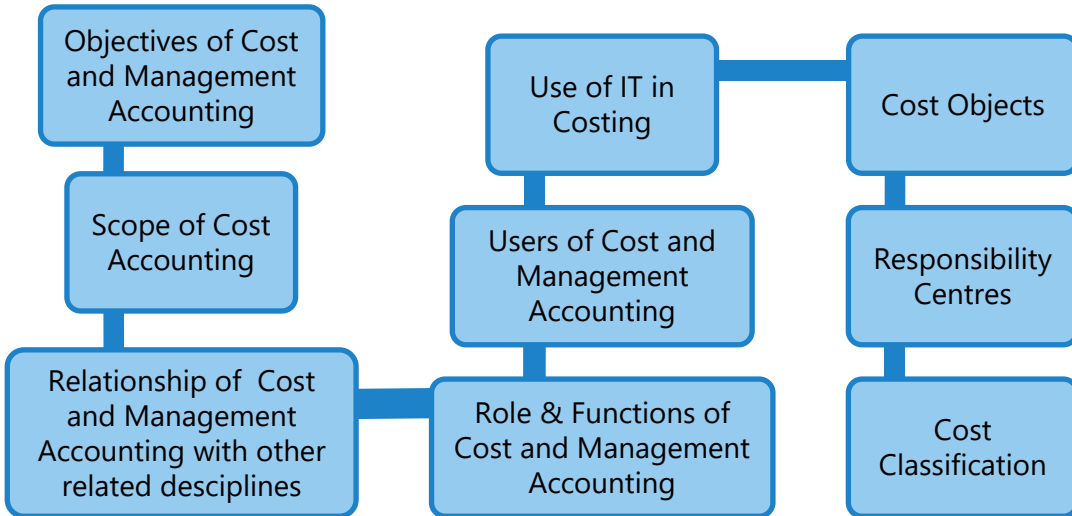


LEARNING OUTCOMES

After studying this chapter, you would be able to-

- ◆ State the meaning, objective and importance of Cost and Management Accounting.
- ◆ Discuss the functions and role of Cost Accounting Department in an organization.
- ◆ Discuss the installation of a Cost Accounting System in an organization.
- ◆ Differentiate between Cost Accounting, Financial Accounting and Management Accounting.
- ◆ List the various elements and classifications of cost.
- ◆ Explain the methods of segregating semi-variable costs into fixed and variable cost.
- ◆ Discuss the concept of cost reduction and cost control.
- ◆ Discuss the methods and techniques of costing.
- ◆ A brief discussion on Digital Costing System.

CHAPTER OVERVIEW



1. INTRODUCTION

Michael E. Porter in his theory of Generic Competitive Strategies has described 'Cost Leadership' as one of the three strategic dimensions (others are 'Product differentiation' and 'Focus or Niche') to achieve competitive advantage in industry. **Cost Leadership implies producing goods or provision of services at lowest cost while maintaining quality** to have better competitive price. In a business environment where each entity is thriving to achieve apex position not only in domestic but global competitive market, it is essential for the entity to fit into any of the three competitive strategic dimensions. Cost Leadership, also in line with the subject Cost and Management Accounting, can be achieved if an entity has a robust Cost and Management Accounting system in place. In this chapter, we will learn various aspects of Cost and Management Accounting and its application in manufacturing and service environment.

1.1 Meaning and Definition

- (i) **Cost-** Cost is the amount of resource given up in exchange of some goods or services. It can be expressed as a noun as well as a verb. As a noun, it

can be defined as the **amount of expenditure** (actual or notional) incurred on or attributable to a specified article, product or activity.

As a verb, it can be as an action to ascertain the cost of a specified thing or activity.

- (ii) **Costing-** Costing is defined as "**the technique and process of ascertaining costs**".

According to CIMA "an organisation's costing system is the foundation of the internal financial information system for managers. It provides the information that management needs to plan and control the organisation's activities and to make decisions about the future."

- (iii) **Cost Accounting-** Cost Accounting is defined as "**the process of accounting for cost** which begins with the recording of income and expenditure or the bases on which they are calculated and ends with the preparation of periodical statements and reports for ascertaining and controlling costs."

- (iv) **Cost Accountancy-** Cost Accountancy has been defined as "**the application of costing and cost accounting principles, methods and techniques** to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived there from for the purpose of managerial decision making."

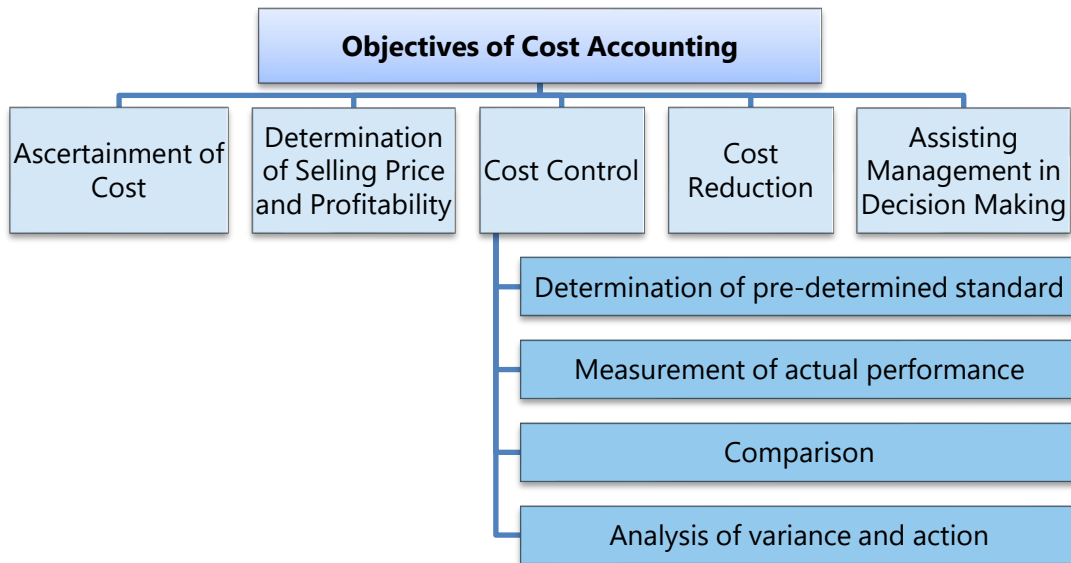
- (v) **Management Accounting-** As per CIMA Official Terminology "Management Accounting is **the application of the principles of accounting and financial management** to create, protect, preserve and increase value for the stakeholders of for-profit and not-for-profit enterprises in the public and private sectors."

Management Accounting is an integral part of management function. It assists management by provision of relevant information for planning, organising, controlling, decision making etc.

- (vi) **Cost Management-** It is an application of management accounting concepts, methods of collections, analysis and presentation of data to provide the information needed to plan, monitor and control costs.



2. OBJECTIVES OF COST ACCOUNTING



The main objectives of Cost and Management Accounting are explained as below:

- (i) **Ascertainment of Cost:** The main objective of Cost Accounting is accumulation and ascertainment of cost. Costs are **accumulated, assigned and ascertained** for each cost object. This cost object may be a unit, job, operation, process, department or service.
- (ii) **Determination of Selling Price and Profitability:** The Cost Accounting System helps in determination of selling price and thus profitability of a cost object. Though in a competitive business environment selling prices are determined by external factors but cost accounting system provides a basis for **price fixation and rate negotiation**.
- (iii) **Cost Control:** Maintaining discipline in expenditure is one of the main objectives of a good cost accounting system. It ensures that **expenditures are in consonance with predetermined set standard and any variation from these set standards is noted and reported on continuous basis**. To exercise control over cost, following steps are followed:
 - (a) *Determination of pre-determined standard or results:* Standard cost or performance targets for a cost object or a cost centre are set before

initiation of production or service activity. These are desired cost or result that need to be achieved.

- (b) *Measurement of actual performance:* Actual cost or result of the cost object or cost centre is measured. Performance should be measured in the same manner in which the targets are set i.e., if the targets are set up operation-wise, and then the actual costs should also be collected and measured operation-wise to have a common basis for comparison.
- (c) *Comparison of actual performance with set standard or target:* The actual performance so measured is compared against the set standard and desired target. Any deviation (variance) between the two is noted and reported to the appropriate person or authority.
- (d) *Analysis of variance and action:* The variance in results so noted is further analysed to know the reasons for variance and appropriate action is taken to ensure compliance in future. If necessary, the standards are further amended to take developments into account.

(iv) Cost Reduction: It may be defined "as the achievement of **real and permanent reduction in the unit cost** of goods manufactured or services rendered without impairing their suitability for the use intended or diminution in the quality of the product."

Cost Reduction is an approach of management where cost of an object is believed to have a scope of further reduction. No cost is termed as lowest and every possibility of cost reduction is explored. To do cost reduction, the following action is taken:

- (a) Each activity within an entity is segmented to analyse and identify value added and non- value added activities. All non-value added activities are eliminated without affecting the essential characteristics of the product or process. **Value Chain Analysis**, a strategic tool, developed by Michael Porter, is one of the method to do value analysis.
- (b) Conducting continuous research and study to know the most optimal way to manufacture a product or render a service.

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

- (a) There is a saving in unit cost.

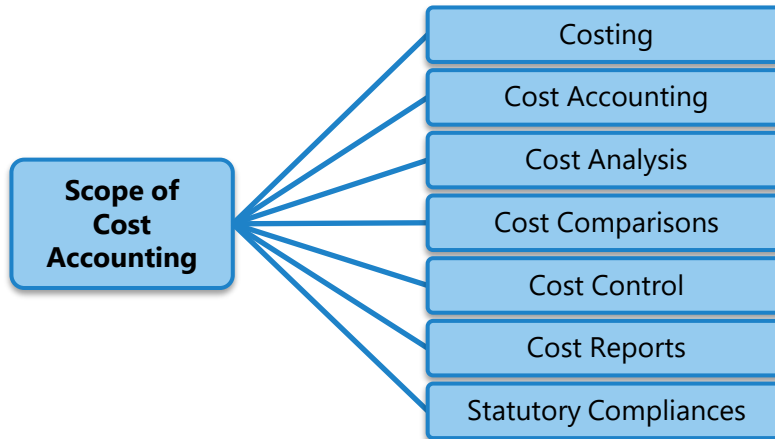
- (b) Such saving is of permanent nature.
- (c) The utility and quality of the goods and services remain unaffected, if not improved.
- (v) **Assisting Management in Decision Making:** Cost and Management Accounting by providing relevant information, assist management in planning, implementing, measuring, controlling and evaluating of various activities. A robust cost and management accounting system provides internal and external information to the industry which will be relevant for decision making.

2.1 Difference between Cost Control and Cost Reduction

Cost Control	Cost Reduction
1. Cost control aims at <i>maintaining</i> the costs in accordance with the established standards.	1. Cost reduction is concerned with <i>reducing</i> costs. It challenges all standards and endeavours to improve them continuously
2. Cost control seeks to <i>attain lowest possible cost</i> under existing conditions.	2. Cost reduction recognises no condition as permanent, since a <i>change will result in lower cost.</i>
3. In case of cost control, emphasis is on <i>past and present</i>	3. In case of cost reduction, it is on <i>present and future.</i>
4. Cost control is a <i>preventive</i> function	4. Cost reduction is a <i>corrective</i> function. It operates even when an efficient cost control system exists.
5. Cost control ends when targets are achieved.	5. Cost reduction has no visible end and is a continuous process.



3. SCOPE OF COST ACCOUNTING



Scope of Cost Accounting consists of the following functions:

- (i) **Costing:** Costing is the **technique and process of ascertaining costs** of products or services. The cost ascertainment procedure is governed by some cost accounting principles and rules. Generally, cost is ascertained using historical costs, standard costs, process cost, operation cost etc.
- (ii) **Cost Accounting:** This is a process of **accounting for cost** which begins with the recording of expenditure and ends with the preparation of periodical statement and reports for ascertaining and controlling cost. Cost Accounting is a formal mechanism of cost ascertainment.
- (iii) **Cost Analysis:** It involves the process of finding out the **factors responsible for variance in actual costs from the budgeted costs** and accordingly fixation of responsibility for cost differences. This also helps in taking better cost management and strategic decisions.
- (iv) **Cost Comparisons:** Cost accounting also includes comparisons of cost **involved in alternative courses of action** such as use of different technology for production, cost of making different products and activities, and cost of same product/ service over a period of time.
- (v) **Cost Control:** It involves a **detailed examination of each cost** in the light of advantage received from the incurrence of the cost. Thus, we can state

that cost is analyzed to know *whether cost is not exceeding its budgeted cost and whether further cost reduction is possible or not.*

- (vi) **Cost Reports:** This is the ultimate function of cost accounting. These reports are primarily prepared for use by the management at different levels. Cost Reports *helps in planning and control, performance appraisal and managerial decision making.*
- (vii) **Statutory Compliances:** Maintaining cost accounting records as per the rules prescribed by the statute to maintain cost records relating to utilization of materials, labour and other items of cost as applicable to the production of goods or provision of services as provided in the Act and these rules.



4. RELATIONSHIP OF COST AND MANAGEMENT ACCOUNTING WITH OTHER RELATED DISCIPLINES

Cost and Management Accounting as a discipline is interrelated and dependent on other disciplines of accounting.

4.1 Cost Accounting with Management Accounting

As we have already studied that though Cost Accounting and Management Accounting is used synonymously but there are a few differences. Management Accounting is an open-ended discipline which enables managers to take informed decisions. Management Accounting takes inputs from cost accounts, financial accounts, statistical and operation management tools etc.

Difference between Cost Accounting and Management Accounting

	Basis	Cost Accounting	Management Accounting
(i)	Nature	It records the quantitative aspect only.	It records both qualitative and quantitative aspect.
(ii)	Objective	It records the cost of producing a product and providing a service.	It provides information to management for planning and co-ordination.

(iii)	Area	It only deals with cost Ascertainment.	It is wider in scope as it includes financial accounting, budgeting, taxation, planning etc.
(iv)	Recording of data	It uses both past and present figures.	It is focused with the projection of figures for future.
(v)	Development	Its development is related to industrial revolution.	Its development is related to the need of modern business world.
(vi)	Rules and Regulation	It follows certain principles and procedures for recording costs of different products.	It does not follow any specific rules and regulations.

4.2 Cost Accounting with Financial Accounting

Cost accounting accumulates and ascertains costs for goods sold and inventories. It provides inputs to record costs in financial accounting system.

Difference between Financial Accounting and Cost Accounting

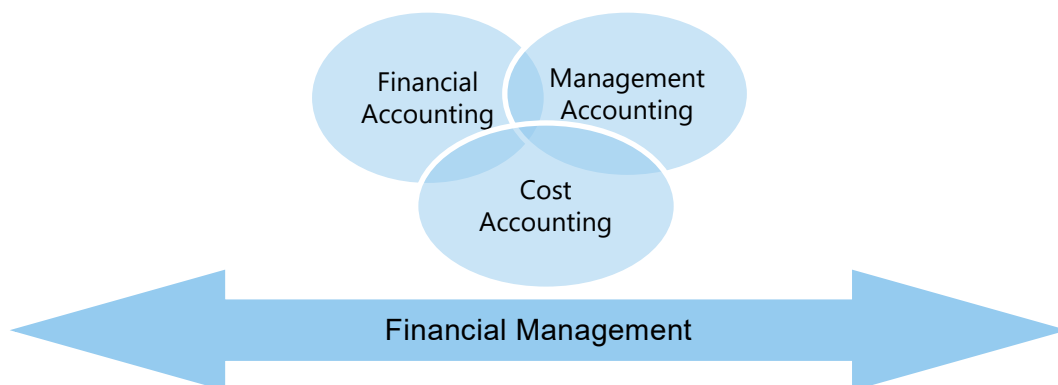
	Basis	Financial Accounting	Cost Accounting
(i)	Objective	It provides information about the <i>financial performance</i> of an entity.	Ascertainment of cost for the purpose of <i>cost control and decision making</i> .
(ii)	Nature	It classifies records, present and interprets transactions in monetary terms.	It classifies, costs records, present, and interprets it in a significant manner.
(iii)	Recording of data	It records <i>Historical data</i> .	It makes use of both <i>historical and pre-determined costs</i> .
(iv)	Users of information	The users of financial accounting statements are	The cost accounting information is generally

		shareholders, creditors, financial analysts and government and its agencies, etc.	used by internal management. But sometimes regulatory authorities also.
(v)	Analysis of cost and profit	It shows profit or loss of the organization either segment wise or as a whole.	It provides the cost details for each cost object i.e. product, process, job, operation, contracts etc.
(vi)	Time period	Financial Statements are prepared <i>usually for a year</i> .	Reports and statements are prepared <i>as and when required</i> .
(vii)	Presentation of information	A <i>set format</i> is used for presenting financial information.	In general, <i>no set formats</i> for presenting cost information is followed.

4.3 Cost and Management Accounting with Financial Management

Cost and Management Accounting is an **application of Financial Management for decision making purposes**.

The relationship among Cost Accounting, Management Accounting, Financial Accounting and Financial Management can be understood with the help of the following diagram.





5. ROLE & FUNCTIONS OF COST AND MANAGEMENT ACCOUNTING

The role of a cost and management accounting system is to:

- Provide relevant information to management for decision making,
- Assist management for planning, measurement, evaluation and controlling of business activities,
- Help in allocation of cost to products and inventories for both external and internal users.

Though the term Cost Accounting and Management Accounting is used by various authors synonymously but in actual practice, **Cost Accounting is concerned with accumulation and allocation of costs to different cost objects, whereas, Management Accounting concerned with provision of information to internal users for decision making.**

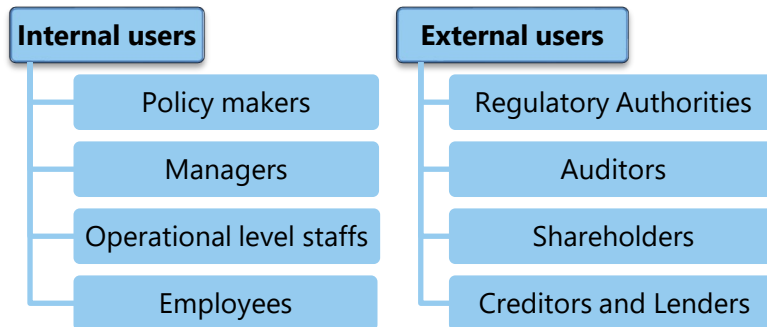
The functions of Cost and Management Accounting include:

- (i) Collection and accumulation of cost for each element of cost.
- (ii) Assigning costs to cost objects to ascertain cost.
- (iii) Cost and Management Accounting Department (whatever nomenclature may be used to denote the department) sets budget and standards for a particular period or activity beforehand and these are compared with the assigned and ascertained cost. Any deviation with the set standards are analysed and reported. All this exercise is done to control costs.
- (iv) The main function of Cost and Management Accounting is provision of relevant information to the management for decision making. An Information system environment is set up which is popularly known as **Management Information System (MIS)**. The MIS provides relevant and timely information related to both internal and external to the organisation to enable management at all levels to take decisions. Decisions include cost optimisation, price fixation, implementation of any plan related with product, process, marketing etc.

- (v) The performance of a responsibility centre is measured and evaluated against the set standards. The function of Cost and Management Accounting is to gather data like time taken, wastages, process idleness etc., analyse the data, prepare reports and take necessary actions.

6. USERS OF COST AND MANAGEMENT ACCOUNTING

Cost and Management Accounting information which is generated or collected is used by different stakeholders. The users of the information can be broadly categorised into internal and external to the entity.



Internal Users

Internal users, who use the Cost and Management Accounting information may include the followings:

- (a) Policy Makers-** The policy makers are those who formulate strategies
- (i) to achieve the goals (short & long term both) to fulfil the objectives of the organisation.
 - (ii) to position the organisation into the competitive market environment.
 - (iii) to design the organisational structure to get the policy and strategies implemented. Etc.
- (b) Managers-** The managers use the information
- (i) to know the cost of a cost object and cost centre
 - (ii) to know the price for the product or service

- (iii) to measure and evaluate performance of responsibility centres
- (iv) to know the profitability-product-wise, department-wise, customer-wise etc.
- (v) to evaluate the strategic options and to make decisions
- (c) Operational level staff-** The operational level staff like supervisors, foreman, team leaders require information
 - (i) to know the objectives and performance goals for them
 - (ii) to know product and service specifications like volume, quality and process etc.
 - (iii) to know the performance parameters against which their performance is measured and evaluated.
 - (iv) to know divisional (responsibility centre) profitability etc.
- (d) Employees-** Employees are concerned with the information related with time and attendance, incentives for work, performance standards etc.

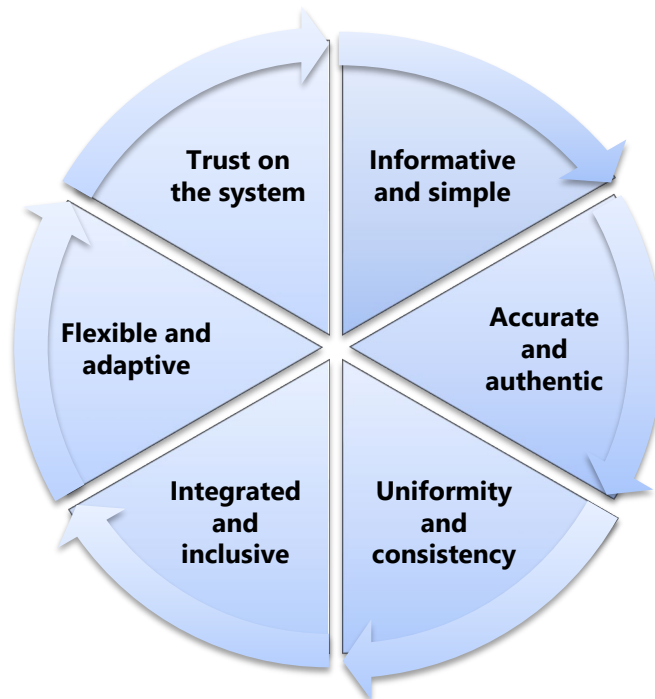
External Users

External users, who use the Cost and Management Accounting information may include the followings:

- (a) Regulatory Authorities-** Regulatory Authorities are concerned with cost accounting data and information *for different purpose which includes tariff determination, providing subsidies, rate fixation* etc. To do this the regulatory bodies require information on the basis of some standards and format in this regard.
- (b) Auditors-** The auditors while conducting audit of financial accounts or for some other special purpose audit like cost audit etc. require information related with costing and reports reviewed by management etc.
- (c) Shareholders-** Shareholders are concerned with information that effect their investment in the entity. Management communicates to the shareholders through periodic communique, annual reports etc. regarding new orders received, product expansion, market share for products etc.

- (d) **Creditors and Lenders-** Creditors and lenders are concerned with data and information which affects an entity's ability to serve lenders or creditors. For example, any financial institutions which provides loan to an entity against book debts and inventories are more concerned with regular reporting on net debt position and stock balances.

7. ESSENTIALS OF A GOOD COST ACCOUNTING SYSTEM



Essential features of a good Cost Accounting System

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

- (a) **Informative and simple:** Cost accounting system should be tailor-made, practical, simple and capable of meeting the requirements of a business concern. The system of costing should not sacrifice the utility by introducing inaccurate and unnecessary details.

- (b) **Accurate and authentic:** The data to be used by the cost accounting system should be accurate and authenticated; otherwise it may distort the output of the system and a wrong decision may be taken.
- (c) **Uniformity and consistency:** There should be uniformity and consistency in classification, *treatment and reporting of cost data and related information*. This is required for benchmarking and comparability of the results of the system for both horizontal and vertical analysis.
- (d) **Integrated and inclusive:** The cost accounting system should be integrated with other systems like financial accounting, taxation, statistics and operational research etc. to have a complete overview and clarity in results.
- (e) **Flexible and adaptive:** The cost accounting system should be flexible enough to *make necessary amendment and modifications* in the system to incorporate changes in technological, reporting, regulatory and other requirements.
- (f) **Trust on the system:** Management should have trust on the system and its output. For this, an active role of management is required for the development of such a system that reflects a strong conviction in using information for decision making.



8. INSTALLATION OF COSTING SYSTEM

As in the case of every other form of activity, it should be considered whether it would be profitable to have a Cost Accounting System. Management of an organisation needs complete and accurate information to make decisions. A well-established costing system should provide all relevant information as and when required by management as well as various stakeholders.

Before setting up a system of cost accounting the factors mentioned below should be studied:

- (a) **Objective:** The objective of setting up the costing system, for example whether it is being introduced for *fixing prices* or for establishing a system of cost control.
- (b) **Nature of Business or Industry:** The industry in which the business is operating. Every business or industry has its own uniqueness and objectives. According to its cost information requirement, cost accounting methods are

followed. For example, an oil refinery maintains process wise cost accounts to find out the cost incurred on a particular process, say in crude refinement process etc.

- (c) **Organisational Hierarchy:** Costing system should fulfil the information requirements of different levels of management. *Top management is concerned with the corporate strategy, strategic level management is concerned with marketing strategy, product diversification, product pricing etc. Operational level management needs the information on standard quantity to be consumed, report on idle time etc.*
- (d) **Knowing the product:** Nature of the product determines the type of costing system to be implemented. The product which has by-products requires costing system which accounts for by-products as well. In case of perishable or short self- life products, marginal costing is appropriate to know the contribution and minimum price at which products could be sold.
- (e) **Knowing the production process:** A good costing system can never be established without the complete knowledge of the production process. Cost apportionment can be done on the most appropriate and scientific basis if a cost accountant can identify degree of effort or resources consumed in a particular process. This also includes some basic technical know-how and process peculiarity.
- (f) **Information synchronisation:** Establishment of a department or a system requires substantial amount of organisational resources. While drafting a costing system, information needs of various other departments should be taken into account. For example, in a typical business organisation accounts department needs to submit monthly stock statement to its lender bank, quantity wise stock details at the time of filing returns to tax authorities etc.
- (g) **Method of maintenance of cost records:** The organization must determine beforehand the manner in which Cost and Financial Accounts could be inter-locked into a single integral accounting system and how the results of separate sets of accounts i.e. cost and financial, could be reconciled by means of control accounts.
- (h) **Statutory compliances and audit:** Records are to be maintained to comply with statutory requirements and applicable cost accounting standards should be followed.

- (i) **Information Attributes:** Information generated from the Costing system should possess all the attributes of useful information i.e. it should be **complete, accurate, timely, relevant**. to have an effective management information system (MIS).

9. COST ACCOUNTING WITH THE USE OF INFORMATION TECHNOLOGY (IT)

With the expansion of e-commerce and increasing competitive business environment, information technology is becoming an integral part of each activity in an organisation including Cost and Management Accounting. Information technology has changed the Cost and Management Accounting functions dramatically with the introduction of **Enterprise Resource Planning (ERP) system**. Cost Accounting and Management Information System has become automated and improved. The new industrial revolution in the form of **digital innovation which is popularly known as Industry 4.0**, has more emphasis on *digitisation and automation of business process to have a better control over cost to maintain market competitiveness*. Cost Accounting System has seen lots of savings in terms of time, money and efforts. The impact of IT in Cost Accounting may include the following:

- (i) After the introduction of ERPs, different **functional activities get integrated** and as a consequence, a *single entry into the accounting system* provides custom made reports for every purpose and saves an organisation from preparing different sets of documents. Reconciliation process of results of both cost and financial accounting systems becomes simpler and less cumbersome.
- (ii) A move towards *paperless environment* can be seen where documents like Bill of Material, Material Requisition Note, Goods Received Note, labour utilisation report etc. are no longer required to be prepared in multiple copies, the related department can get *e-copy* from the system.
- (iii) Information Technology with the help of internet (including intranet and extranet) are helping in **resource procurement and mobilisation**. For example, production department can get materials from the stores without issuing material requisition note physically. Similarly, purchase orders can

be initiated to the suppliers with the help of extranet. This enables an entity to shift towards Just-in-Time (JIT) approach of inventory management and production.

- (iv) Cost information for a cost centre or cost object is ascertained with accuracy in timely manner. Each cost centre a cost object is codified and all related costs are assigned to the cost objects or cost centres using assigned codes. This automates the cost accumulation and ascertainment process. *The cost information can be customised as per the requirement.* For example, when an entity manufactures or provides services, managers are able to receive information job-wise, batch-wise, process-wise, cost centre wise etc.
- (v) Uniformity in preparation of report, budgets and standards can be achieved with the help of IT. ERP software plays an important role in bringing uniformity irrespective of location, currency, language and regulations.
- (vi) Cost and revenue variance reports are generated in *real time basis* which enables the management to take control measures immediately.
- (vii) IT enables an entity to monitor and analyse each process of manufacturing or service activity closely to eliminate non value-added activities.

The above are examples of few areas where Cost Accounting is done with the help of IT.

9.1 Digital Costing System

Like the conventional cost accounting system, Digital costing system too collects data, classify the data, account the data to get and process information to make decisions, but the difference is the *method* of collection, *medium* of storage, *forms* of analysis and reporting. Digital costing system *links* different business functions such as production, procurement, inventory management with the digital costing system of its suppliers, customers and the market through data sharing and network interaction.

Digital Costing System provides data to get the following information:

- (i) Cost incurred on a cost object.
- (ii) Data on time spent.
- (iii) Data on resource consumption.
- (iv) Data on current market price of final product and raw materials.

- (v) Data on lead time and availability of materials.
- (vi) Data on product demand and trend.

Benefits of Digital Costing System

With the help of Artificial Intelligence (AI) and Machine learnings (ML) which helps in analysis of the Big data and apprehend the consumption and demand pattern, the following benefits can be achieved:

- (i) **Ascertainment of cost** with certainty on a cost object (the cost object is discussed in later paragraph). This helps to analyse the activities for cost allocation and apportionment.
- (ii) Analysis of **data on time spent** on each activity to study and formulate incentive plans.
- (iii) Helps in **material requirement planning and scheduling** the material procurement. Data on resource consumption can be analysed for resource optimisation and finding the possibilities for zero wastage and Just-in Time (JIT).
- (iv) Helps to **identify and eliminate the non-value-added activities**.
- (v) Data on resource consumption is helpful in **setting the standards** and measurement of variances on real time basis.
- (vi) Data on current market prices of material and consumables helps to **estimate cost and setting standards** on Marked to Market (M2M) basis.
- (vii) Extrapolation of data on customer behaviour towards the products to **predict the market demand**. It is helpful in preparation of budgets and planning of production.
- (viii) A better analysis of cost behaviour **improves the cost benefit analysis** and equipping the management in informed decision making.



10. COST OBJECTS

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

Examples of cost objects are:

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

Cost object remains in nucleus of cost classification and analysis of the cost behaviour. Classification of a cost element as direct, indirect, fixed or variable, all depends on cost object.

10.1 Cost Units

It is a unit of product, service or time (or combination of these) in relation to which costs may be ascertained or expressed.

We may for instance determine the cost per ton of steel, per ton-kilometre of a transport service or cost per machine hour. Sometime, a single order or a contract constitutes a cost unit. A batch which consists of a group of identical items and maintains its identity through one or more stages of production may also be considered as a cost unit.

Cost units are usually the units of physical measurement like number, weight, area, volume, length, time and value.

A few typical examples of cost units are as follows:

Industry or Product	Cost Unit Basis
Automobile	Number
Cement	Ton/ per bag etc.
Chemicals	Litre, gallon, kilogram, ton etc.

Power	Kilo-watt hour (kWh)
Steel	Ton
Transport	Passenger- kilometer
Gas	Cubic feet

Some examples from the CIMA terminology are as follows:

Industry Sector	Cost unit
Brewing	Barrel
Brick-making	1,000 bricks
Coal mining	Tonne/ton
Electricity	Kilowatt-hour (kWh)
Engineering	Contract, job
Oil	Barrel, tonne, litre
Hotel/Catering	Room/meal
Professional services	Chargeable hour, job, contract
Education	Course, enrolled student, successful student
Hospitals	Patient day
Activity	Cost unit
Credit control	Accounts maintained
Selling	Customer call, value of sales, orders taken
Materials storage/handling	Requisition unit issued/received, material movement, value issued/received
Personnel administration	Personnel record

10.2 Cost Driver

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

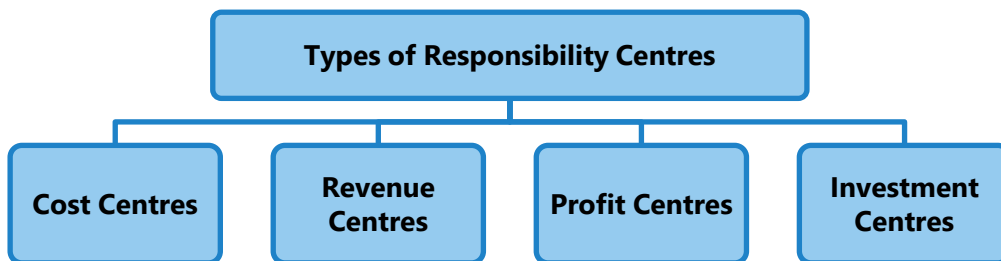
CIMA Official terminology defines cost driver as *“Factor influencing the level of cost”* Often used in the context of Activity Based Costing to denote the factor which links activity resource consumption to product outputs, for example the number of purchase orders would be a cost driver for procurement cost.”

Examples of cost drivers are number of machine set ups, number of purchase orders, hours spent on product inspection, number of tests performed etc.



11. RESPONSIBILITY CENTRES

As the organization grows, its functions, organisational structure and other related functions also grow in terms of volume and complexity. To have a better control over the organisation, management delegates its responsibility and authority to various departments or persons. These departments or persons are known as **responsibility centres** and are held responsible for performance in terms of expenditure, revenue, profitability and return on investment. Performance of these responsibility centres are measured against some set standards (input-output ratio, budgets etc.) and evaluated against organisational goal and performance targets.



- (i) **Cost Centres:** The responsibility centre which is held accountable for *incurrence of costs* which are under its control. The performance of this responsibility centre is measured against pre-determined standards or budgets. The cost centres are of two types:

(a) Standard Cost Centre and (b) Discretionary Cost Centre

- (a) **Standard Cost Centre:** Cost Centre where *output is measurable and input required for the output can be specified*. Based on a well-established study, an estimate of standard units of input to produce a unit of output is set. The actual cost for inputs is compared with the standard cost. Any deviation (variance) in cost is measured and analysed into controllable

and uncontrollable cost. The manager of the cost centre is expected to comply with the standard and held responsible for adverse cost variances. The input-output ratio for a standard cost centre is clearly identifiable.

- (b) **Discretionary Cost Centre:** The cost centre *whose output cannot be measured in financial terms, thus input-output ratio cannot be defined*. The cost of input is compared with allocated budget for the activity. Examples of discretionary cost centres are Research & Development department, Advertisement department where output of these department cannot be measured with certainty and co-related with cost incurred on inputs.
- (ii) **Revenue Centres:** The responsibility centres which are accountable for *generation of revenue for the entity*. Sales Department for example, is responsible for achievement of sales target and revenue generation. Though, revenue centres do not have control on expenditures it incurs but sometimes expenditures related with selling activities like commission to sales person etc. are incurred by revenue centres.
- (iii) **Profit Centres:** These are the responsibility centres which have *both responsibility of generation of revenue and incurrence of expenditures*. Since, managers of profit centres are accountable for both costs as well as revenue, profitability is the basis for measurement of performance of these responsibility centres. Examples of profit centres are decentralised branches of an organisation.
- (iv) **Investment Centres:** These are the responsibility centres which are *not only responsible for profitability but also have the authority to make capital investment decisions*. The performance of these responsibility centres are measured on the basis of Return on Investment (ROI) besides profit. Examples of investment centres are Maharatna, Navratna and Miniratna companies of Public Sector Undertakings of Central Government.



12. LIMITATIONS OF COST ACCOUNTING

Like other branches of accounting, cost accounting also has certain limitations. The limitations of cost accounting are as follows:

1. **Expensive:** It is expensive because analysis, allocation and absorption of overheads requires considerable amount of additional work, and hence additional money.
2. **Requirement of reconciliation:** The results shown by cost accounts differ from those shown by financial accounts. Thus preparation of reconciliation statements is necessary to verify their accuracy.
3. **Duplication of work:** It involves duplication of work as organization has to maintain two sets of accounts i.e. Financial Accounts and Cost Accounts.



13. CLASSIFICATION OF COSTS

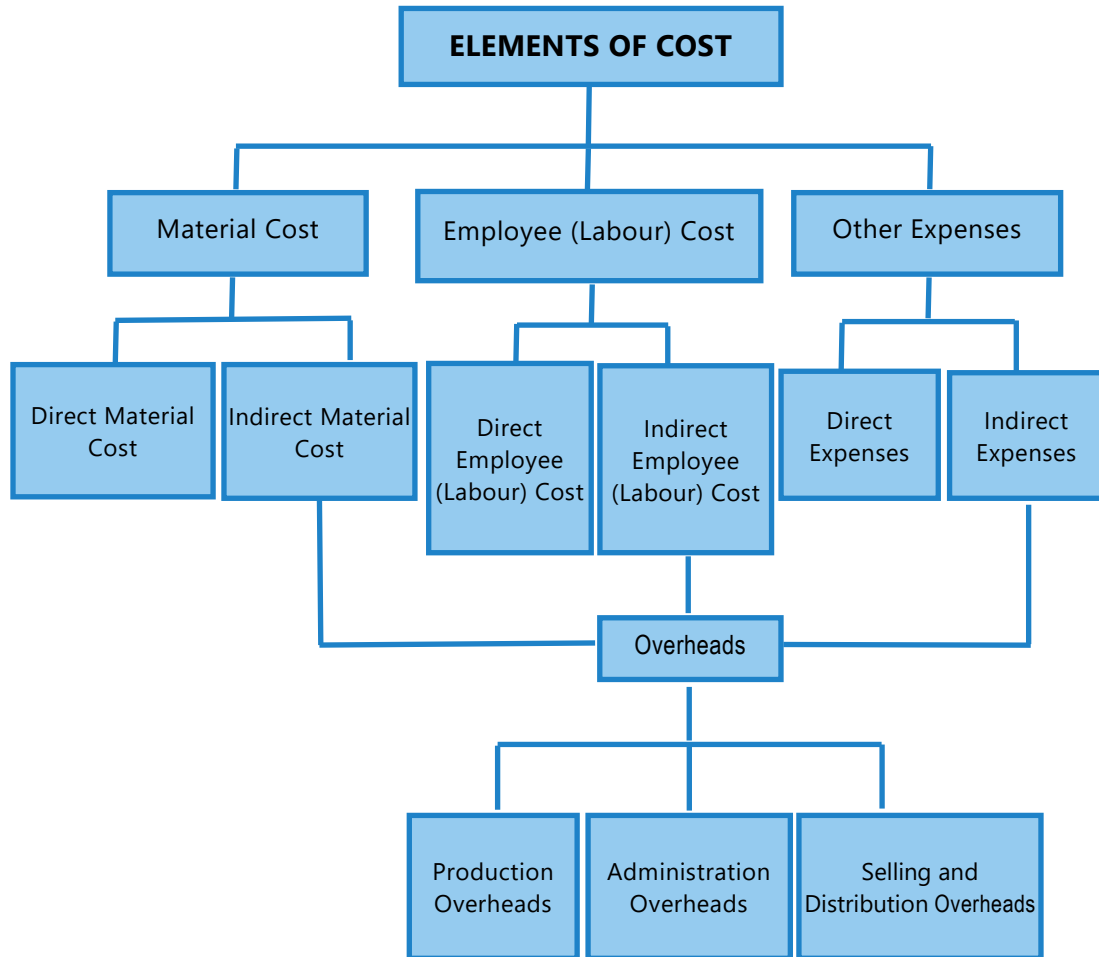
It means the grouping of costs according to their common characteristics. The important ways of classification of costs are:

- (i) By Nature or Element
- (ii) By Functions
- (iii) By Variability or Behaviour
- (iv) By Controllability
- (v) By Normality
- (vi) By Costs for Managerial Decision Making

13.1 By Nature or Element

Under this type of classification of cost, total cost of a cost object is classified on the basis of element of cost i.e., material, labour, other expenses and overheads.

A diagram as given below shows the elements of cost described as under:



- (i) **Material:** Material cost means cost of raw material required to make a product into finished goods. The materials can be directly attributable to a cost object or allocable on some reasonable basis where direct attribution is not possible. Materials which are present in the finished product (cost object) or can be economically identified in the product are termed as direct materials. For example, cloth in dress making; materials purchased for a specific job etc. However, in some cases a material may be direct but it is treated as indirect; because it is used in small quantities, it is not economically feasible to identify that quantity. Those materials which are used for purposes ancillary to the business are also treated as Indirect Materials.

- (ii) **Labour:** Wages paid to workers for converting the raw materials into finished goods, is called labour cost/ labour which can be economically identified or attributed wholly to a cost object is termed as direct labour. For example, employee engaged on the actual production of the product or in carrying out the necessary operations for converting the raw materials into finished product.
- (iii) **Other Expenses:** *All expenses other than material or labour* which are incurred for a particular cost object are termed as other Expenses. For example, hire charges for some special machinery, cost of defective work etc.
- (iv) **Overheads:** The aggregate of indirect material costs, indirect labour costs and indirect expenses is termed as Overheads. The main groups into which overheads may be subdivided are as follows:
- **Production or Works Overheads:** Indirect expenses which are incurred in the factory and for the running of the factory. E.g.: rent, power etc.
 - **Administration Overheads:** Indirect expenses related to management and administration of business. E.g.: office rent, lighting, telephone etc.
 - **Selling Overheads:** Indirect expenses incurred for marketing of a commodity. E.g.: Advertisement expenses, commission to sales persons etc.
 - **Distribution Overheads:** Indirect expenses incurred for dispatch of the goods E.g.: warehouse charges, packing(secondary) and loading charges.

13.2 By Functions

Under this classification, costs are divided according to the function for which they have been incurred. It includes the following:

- (i) Production/ Manufacturing Cost
- (ii) Administration Cost
- (iii) Selling Cost

- (iv) Distribution Cost
- (v) Research and Development cost etc.

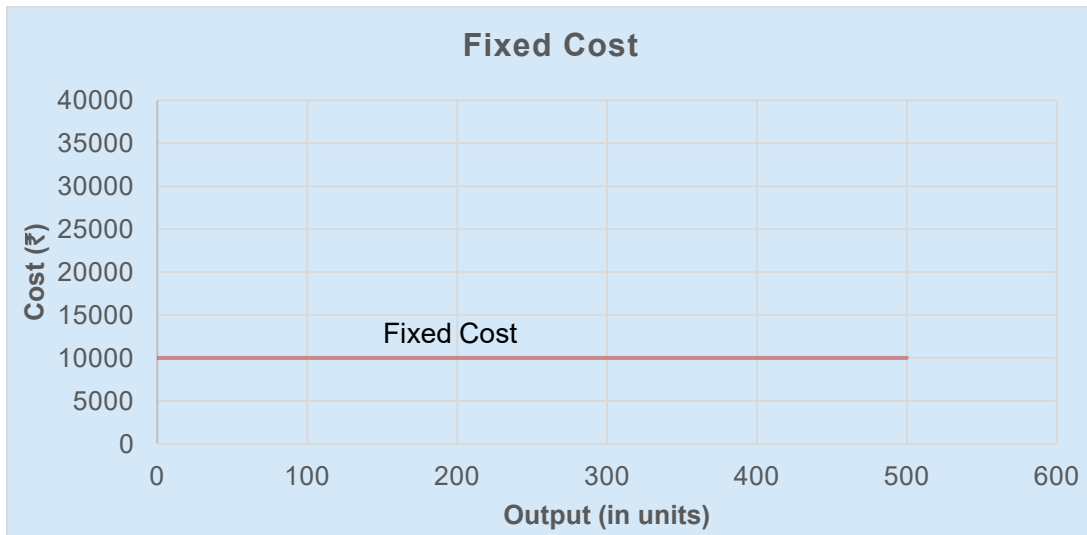
The below chart shows the flow of costs in a cost sheet under functional classification:

Direct Materials	}			Prime Cost
Direct Employees (Labours)				
Direct Expenses				
Indirect Material	}	Factory Overheads		Factory Cost or Works Cost
Indirect Labour		Administration Overheads		
Indirect Expenses				
		Selling and Distribution Overheads		Cost of Goods Sold
				Cost of Sales

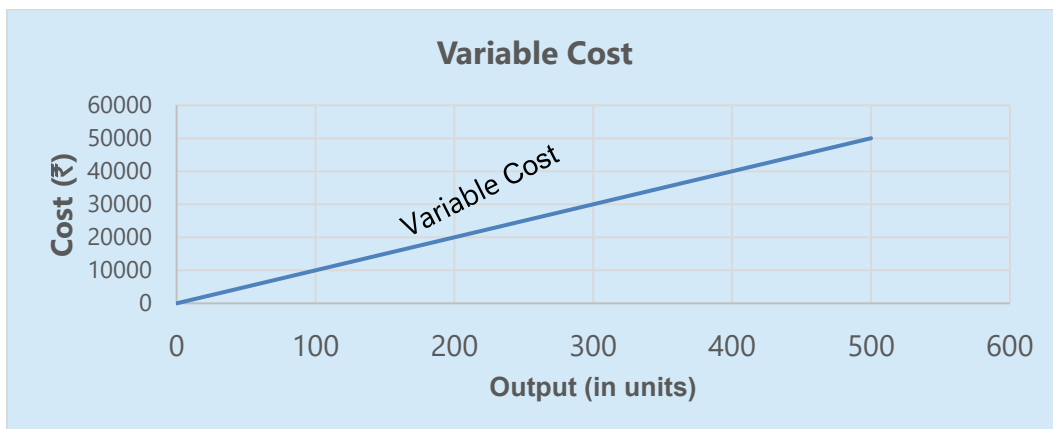
13.3 By Variability or Behaviour

Based on this classification, costs are classified into three groups viz., fixed, variable and semi-variable.

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

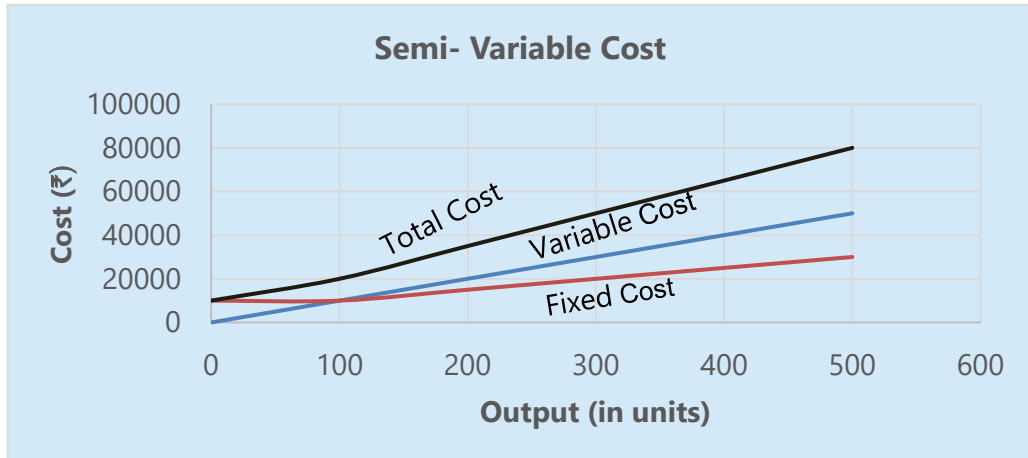


- (b) **Variable Costs**– These costs tend to vary with the volume of activity. Any increase in the activity results in an increase in the variable cost and vice-versa. For example, cost of direct material, cost of direct labour, etc.



- (c) **Semi-variable costs**– These costs contain both fixed and variable components and are thus partly affected by fluctuations in the level of activity. Examples of semi variable costs are telephone bills, gas and electricity etc. Such costs are depicted graphically as follows:

13.3.1 Methods of segregating Semi-variable costs into fixed and variable costs



The segregation of semi-variable costs into fixed and variable costs can be carried out by using the following methods:

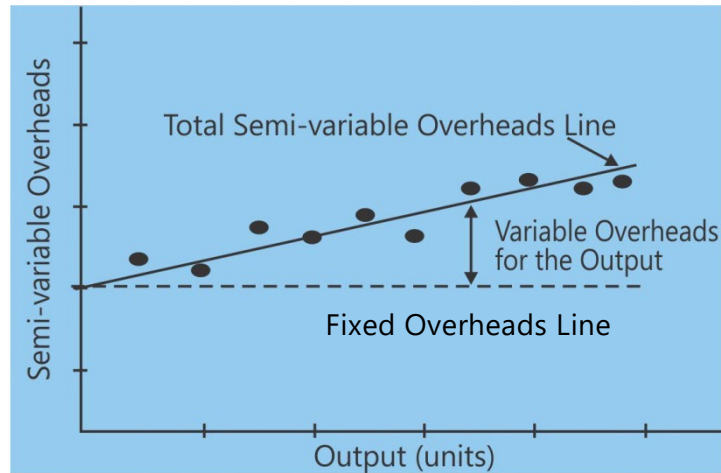
- (a) Graphical method
- (b) High-Low method
- (c) Analytical method
- (d) Comparison by period or level of activity method
- (e) Least squares method

(a) Graphical Method: Under this method, the following steps are followed:

- (i) A large number of observations regarding the total costs at different levels of output are plotted on a graph.
- (ii) The output is plotted on the X-axis and the total cost is plotted on the Y-axis.
- (iii) Then, by judgment, a line of "best-fit", which passes through all or most of the points, is drawn.
- (iv) The point at which this line cuts the Y-axis indicates the total fixed cost component in the total cost.
- (v) If a line is drawn at this point parallel to the X-axis, this indicates the fixed cost.

- (vi) The variable cost, at any level of output, is derived by deducting this fixed cost element from the total cost.

The following graph illustrates this:



- (b) High- Low Method:** Under this method, difference between the total cost at highest and lowest volume is divided by the difference between the sales value at the highest and lowest volume. The quotient thus obtained gives us the rate of variable cost in relation to sales value.

ILLUSTRATION 1: (Segregation of fixed cost and variable cost)

	Sales value	Total cost
	(₹)	(₹)
At the Highest volume	1,40,000	72,000
At the Lowest volume	80,000	60,000
	60,000	12,000

Thus, Variable Cost (₹ 12,000/₹ 60,000)

= $\frac{1}{5}$ or 20% of sales value = ₹ 28,000 (at highest volume)

Fixed Cost ₹ 72,000 – ₹ 28,000 i.e., (20% of ₹ 1,40,000) = ₹ 44,000.

Alternatively, ₹ 60,000 – ₹ 16,000 (20% of ₹ 80,000) = ₹ 44,000.

- (c) Analytical Method:** Under this method an experienced cost accountant tries to judge empirically what proportion of the semi-variable cost would be variable and what would be fixed. The degree of variability is ascertained

for each item of semi-variable expenses. For example, some semi-variable expenses may vary to the extent of 20% while others may vary to the extent of 80%. Although it is very difficult to estimate the extent of variability of an expense, the method is easy to apply. (Go through the following illustration for clarity).

ILLUSTRATION 2: (Segregation of fixed cost and variable cost)

Suppose last month the total semi-variable expenses amounted to ₹ 3,000.

If the degree of variability is assumed to be 70%, then variable cost = 70% of ₹ 3,000 = ₹ 2,100.

Fixed cost = ₹ 3,000 – ₹ 2,100 = ₹ 900.

Now in the future months, the fixed cost will remain constant, but the variable cost will vary according to the change in production volume.

Thus, if in the next month production increases by 50%, the total semi-variable expenses will be:

Fixed cost of ₹ 900, plus variable cost viz., ₹ 3,150 i.e., (₹ 2,100 (V.C.) plus 50% increase of V.C. i.e., ₹ 1,050) =, ₹ 4,050.

- (d) **Comparison by period or level of activity method:** Under this method, the variable overhead may be determined by comparing two levels of output with the amount of expenses at those levels. Since the fixed element does not change, the variable element may be ascertained with the help of the following formula.

$$\frac{\text{Change in the amount of expense}}{\text{Change in the quantity of output}}$$

Suppose the following information is available:

	Production Units	Semi-variable expenses
		(₹)
January	100	260
February	140	300
Difference	40	40

The variable cost:

$$\frac{\text{Change in Semi-variable expenses}}{\text{Change in production volume}} = \frac{\text{₹ 40}}{40 \text{ units}} = \text{₹ 1/unit}$$

Thus, in January, the variable cost will be $100 \times \text{₹ 1} = \text{₹ 100}$

The fixed cost element will be $(\text{₹ 260} - \text{₹ 100})$ or ₹ 160.

In February, the variable cost will be $140 \times \text{₹ 1} = \text{₹ 140}$

whereas the fixed cost element will remain the same, i.e., ₹ 160.

- (e) **Least Square Method:** This is the best method to segregate semi-variable costs into its fixed and variable components. This is a statistical method and is based on finding out a line of best fit for a number of observations.

The method uses the linear equation $y = mx + c$, where

'm' represents the variable element of cost per unit,

'c' represents the total fixed cost,

'y' represents the total cost,

'x' represents the volume of output.

The total cost is thus split into its fixed and variable elements by solving this equation.

ILLUSTRATION 3: (Segregation of fixed cost and variable cost)

	Level of activity	
Capacity %	60%	80%
Volume (Labour hours) or 'x'	150	200
Semi-variable expenses (maintenance of plant) or 'y'	₹ 1,200	₹ 1,275

Substituting the values of 'x' and 'y' in the equation, $y = mx + c$, at both the levels of activity, we get

$$1,200 = 150 m + c$$

$$1,275 = 200 m + c$$

On solving the above equations, we get the value of 'c'

Fixed cost or 'c' = ₹ 975 and Variable cost or 'm' = ₹ 1.50 per labour hour.

13.4 By Controllability

Costs here may be classified into controllable and uncontrollable costs.

- (a) **Controllable Costs:** - Cost that can be controlled, typically by a cost, profit or investment centre manager is called controllable cost. Controllable costs incurred in a particular responsibility centre can be influenced by the action of the manager heading that responsibility centre. For example, direct costs comprising direct labour, direct material, direct expenses and some of the overheads are generally controllable by the shop floor supervisor or the factory manager.
- (b) **Uncontrollable Costs** - Costs which cannot be influenced by the action of a specified member of an undertaking are known as uncontrollable costs. For example, expenditure incurred by say, the tool room is controllable by the foreman in-charge of that section but the share of the tool-room expenditure which is apportioned to a machine shop is not controlled by the machine shop foreman.

Distinction between Controllable Cost and Uncontrollable Cost: The distinction between controllable and uncontrollable costs is not very prominent and is sometimes left to individual judgement. In fact, no cost is uncontrollable; it is only in relation to a particular individual that we may specify a particular cost to be either controllable or uncontrollable.

13.5 By Normality

According to this basis, cost may be categorised as follows:

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

13.6 By Costs used in Managerial Decision Making

According to this basis, cost may be categorised as follows:

- (a) **Pre-determined Cost** - A cost which is *computed in advance before production or operations start*, on the basis of specification of all the factors affecting cost, is known as a pre-determined cost.
- (b) **Standard Cost** - A pre-determined cost, which is calculated from managements 'expected standard of efficient operation' and the relevant necessary expenditure. It may be used as a basis for price fixation and for cost control through variance analysis.
- (c) **Marginal Cost** - The amount at any given volume of output by which aggregate costs increases if the volume of output is increased or decreased by one unit.
- (d) **Estimated Cost** - Kohler defines estimated cost as "the expected cost of manufacture, or acquisition, often in terms of a unit of product computed on the basis of information available in advance of actual production or purchase". Estimated costs are **prospective costs** since they refer to prediction of costs.
- (e) **Differential Cost** - (Incremental and decremental costs). It represents the change (increase or decrease) in total cost (variable as well as fixed) due to change in activity level, technology, process or method of production, etc. For example, if any change is proposed in the existing level or in the existing method of production, the increase or decrease in total cost or in specific elements of cost as a result of this decision will be known as incremental cost or decremental cost.
- (f) **Imputed Costs** - These costs are **notional costs** which do not involve any cash outlay. Interest on capital, the payment for which is not actually made, is an example of imputed cost. *These costs are similar to opportunity costs.*
- (g) **Capitalized Costs** - These are costs which are initially recorded as assets and subsequently treated as expenses. Example, installation expenses on the erection of a machine are added to the cost of a machine.

- (h) **Product Costs** - These are the costs which are associated with the *purchase and sale of goods* (in the case of merchandise inventory). In the production scenario, such costs are associated with the *acquisition and conversion of materials and all other manufacturing inputs into finished product* for sale. Hence, under marginal costing, variable manufacturing costs and under absorption costing, total manufacturing costs (variable and fixed) constitute inventoriable or product costs.
- (i) **Opportunity Cost** - This cost refers to the value of sacrifice made or *benefit of opportunity foregone in accepting an alternative course of action*. For example, a firm financing its expansion plan by withdrawing money from its bank deposits. In such a case the loss of interest on the bank deposit is the opportunity cost for carrying out the expansion plan.
- (j) **Out-of-pocket Cost** - It is that portion of total cost, which involves *cash outflow*. This cost concept is a short-run concept and is used in decisions relating to fixation of selling price in recession, make or buy, etc. Out-of-pocket costs can be avoided or saved if a particular proposal under consideration is not accepted.
- (k) **Shut down Costs** - Those costs, which continue to be, incurred even when a plant is temporarily shut-down *e.g.* rent, rates, depreciation, etc. These costs cannot be eliminated with the closure of the plant. In other words, *all fixed costs, which cannot be avoided during the temporary closure of a plant, will be known as shut down costs*.
- (l) **Sunk Costs** - *Historical costs incurred in the past* are known as sunk costs. They play no role in decision making in the current period. For example, in the case of a decision relating to the replacement of a machine, the written down value of the existing machine is a sunk cost and therefore, not considered.
- (m) **Absolute Cost** - These costs refer to the *cost of any product, process or unit in its totality*. When costs are presented in a statement form, various cost components may be shown in absolute amount or as a percentage of total cost or as per unit cost or all together. Here the costs depicted in absolute amount may be called absolute costs and are base costs on which further analysis and decisions are made.

- (n) **Discretionary Costs** – Such costs are *not tied to a clear cause and effect* relationship between inputs and outputs. They usually arise from periodic decisions regarding the maximum outlay to be incurred. Examples include advertising, public relations, executive training etc.
- (o) **Period Costs** - These are the costs, which are not assigned to the products but are *charged as expenses against the revenue of the period in which they are incurred*. All non-manufacturing costs such as general & administrative expenses, selling and distribution expenses are recognised as period costs.
- (p) **Engineered Costs** - These are costs that result specifically from a *clear cause and effect relationship between inputs and outputs*. The relationship is usually personally observable. Examples of inputs are direct material costs, direct labour costs etc. Examples of output are cars, computers etc.
- (q) **Explicit Costs** - These costs are also known as out-of-pocket costs and refer to *costs involving immediate payment of cash*. salaries, wages, postage and telegram, printing and stationery, interest on loan etc. are some examples of explicit costs involving immediate cash payment.
- (r) **Implicit Costs** - These costs do not involve any immediate cash payment. They *are not recorded in the books of account*. They are also known as economic costs.



14. METHODS OF COSTING

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

Methods	Description
Single or Output Costing	Under this method, the cost of a product is ascertained, the product being the only one produced like bricks, coals, etc.
Batch Costing	This method is the extension of job costing. A batch may represent a number of small orders passed through the factory in batch. Each batch here is treated as a unit of cost and thus separately costed. Here cost per unit is determined by dividing the cost of the batch by the number of units produced in the batch.

Job Costing	Under this method of costing, cost of each job is ascertained separately. It is suitable in all cases where work is undertaken on receiving a customer's order like a printing press, motor workshop, etc.
Contract Costing	Under this method, the cost of each contract is ascertained separately. It is suitable for firms engaged in the construction of bridges, roads, buildings etc.
Process Costing	Under this method, the cost of completing each stage of work is ascertained, like cost of making pulp and cost of making paper from pulp. In mechanical operations, the cost of each operation may be ascertained separately; the name given is operation costing.
Operating Costing	It is used in the case of concerns rendering services like transport, supply of water, retail trade etc.
Multiple Costing	It is a combination of two or more methods of costing outlined above. Suppose a firm manufactures bicycles including its components; the parts will be costed by the system of job or batch costing but the cost of assembling the bicycle will be computed by the single or output costing method. The whole system of costing is known as multiple costing.

The following table summarises the various methods of costing applied in different industries:

Nature of Output	Method	Cost	Examples of Industries
A Series of Processes	Process costing or Operation Costing	For each process	Sugar
Construction of building	Contract Costing	For each contract	Real estate

Similar units of a Single Product, produced by Single Process	Unit or output or Single Costing	For the entire activity, but averaged for the output	Cold Drinks
Rendering of Services	Operating Costing	For all services	Hospitals
Customer Specifications: single Unit	Job Costing	For each order/ assignment/job	Advertising
Consisting of multiple varieties of activities and processes	Multiple Costing	Combination of any method	Car Assembly

Industries also follows Activity Based Costing which is an accounting methodology that assigns costs to activities rather than products or services. ABC is a technique which involves identification of cost with each cost driving activity and making it as the basis for apportionment of costs over different cost objects/ jobs/ products/customers or services.



15. TECHNIQUES OF COSTING

For ascertaining cost, following types of costing are usually used.

Techniques	Description
Uniform Costing	When a number of firms in an industry agree among themselves to follow the same system of costing in details, adopting common terminology for various items and processes they are said to follow a system of uniform costing. Advantages of such a system are: (i) A comparison of the performance of each of the firms can be made with that of another, or with the average performance in the industry. (ii) Under such a system, it is also possible to determine the cost of production of goods which is true for the

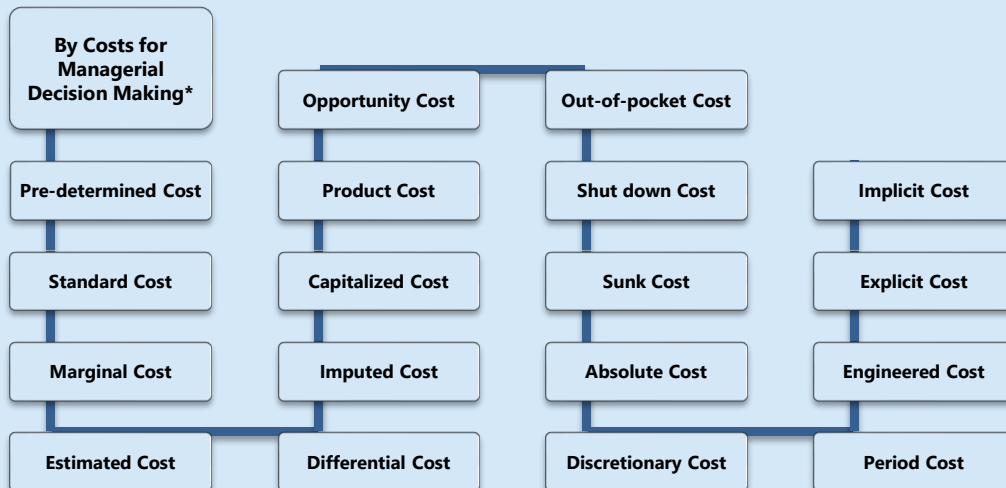
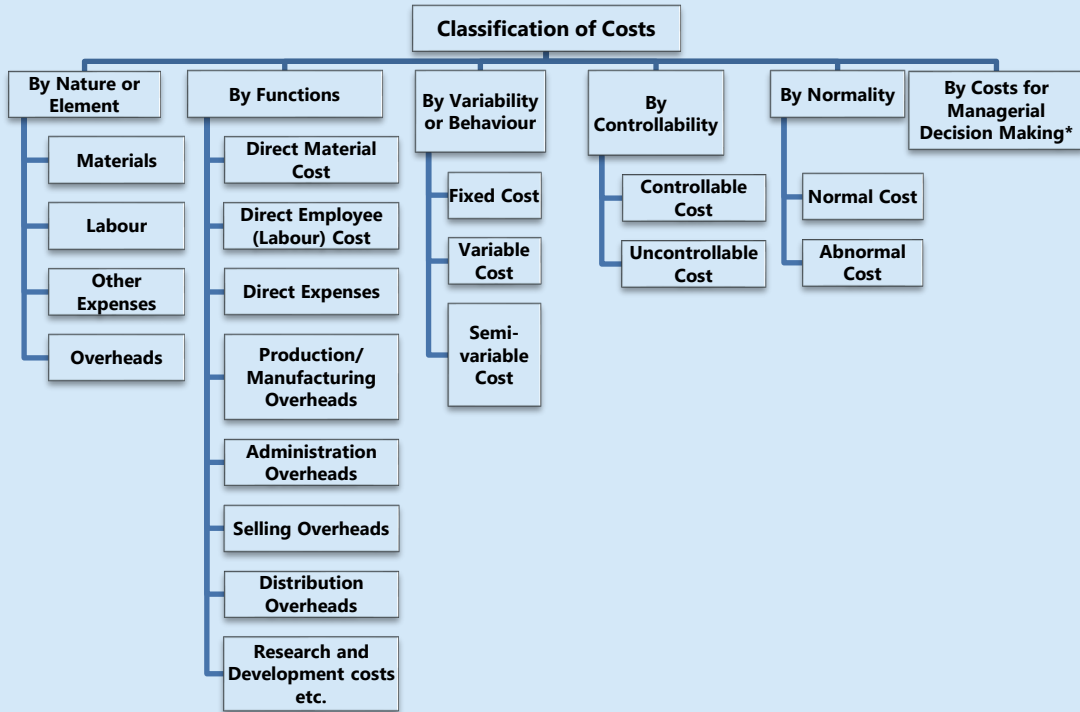
	industry as a whole. It is found useful when tax-relief or protection is sought from the Government.
Marginal Costing	It is defined as the ascertainment of marginal cost by differentiating between fixed and variable costs . It is used to ascertain effect of changes in volume or type of output on profit.
Standard Costing and Variance Analysis	It is the name given to the technique whereby <i>standard costs are pre-determined and subsequently compared with the recorded actual costs</i> . It is thus a technique of cost ascertainment and cost control. This technique may be used in conjunction with any method of costing. However, it is especially suitable where the manufacturing method involves production of standardised goods of repetitive nature.
Historical Costing	It is the ascertainment of costs after they have been incurred . This type of costing has limited utility. • <i>Post Costing</i> : It means ascertainment of cost after production is completed. • <i>Continuous costing</i> : Cost is ascertained as soon as the job is completed or even when the job is in progress.
Absorption Costing	It is the practice of charging all costs, both variable and fixed to operations, processes or products. This differs from marginal costing where fixed costs are excluded.

SUMMARY

- ◆ **Cost:**
 - ❑ The amount of expenditure (actual or notional) incurred on or attributable to a specified article, product or activity. (*as a noun*)
 - ❑ To ascertain the cost of a specified thing or activity. (*as a verb*)
- ◆ **Costing:** It is the technique and process of ascertaining costs.
- ◆ **Cost Accounting:** It is the process of accounting for cost which begins with the recording of income and expenditure or the bases on which they are calculated and ends with the preparation of periodical statements and reports for ascertaining and controlling costs.
- ◆ **Cost Accountancy:** It has been defined as "the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived there from for the purpose of managerial decision making."
- ◆ **Management Accounting:** As per CIMA Official Terminology "Management Accounting is the application of the principles of accounting and financial management to create, protect, preserve and increase value for the stakeholders of for-profit and not-for-profit enterprises in the public and private sectors."
- ◆ **Cost Management:** It is an application of management accounting concepts, methods of collections, analysis and presentation of data to provide the information needed to plan, monitor and control costs.
- ◆ **Cost Control:** Maintaining discipline in expenditure is one of the main objective of a good cost and management accounting system. It ensures that expenditures are in consonance with predetermined set standard and any variation from these set standards is noted and reported on continuous basis.
- ◆ **Cost Reduction:** It may be defined "as the achievement of real and permanent reduction in the unit cost of goods manufactured or services rendered without impairing their suitability for the use intended or diminution in the quality of the product."

- ◆ **Cost Objects:** Cost object is anything for which a separate measurement of cost is required. Cost object may be a product, a service, a project, a customer, a brand category, an activity, a department or a programme etc.
- ◆ **Cost Units:** It is a unit of product, service or time (or combination of these) in relation to which costs may be ascertained or expressed.
- ◆ **Cost Drivers:** A Cost driver is a factor or variable which effect level of cost. Generally, it is an activity which is responsible for cost incurrence. Level of activity or volume of production is the example of a cost driver. An activity may be an event, task, or unit of work etc.
- ◆ **Responsibility Centres:** To have a better control over the organisation, management delegates its responsibility and authority to various departments or persons. These departments or persons are known as responsibility centres and are held responsible for performance in terms of expenditure, revenue, profitability and return on investment.
- ◆ **Cost Centres:** The responsibility centre which is held accountable for incurrence of costs which are under its control. The performance of this responsibility centre is measured against pre-determined standards or budgets.
- ◆ **Revenue Centres:** The responsibility centres which are accountable for generation of revenue for the entity.
- ◆ **Profit Centres:** These are the responsibility centres which have both responsibility of generating revenue and incurrence of expenditures. Since, managers of profit centres are accountable for both costs as well as revenue, profitability is the basis for measurement of performance of these responsibility centres.
- ◆ **Investment Centres:** These are the responsibility centres which are not only responsible for profitability but also has the authority to make capital investment decisions. The performance of these responsibility centres are measured on the basis of Return on Investment (ROI) besides profit.

♦ **Classification of Costs:**



TEST YOUR KNOWLEDGE

Multiple Choice Questions (MCQs)

1. is anything for which a separate measurement is required.
 - (a) Cost unit
 - (b) Cost object
 - (c) Cost driver
 - (d) Cost centre
2. Which of the following is true about Cost control:
 - (a) It is a corrective function
 - (b) It challenges the set standards
 - (c) It ends when targets achieved
 - (d) It is concerned with future
3. Cost units used in power sector is:
 - (a) Kilometer (K.M)
 - (b) Kilowatt-hour (kWh)
 - (c) Number of electric points
 - (d) Number of hours
4. Process Costing method is suitable for
 - (a) Transport sector
 - (b) Chemical industries
 - (c) Dam construction
 - (d) Furniture making
5. Which of the following is Not true about the cost control and cost reduction:
 - (a) Cost control seeks to attain lowest possible cost under best conditions.
 - (b) Cost control emphasises on past and present.

- (c) *Cost reduction is a corrective function. It operates even when an efficient cost control system exists.*
 - (d) *Cost control ends when targets are achieved.*
6. *The advantage of using IT in Cost Accounting does not include:*
- (a) *Integration of various functions*
 - (b) *Stock needs to be reconciled with Goods Received Note*
 - (c) *Reduction in multicity of documents*
 - (d) *Customised reports can be prepared.*
7. *A taxi provider charges minimum ₹ 80 thereafter ₹ 12 per kilometer of distance travelled, the behaviour of conveyance cost is:*
- (a) *Fixed Cost*
 - (b) *Semi-variable Cost*
 - (c) *Variable Cost*
 - (d) *Administrative cost.*
8. *A Ltd. has three production department, and each department has two machines, which of the following cannot be treated as cost centre for cost allocation:*
- (a) *Machines under the production department*
 - (b) *Production departments*
 - (c) *Both Production department and machines*
 - (d) *A Ltd.*
9. *Which of the following is an example of functional classification of cost:*
- (a) *Direct Material Cost*
 - (b) *Fixed Cost*
 - (c) *Administrative Overheads*
 - (d) *Indirect Overheads.*

10. Ticket counter in a Railway Station is an example of
- (a) Cost Centre
 - (b) Revenue Centre
 - (c) Profit Centre
 - (d) Investment Centre

Theoretical Questions

1. DESCRIBE the main objectives of introduction of a Cost and Management Accounting System in a manufacturing organization.
2. DISCUSS the different cost centres that an organization can have.
3. DISCUSS cost classification based on variability and controllability.
4. DISCUSS the essential features of a good cost accounting system.
5. DESCRIBE the factors which are to be considered before installing a system of cost accounting.
6. DISCUSS the four different methods of costing along with their applicability to concerned industry.
7. STATE the method of costing and the suggested unit of cost for the following industries:
 - (a) Transport (b) Power (c) Hotel
 - (d) Hospital (e) Steel (f) Coal
 - (g) Bicycles (h) Bridge Construction (i) Interior Decoration
 - (j) Advertising (k) Furniture (l) Brick-works
8. WRITE a note on the following, indicating in which kinds of industries or undertakings, the different methods could be suitably applied:
 - (a) Single or Output Costing (b) Batch Costing
 - (c) Process Costing (d) Operating Costing
 - (e) Contract Costing (f) Multiple Costing

ANSWERS

Answers to the MCQs

1.	(b)	2.	(c)	3.	(b)	4.	(b)	5.	(a)	6.	(b)
7.	(b)	8.	(d)	9.	(c)	10.	(b)				

Answers to the Theoretical Questions

1. Please refer paragraph 2
2. Please refer paragraph 11
3. Please refer paragraph 13
4. Please refer paragraph 7
5. Please refer paragraph 8
6. Please refer paragraph 14
7. Please refer paragraph 14 & 10
8. Please refer paragraph 14

MATERIAL COST

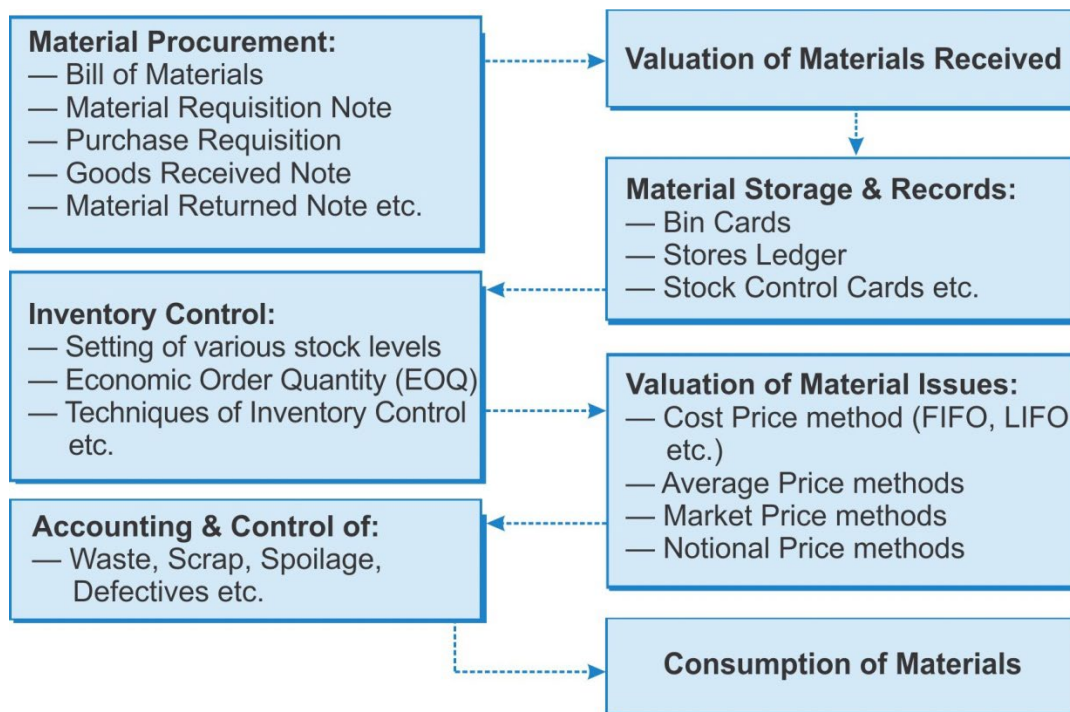


LEARNING OUTCOMES

After studying this chapter, you would be able to-

- ◆ State the meaning, need and importance of materials.
- ◆ Discuss the procedures and documentations involved in procuring, storing and issuing material.
- ◆ Discuss the various inventory control techniques and determination of various stock levels.
- ◆ Compute Economic Order Quantity (EOQ) and apply the EOQ to determine the optimum order quantity.
- ◆ Discuss the various methods of inventory accounting and Prepare stock ledger/ account.
- ◆ Identify and explain normal and abnormal loss and its accounting treatment.

CHAPTER OVERVIEW



1. INTRODUCTION

We have acquired a basic knowledge about the concepts, objectives, advantages, methods and elements of cost. We shall now study each element of cost separately beginning with material cost. The general meaning of material is **all commodities/ physical objects used to make the final product**. It may be direct or indirect.

- (i) *Direct Materials:* Materials, cost of which can be directly attributable to the end product for which it is being used, in an economically feasible way.
- (ii) *Indirect Materials:* Those materials which are not directly attributable to a particular final product.

Direct Materials constitute a significant part for manufacturing and production of goods. Being an input and a significant cost element, it requires adequate

management attention. Cost control starts from here, and for this purpose it is necessary that the principle of **3Es (Economy, Efficiency and Effectiveness)** i.e. economy in procurement, efficiency in handling and processing the material and effectiveness in producing desired output as per the standard, is also applied for this cost element. *Importance of proper recording and control of material are as follows:*

- (a) **Quality of final product:** The quality of output depends on the quality of inputs.
- (b) **Price of the final product:** Material constitutes a significant part of any product and the cost of final product is directly related with cost of materials used to produce the product.
- (c) **Production continuity:** The production firms need to ensure that production process runs smoothly and should not be paused for the want of materials. In order to avoid production interruptions, an adequate level of stock of materials should be maintained.
- (d) **Cost of Stock holding and stock-out:** An entity has to incur stock holding costs in the form of interest and/or opportunity cost for the fund used, stock handling losses like evaporation, obsolescence etc. Under-stocking causes in loss of revenue due to stock-out and breach of commitment.
- (e) **Wastage and other losses:** While handling and processing of materials, some wastage and loss arise. Based on the nature of material and process, these are classified as normal and abnormal for efficient utilisation and control.
- (f) **Regular information about resources:** Regular and updated information on availability and utilisation of materials are necessary for the entity for timely and informed decision making.



2. MATERIAL CONTROL

In the previous chapter, we have discussed the term Cost Control, which means all activities and control mechanism which are necessary to keep the cost in adherence to the set standards. Material, being one of the total cost elements, are also required to be controlled so that the overall cost control objective can be fulfilled.

2.1 Objectives of System of Material Control

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

- (i) **Minimising interruption in production process:** Material Control system ensures that no activity, particularly production, suffers from interruption for want of materials and stores. It should be noted that this requires constant availability of every item that may be needed in production process, howsoever, small its cost may be.
- (ii) **Optimisation of Material Cost:** The overall material costs includes price, ordering costs and holding costs. Since all the materials and stores are acquired at the lowest possible price considering the required quality and other relevant factors like reliability in respect of delivery, etc., holding cost too needs to be minimized.
- (iii) **Reduction in Wastages:** Material Control System has an objective of avoidance of unnecessary losses and wastages that may arise from deterioration in quality due to defective or long storage or from obsolescence. It may be noted that losses and wastages in the process of manufacture are a concern of the production department.
- (iv) **Adequate Information:** The system of material control maintains proper records to ensure that reliable information is available for all items of materials and stores. This not only helps in detecting losses and pilferages but also facilitates proper production planning.
- (v) **Completion of order in time:** Proper material management is very necessary for fulfilling orders of the firm. This adds to the goodwill of the firm.

2.2 Requirements of Material Control

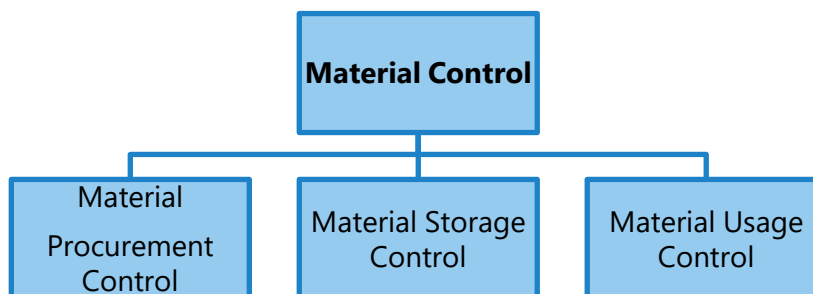
Material control requirements can be summarised as follows:

1. Proper co-ordination of all departments involved viz., finance, purchasing, receiving, inspection, storage, accounting and payment.
2. Determining purchase procedure to see that purchases are made, after making suitable enquiries, at the most favourable terms to the firm.

3. Use of standard forms for placing the order, noting receipt of goods, authorising issue of the materials etc.
4. Preparation of budgets concerning materials, supplies and equipment to ensure economy in purchasing and use of materials.
5. Operation of a system of internal check so that all transactions involving materials, supplies and equipment purchases are properly approved and automatically checked.
6. Storage of all materials and supplies in a well designated location with proper safeguards.
7. Operation of a system of perpetual inventory together with continuous stock checking so that it is possible to determine, at any time, the amount and the value of each kind of material in stock.
8. *Operation of a system of stores control* and issue so that there will be delivery of materials upon requisition to departments in the right amount at the time they are needed.
9. *Development of system of controlling accounts and subsidiary records* which exhibit summary and detailed material costs at the stage of material receipt and consumption.
10. *Regular reports* of materials purchased issue from stock, inventory balances, obsolete stock, goods returned to vendors, and spoiled or defective units are required.

2.3 Elements of Material Control

Material control is a systematic control over the procurement, storage and usage of material so as to maintain an even flow of material.



Material control involves efficient functioning of the following operations:

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

3. MATERIALS PROCUREMENT PROCEDURE

Material procurement procedure can be understood with help of the following diagram. Documents required and the departments who initiate these documents are shown sequentially.

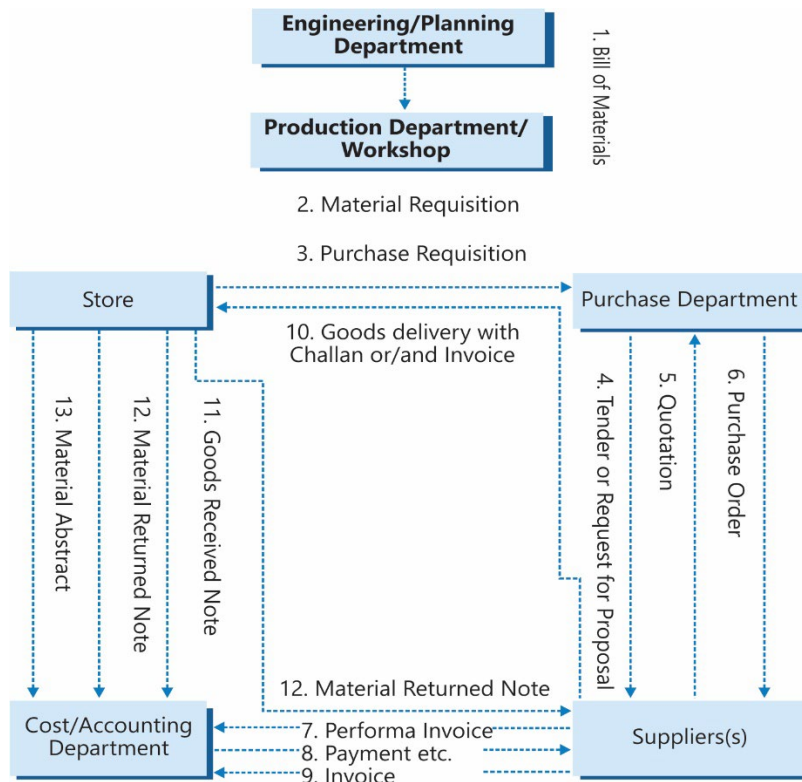


Diagram: Material Procurement Procedure

[The name of the departments and documents shown in the diagram are for illustrative purpose only]

3.1 Bill of Materials

It is also known as **Materials Specification List** or Materials List. It is a **detailed list specifying the standard quantities and qualities of materials and components required for producing a product or carrying out of any job**. The materials specification list is prepared by the product development team commonly known as engineering or planning department in a standard form. This is shared with other concerned departments like Marketing, Production, Store, and Cost/ Accounting department.

Format and content of a Bill of Materials vary on the basis of industrial peculiarities, management information system (MIS) and accounting system in place.

Uses of Bill of Material

Marketing (Purchase) Dept.	Production Dept.	Stores Dept.	Cost/ Accounting Dept.
Materials are procured (purchased) on the basis of specifications mentioned in it.	Production is planned according to the nature, volume of the materials required to be used. Accordingly, material requisition lists are prepared.	It is used as a reference document while issuing materials to the requisitioning department.	It is used to estimate cost and profit. Any purchase, issue and usage are compared/verified against this document.

3.2 Material Requisition Note

It is also known as material requisition slip. It is a **voucher of authority used to get materials issued from store**. Generally, it is prepared by the production department and materials are withdrawn on the basis of material requisition list or bill of materials. If no material list has been prepared, it is desirable that the task of the preparation of material requisition notes be left to the planning department or by the department requires the materials. The note is shared with Store and Cost/ Accounting department.

Format of a Material requisition note may vary on the basis of Industrial Peculiarities, Management Information System (MIS) and Accounting System in place.

Difference between Bill of Materials and Material Requisition Note

Bill of Materials	Material Requisition Note
1. It is the document prepared by the engineering or planning dept.	1. It is prepared by the production or other consuming department.
2. It is a complete schedule of component parts and raw materials required for a particular job or work order.	2. It is a document asking Store-keeper to issue materials to the consuming department.
3. It often serves the purpose of a material requisition as it shows the complete schedule of materials required for a particular job i.e. it can replace material requisition.	3. It cannot replace a bill of materials.
4. It can be used for the purpose of quotations.	4. It is useful in arriving historical cost only.
5. It helps in keeping a quantitative control on materials drawn through material requisition.	5. It shows the material actually drawn from stores.

3.3 Purchase Requisition

This document authorises the purchase department to order for the materials specified in the note. Since the materials purchased will be used by the production departments, there should be constant co-ordination between the purchase and production departments. A purchase requisition is a **form used for making a formal request to the purchasing department to purchase materials**. This form is usually filled up by the store keeper for regular materials and by the departmental head for special materials (not stocked as regular items).

At the beginning a complete list of materials and stores required should be drawn up, which should be reviewed periodically for any addition or deletion. On the basis of **standing order**, once an item is included in the standard list, it becomes the duty of the purchase department to arrange for fresh supplies before existing stocks are exhausted. Any change in the consumption pattern should be informed to the purchase department for necessary action from their end.

For control over buying of regular store materials, Inventory control system is to determine stock levels to be maintained and the number of quantities to be ordered. In respect of special materials, required for a special order or purpose, it is desirable that the concerned technical department should prepare materials specifications list specifying the quantity, size and order for the materials.

Purchase requisition note may either be originated by the stores department in connection with regular materials or by the production planning or other technical departments in respect of special materials.

Format of a purchase requisition note may vary on the basis of Industrial Peculiarities, Management Information System (MIS) and Accounting System in place.

3.4 Inviting Quotation/ Request for Proposal (RFP)/ Notification Inviting Tender (NIT)

Materials purchase department has to answer the following question before initiating purchasing of materials:

- (i) What to purchase?
- (ii) When to purchase?
- (iii) How much to purchase?
- (iv) From where to purchase?
- (v) At what price to purchase?

The following are the few suggestive steps to answer to the questions:

(i) What to purchase?

Materials are purchased as per the requisition received from the stores or user departments. In case of materials used regularly, the materials are purchased as per the standard operating procedures (SOP).

(ii) When to purchase?

Materials are purchased considering the need for the materials for production and safety, however, the timing of placing the order is very important to get the materials replenished before the requirement arise and without affecting the production schedule. *Supply* of materials i.e., how easily the materials are available in the market, *Lead time* i.e., time required to get the order from supplier's place to production place, *consumption pattern* of materials are the important factors which affects the timing of purchase. Related to the question, later in this chapter *Re-order Stock Level* will be learnt. Further the concept of just-in-time (JIT), which is briefly discussed in this chapter is also associated with the question 'when' to purchase.

(iii) How much to purchase?

The quantity of materials to be ordered depends on the factors like material consumption pattern, minimum order size as offered by the supplier, quantity discount, storage cost and capacity and working capital requirement etc. The concept of *Economic Order Quantity (EOQ)* will be discussed later in this chapter.

(iv) Where to purchase?

This is the process of selecting supplier of materials to be purchased. This is a very sensitive and crucial process, though for every organization but specifically for the organizations where public money is involved i.e., public sector undertakings (PSUs). *Selection process* of supplier could be a grey area which attracts special attention of regulators like CVC (Central Vigilance Commission), CAG (Comptroller and Auditor General of India), Auditors and others. The question is why this is so sensitive to attract attention of watchdogs. The answer to this question is in a line from Preamble of the Constitution of India, which reads as to secure to all its citizens: "*Equality of status and of opportunity*". This means the supplier selection process be such transparent and fair that all suppliers are treated equal to get opportunity in participation in Tender process.

The selection process starts with Enquiry/Request for Proposals (RFP)/ Notification Inviting Tender (NIT). The geographical area for an enquiry/ RFP or NIT can be local or global depending on the propriety, availability and government guidelines for materials to be purchased. The RFP or NIT can be floated offline i.e., manual process or online by publishing on website or designated electronic market places. One of the examples of electronic market place is GeM (Government e Marketplace).

Government e Marketplace (GeM): A dedicated e-market for different goods & services procured by Government Organisations / Departments / PSUs. It aims to enhance transparency, efficiency and speed in public procurement. It provides the tools of e-bidding, reverse e-auction and demand aggregation to facilitate the government users, achieve the best value for their money. The purchases through GeM by Government users have been authorised and made mandatory by Ministry of Finance.

(v) At what price to purchase?

The answer to the question is discussed in the following paragraph where the Lowest bidder (also called L1 bidder) for the material is selected.

3.5 Selection of Quotation/ Proposal

After invitation of tender from the vendors, interested vendors who are fulfilling all the criteria mentioned in the tender notice send their price quotations/ proposals to the purchase department. On the receipt of quotations, a comparative statement is prepared. For selecting material suppliers, the factors which the purchase department keeps in its mind are—*price, quantity, quality offered, time of delivery, mode of transportation, terms of payment, reputation of supplier* etc. In addition to the above listed factors purchase manager obtains other necessary information for final selection of material suppliers.

3.6 Preparation and Execution of Purchase Orders

Having decided on the best quotation that should be accepted, the purchase manager or concerned officer proceeds to issue the formal purchase order. It is a written request to the supplier to supply specified materials at specified rates and within a specified period. Generally, copies of purchase order are given to Store or

order indenting department, receiving department and cost accounting department. A copy of the purchase order with relevant purchase requisitions, is held in the file of the department to facilitate the follow-up of the delivery and also for approval of the invoice for payment.

3.7 Receipt and Inspection of Materials

After execution of purchase order and advance payment (if terms of quotation so specify), necessary arrangement is made to receive the delivery of materials. After receipt of materials along with relevant documents or/ and invoice, receiving department (store dept.) arrange to inspect the materials for its conformity with purchase order. After satisfactory inspection, materials are received and **Goods Received Note** is issued. If some materials are not found in good condition or are not in conformity with the purchase order are returned back to the vendor along with a Material Returned Note.

3.7.1 Goods Received Note

If everything is in order and the supply is considered suitable for acceptance, the Receiving department prepares a Receiving Report or **Material Inward Note** or Goods Received Note. Generally, it is prepared in quadruplicate, the copies being distributed to purchase department, store or order indenting department, receiving department and accounting department.

3.7.2 Material Returned Note

Sometimes materials have to be returned to suppliers after these have been received in the factory. Such returns may occur before or after the preparation of the receiving report. If the return takes place before the preparation of the receiving report, such material obviously would not be included in the report and hence not shown in the stores ledgers. In that case, no adjustment in the account books would be necessary. But if the material is returned after its entry in the receiving report, a suitable document must be drawn up in support of the issue so as to exclude from the Stores of Material Account the value of the materials returned back. This document usually takes the form of a *Material Returned Note* or *Material outward return note*.

3.8 Checking and Passing of Bills for Payment

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



4. VALUATION OF MATERIAL RECEIPTS

After the procurement of materials from the supplier actual material cost is calculated. **Ascertainment of cost of material purchased is called valuation of materials receipts.** Cost of material includes cost of purchase net of trade discounts, rebates, duty draw-back, input credit availed, etc. and other costs incurred in bringing the inventories to their present location and condition. Invoice of material purchased from the market sometime contain items such as trade discount, quantity discount, freight, duty, insurance, cost of containers, taxes, cash discount etc.

Treatment of items associated with purchase of materials is tabulated as below

Sl No.	Items	Treatment
Discounts and Subsidy		
(i)	Trade Discount	Trade discount is deducted from the purchase price if it is not shown as deduction in the invoice.
(ii)	Quantity Discount	Like trade discount quantity discount is also shown as deduction from the invoice. It is deducted from the purchase price if not shown as deduction.
(iii)	Cash Discount	Cash discount is not deducted from the purchase price. It is treated as interest and finance item. It is ignored.
(iv)	Subsidy/ Grant/ Incentives	Any subsidy/ grant/ incentive received from the Government or from other sources deducted from the cost of purchase.

Duties and Taxes		
(v)	Road Tax/ Toll Tax	Road tax/ Toll tax, if paid by the buyer, is included with the cost of purchase.
(vi)	Goods and Service Tax (GST)	Goods and Service Tax (GST) is paid on supply of goods and provision of services and collected from the buyers. It is excluded from the cost of purchase if credit for the same is available. Unless mentioned specifically it should not form part of cost of purchase.
(vii)	Custom Duty	Custom duty is paid on import of goods from outside India. It is added with the purchase cost.
Penalty and Charges		
(viii)	Demurrage	Demurrage is a penalty imposed by the transporter for delay in uploading or offloading of materials. It is an abnormal cost and not included with cost of purchase
(ix)	Detention charges/ Fine	Detention charges/ fines imposed for non-compliance of rule or law by any statutory authority. It is an abnormal cost and not included with cost of purchase
(x)	Penalty	Penalty of any type is not included with the cost of purchase
Other expenditures		
(xi)	Insurance charges	Insurance charges are paid for protecting goods during transit. It is added with the cost of purchase.
(xii)	Commission or brokerage paid.	Commission or brokerage paid is added with the cost of purchase.
(xiii)	Freight inwards	It is added with the cost of purchase as it is directly attributable to procurement of material.

(xiv)	Cost of containers	Treatment of cost of containers are as follows: • Non-returnable containers: The cost of containers is added with the cost of purchase of materials. • Returnable Containers: If the containers are returned and their costs are refunded, then cost of containers should not be considered in the cost of purchase. • If the amount of refund on returning the container is less than the amount paid, then, only the short fall is added with the cost of purchase.
(xv)	Shortage	Shortage in materials is treated as follows: Shortage due to normal reasons: Good units absorb the cost of shortage due to normal reasons. Losses due to breaking of bulk, evaporation, or due to any unavoidable conditions etc. are the reasons of normal loss. Shortage due to abnormal reasons: Shortage arises due to abnormal reasons such as material mishandling, pilferage, or due to any avoidable reasons are not absorbed by the good units. Losses due to abnormal reasons are debited to costing profit and loss account.

ILLUSTRATION 1

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

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

A shortage of 500 kgs. in chemical A and 320 kgs. in chemical B is noticed due to normal breakages. You are required to COMPUTE the rate per kg. of each chemical, assuming a provision of 2% for further deterioration.

SOLUTION

Working:

Computation of effective quantity of each chemical available for use

	Chemical A (kg.)	Chemical B (kg.)
Quantity purchased	10,000	8,000
Less: Shortage due to normal breakages	500	320
	9,500	7,680
Less: Provision for deterioration 2%	190	153.6
Quantity available	9,310	7,526.4

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

	Chemical A (₹)	Chemical B (₹)
Purchase price 10,000@ ₹10 per kg, 8,000@₹13 per kg	1,00,000	1,04,000
Add: Basic Custom Duty @10%	10,000	10,400
Add: Railway freight (in the ratio of quantity purchased i.e., 5:4)	2,133	1,707
Total cost (A)	1,12,133	1,16,107
Effective Quantity (see working) (B)	9,310 kg.	7,526.4 kg.
Rate per kg. (A ÷ B)	12.04	15.43

ILLUSTRATION 2

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

Invoice	(₹)
200 units Part No. A 32 @ ₹ 5	1,000.00
Less: 20% discount	(200.00)
	800.00
Add: GST @ 12%	96.00
	896.00
Add: Packing charges (5 non-returnable boxes)	50.00
	946.00

- (i) A 2 per cent cash discount will be given if payment is made in 30 days.
- (ii) Documents substantiating payment of GST are enclosed for claiming Input credit.

SOLUTION

Computation of cost per unit

	(₹)
Net purchase Price	800.00
Add: Packing charges (5 non-returnable boxes)	50.00
	850.00
No. of units purchased	200 units
Cost per unit	4.25

Note: (i) Cash discount is treated as interest and finance charges, hence, it is not considered for valuation of material.

(ii) Input credit is available for GST paid; hence it will not be added to purchase cost.



5. MATERIAL STORAGE & RECORDS

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

5.1 Duties of Store Keeper

These can be briefly set out as follows:

- (i) **General control over store:** Store keeper should keep control over all activities in Stores department. He should check the quantities as mentioned in Goods received note and with the purchased materials forwarded by the receiving department and to arrange for the storage in appropriate places.
- (ii) **Safe custody of materials:** Store keeper should ensure that all the materials are stored in a safe condition and environment required to preserve the quality of the materials.
- (iii) **Maintaining records:** Store keeper should maintain proper record of quantity received, issued, balance in hand and transferred to/ from other stores.
- (iv) **Initiate purchase requisition:** Store keeper should initiate purchase requisitions for the replacement of stock of all regular stores items whenever the stock level of any item of store approaches the re-order level fixed.
- (v) **Maintaining adequate level of stock:** Store keeper should maintain adequate level of stock at all time. He/ she should take all the necessary action so that production could not be interrupted due to lack of stock. Further he/ she should take immediate action for stoppage of further purchasing when the stock level approaches the maximum limit. He also needs to reserve a particular material for a specific job when so required.

- (vi) **Issue of materials:** Store keeper should issue materials only against the material requisition slip approved by the appropriate authority. He/ she should also refer to bill of materials while issuing materials to requisitioning department.
- (vii) **Stock verification and reconciliation:** Store keeper should verify the book balances with the actual physical stock at frequent intervals by way of internal control and check the any irregular or abnormal issues, pilferage, etc.

5.2 Store Records

The record of stores may be maintained in three forms:

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

Bin Cards: It is a **quantitative** record of inventory which shows the quantity of inventory available in a particular bin. Bin refers to a box/ container/ space where materials are kept. Card is placed with each of the bin (space) to record the details of material like receipt, issue and return. It is maintained by store department.

Stock Control Cards: It is also a **quantitative** record of inventory maintained by stores department for every item of material. In other words, it is a record which shows the overall inventory position in store. Recording includes receipt, issue, return, in hand and order given.

Advantages and Disadvantages of Bin Cards

Advantages:

- (i) There would be fewer chances of mistakes being made as entries are made at the same time as goods received or issued by the person actually handling the materials.
- (ii) Control over stock can be more effective, as comparison of the actual quantity in hand at any time with the book balance is possible.
- (iii) Identification of the different items of materials is facilitated by reference to the Bin Card, the bin or storage receptacle.

Disadvantages

- (i) Store records are dispersed over a wide area.
- (ii) The cards are liable to be smeared with dirt and grease because of proximity to material and also because of handling materials.
- (iii) People handling materials are not ordinarily suitable for the clerical work involved in writing Bin Cards.

Advantages and Disadvantages of Stock Control Cards**Advantages:**

- (i) Records are kept in a more compact manner so that reference to them is facilitated.
- (ii) Records can be kept in a neat and clean way by men solely engaged in clerical work so that a division of workers between record keeping and actual material handling is possible.
- (iii) As the records are at one place, it is possible to get an overall idea of the stock position without the necessity of going round the stores.

Disadvantages:

- (i) On the spot comparison of the physical stock of an item with its book balance is not facilitated.
- (ii) Physical identification of materials in stock may not be as easy as in the case of bin cards, as the Stock Control Cards are housed in cabinets or trays.

Stores Ledger: A Stores Ledger is maintained to record **both quantity and cost of materials received, issued and those in stock**. It is a subsidiary ledger to the main cost ledger; it is maintained by the Cost/ Accounts Department. The source documents for posting the ledger are Goods received notes, Materials requisition notes etc.

The first two forms are records of quantities received, issued and those in balance, but in the third record i.e. store ledger, value of receipts, issues and closing balance is also maintained. Usually, records of quantities i.e. *Bin cards and Store Control Cards* are kept by the store keeper in store department while record of both quantity and value is maintained by cost accounting department.

Difference between Bin Card & Stores Ledger

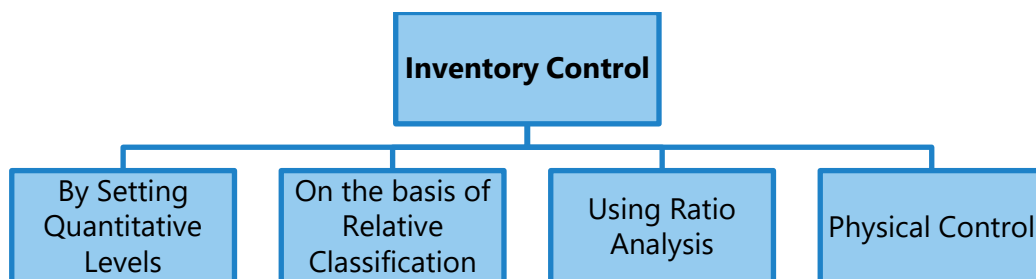
Bin Card	Stores Ledger
It is maintained by the storekeeper in the store.	It is maintained in cost accounting department.
It contains only quantitative details of material received, issued and returned to stores.	It contains information both in quantity and value.
Entries are made when transaction takes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



6. INVENTORY CONTROL

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

The objective of inventory control is to make a balance between sufficient stock and over-stock. The stock maintained should be sufficient to meet the production requirements so that uninterrupted production flow can be maintained. Insufficient stock not only pause the production but also cause a loss of revenue and goodwill. On the other hand, inventory requires some funds for purchase, storage, maintenance of materials with a risk of obsolescence, pilferage etc. The main objective of inventory control is to maintain a **trade-off between stock-out and over-stocking**. The management may employ various methods of inventory control to have a balance. Management may adopt the following basis for inventory control:



6.1 Inventory Control- By Setting Quantitative Levels

Re-order Stock Level	•When to Order
Re-order Quantity/ EOQ	•How Much to Order
Maximum Stock Level	•Upto How much to stock
Minimum Stock Level	•Atleast How much to stock
Average Stock Level	•Stock normally kept
Danger Stock Level	•Kept for emergency requirement
Buffer Stock	•To meet sudden demand

- (i) **Re-order Stock Level (ROL):** *This level lies between minimum and the maximum levels in such a way that before the material ordered is received into the stores, there is sufficient quantity in hand to cover both normal and abnormal consumption situations. In other words, it is the level at which fresh order should be placed for replenishment of stock.*

It is calculated as:

$$\text{ROL} = \text{Maximum Consumption} \times \text{Maximum Re-order Period}$$

Maximum Consumption = The maximum rate of material consumption in production activity

Maximum Re-order period = The maximum time to get order from supplier to the stores

This can also be calculated alternatively as below:

$$\text{ROL} = \text{Minimum Stock Level} + (\text{Average Rate of Consumption} \times \text{Average Re-order period})$$

Minimum Stock Level = Minimum Stock level that must be maintained all the time.

Average Rate of Consumption = Average rate of material consumption in production activity. It is also known as normal consumption/ usage

Average Re-order period = Average time to get an order from supplier to the stores. It is also known as normal period.

(Re-order period is also known as Lead time)

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

Economic Order Quantity (EOQ): The size of an order for which total of ordering and carrying cost are minimum.

Ordering Cost: Ordering costs are the costs which are associated with the purchase or order of materials such as *cost to invite quotations, documentation works like preparation of purchase orders*, employee cost directly attributable to the procurement of material, transportation and inspection cost etc.

Carrying Cost: **Carrying costs are** the costs for *holding/ carrying of inventories in store* such as the cost of fund invested in inventories, cost of storage, insurance cost, obsolescence etc.

The Economic Order Quantity (EOQ) is calculated as below:

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

Annual Requirement (A)- It represents demand for raw material or Input for a year.

Cost per Order (O) - It represents cost of placing an order for purchase.

Carrying Cost (C) – It represents cost of carrying average inventory on annual basis.

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

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

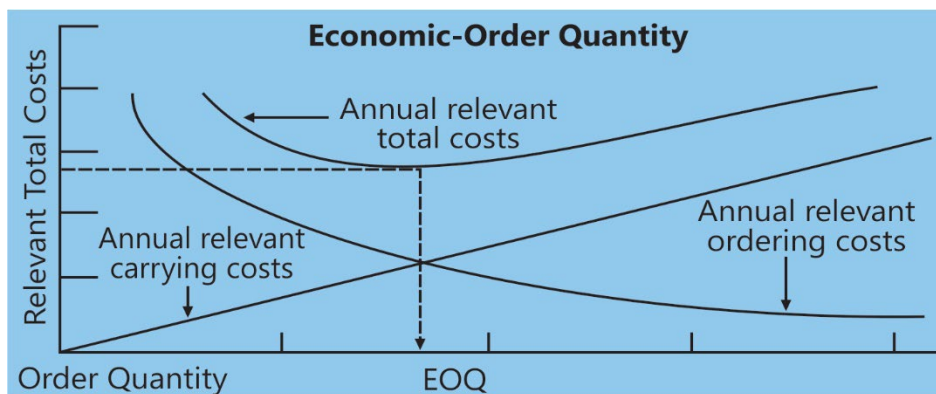


ILLUSTRATION 3

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

Consumption of materials per annum : 10,000 kg.

Order placing cost per order	:	₹ 50
Cost per kg. of raw materials	:	₹ 2
Storage costs	:	8% on average inventory

SOLUTION

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

A = Units consumed during year = 10,000

O = Ordering cost per order = 50

C = Inventory carrying cost per unit per annum. = 8% of ₹ 2

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 50}{\frac{2 \times 8}{100}}} = \sqrt{\frac{2 \times 10,000 \times 50 \times 25}{4}} = \mathbf{2,500 \text{ kg}}$$

No. of orders to be placed in a year

$$= \frac{\text{Total consumption of materials per annum}}{EOQ}$$

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

ILLUSTRATION 4

(i) COMPUTE E.O.Q. and the total variable cost for the following:

Annual Demand = 5,000 units

Unit price = ₹ 20.00

Order cost = ₹ 16.00

Storage rate = 2% per annum

Interest rate = 12% per annum

Obsolescence rate = 6% per annum

(ii) DETERMINE the total cost that would result for the items if a new price of ₹ 12.80 is used.

SOLUTION

(i) Carrying cost (C) =	Storage rate	=	2%
	Interest Rate	=	12%
	Obsolescence Rate	=	<u>6%</u>
	Total	=	<u>20%</u> per annum

$$C = 20\% \text{ of ₹ } 20 = ₹ 4 \text{ per unit per annum.}$$

$$\text{E.O.Q} = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 5000 \times 16}{4}} = \sqrt{40,000} = 200 \text{ units}$$

Total cost:

$$\text{Purchase price of 5,000 units @ ₹ 20.00 per unit} = ₹ 1,00,000$$

$$\text{Ordering cost} = \frac{5000}{200} = 25 \text{ orders @ ₹ 16} = ₹ 400$$

Carrying cost of average Inventory

$$= \frac{200}{2} = 100 \text{ units @ ₹ 4} = ₹ 400$$

$$\text{Total cost} = ₹ \underline{\underline{1,00,800}}$$

(ii) If the new price of ₹ 12.80 is used:

$$C = 20\% \text{ of } 12.80 = ₹ 2.56 \text{ per unit per annum.}$$

$$\text{E.O.Q.} = \sqrt{\frac{2 \times 5,000 \times 16}{2.56}} = 250 \text{ units}$$

Total cost:

$$\text{Purchase price of 5,000 units @ ₹ 12.80 per unit} = ₹ 64,000$$

$$\text{Ordering cost} = \frac{5,000}{250} = 20 \text{ orders @ ₹ 16} = ₹ 320$$

$$\text{Carrying cost (of average inventory)} = \frac{250}{2} = 125 \text{ units @ ₹ 2.56} = ₹ \underline{\underline{320}}$$

$$\text{Total variable cost} = ₹ \underline{\underline{64,640}}$$

- (iii) **Minimum Stock Level:** It is lowest level of material stock, which must be *maintained in hand at all times*, so that there is no stoppage of production due to non-availability of inventory.

It is calculated as below:

$$\text{Minimum Stock Level} = \text{Re-order Stock Level} - (\text{Average Consumption Rate} \times \text{Average Re-order Period})$$

- (iv) **Maximum Stock Level:** It is *the highest level of quantity for any material which can be held in stock at any time*. Any quantity beyond this level cause extra amount of expenditure due to engagement of fund, cost of storage, obsolescence etc.

It can be calculated as below:

$$\text{Maximum Stock Level} = \text{Re-order Level} + \text{Re-order Quantity} - (\text{Minimum Consumption Rate} \times \text{Minimum Re-order Period})$$

Here, Re-order Quantity may be EOQ

- (v) **Average Inventory Level:** This is the quantity of material that is normally held in stock over a period. *It is also known as normal stock level.*

It can be calculated as below:

$$\text{Average Stock Level} = \text{Minimum Stock Level} + \frac{1}{2} \text{ Re-order Quantity}$$

Alternatively, it can be calculated as below:

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

- (vi) **Danger level:** It is the level at which normal issues of the raw material inventory are stopped and emergency issues are only made.

It can be calculated as below:

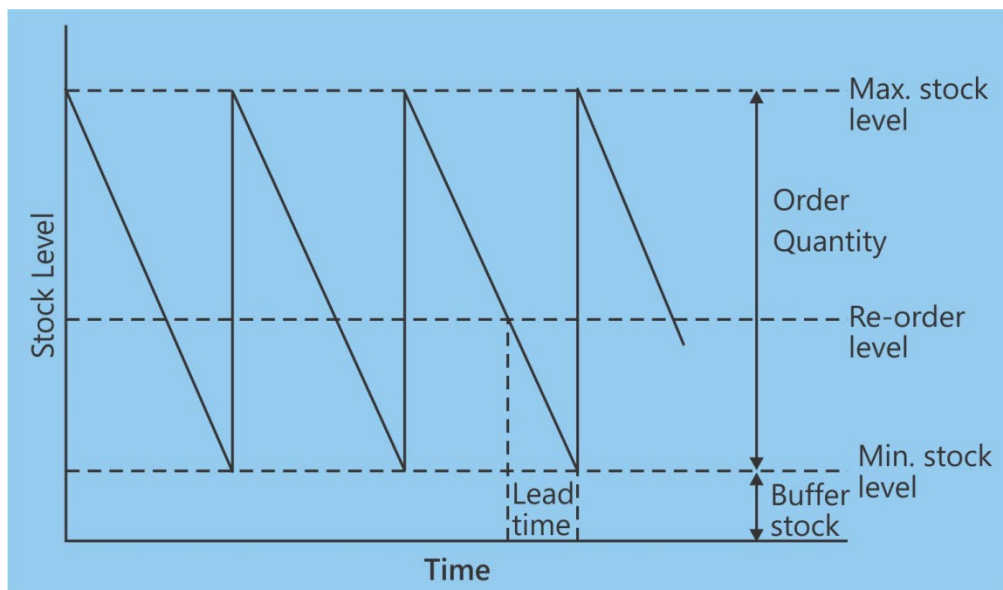
$$\text{Danger Level} = \text{Average Consumption} \times \text{Lead time for emergency purchase}$$

*Some time minimum consumption is also used.

- (vii) **Buffer Stock:** Some quantity of stock may be kept for **contingency** to be used in case of sudden order, such stock is known as buffer stock.

All the above stock levels can be understood with the help of the following diagram:

Stock Control Chart



When the materials are purchased, the level keeps rising. It may reach maximum level if the rate of issuance is less. As the materials are consumed, the stock level starts declining. At re-order level, reorder quantity is ordered and fresh supplies are normally received when stocks reach minimum level. The time interval between re-order level, when the fresh order is placed, and the time of actual receipt of materials is known as lead time.

ILLUSTRATION 5

Two components, A and B are used as follows:

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

CALCULATE for each component (a) Re-ordering level, (b) Minimum level, (c) Maximum level, (d) Average stock level.

SOLUTION**(a) Re-ordering level:**

Maximum usage per week $\times$ Maximum delivery period.

Re-ordering level for component A = 75 units $\times$ 6 weeks = **450 units**

Re-ordering level for component B = 75 units $\times$ 4 weeks = **300 units**

(b) Minimum level:

Re-order level – (Normal usage $\times$ Average period)

Minimum level for component A = 450 units – (50 units $\times$ 5 weeks) = 200 units

Minimum level for component B = 300 units – (50 units $\times$ 3 weeks) = 150 units

(c) Maximum level:

Re-order level + Re-order quantity – (Min. usage $\times$ Minimum period)

Maximum level for component A = (450 units + 300 units) – (25 units $\times$ 4 weeks) = 650 units

Maximum level for component B = (300 units + 500 units) – (25 units $\times$ 2 weeks) = 750 units

(d) Average stock level:

$\frac{1}{2}$ (Minimum + Maximum) stock level

Average stock level for component A = $\frac{1}{2}$ (200 units + 650 units) = 425 units.

Average stock level for component B = $\frac{1}{2}$ (150 units + 750 units) = 450 units.

ILLUSTRATION 6

From the details given below, CALCULATE:

(i) *Re-ordering level*

(ii) *Maximum level*

(iii) *Minimum level*

(iv) *Danger level.*

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

Cost of placing a purchase order is ₹ 20

Number of units to be purchased during the year is 5,000

Purchase price per unit inclusive of transportation cost is ₹ 50

Annual cost of storage per units is ₹ 5.

Details of lead time : Average- 10 days, Maximum- 15 days, Minimum- 5 days.

For emergency purchases- 4 days.

Rate of consumption : Average: 15 units per day,

Maximum: 20 units per day.

SOLUTION

Basic Data:

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

Computations:

- (i) **Re-ordering level** = Maximum usage per period × Maximum lead time
 (ROL) = 20 units per day × 15 days
 = **300 units**
- (ii) **Maximum level** = ROL + ROQ – [Min. rate of consumption × Min.
 (Refer to working notes 1 and 2) lead time]
 = 300 units + 200 units – [10 units per day × 5 days]
 = **450 units**
- (iii) **Minimum level** = ROL – Average rate of consumption × Average re-
 order-period
 = 300 units – (15 units per day × 10 days)
 = **150 units**

$$\begin{aligned}
 \text{(iv) Danger level} &= \text{Average consumption} \times \text{Lead time for emergency purchases} \\
 &= 15 \text{ units per day} \times 4 \text{ days} \\
 &= \mathbf{60 \text{ units}}
 \end{aligned}$$

Working Notes:

1. Minimum rate of consumption per day

$$\text{Av. rate of consumption} = \frac{\text{Minimum rate of consumption} + \text{Maximum rate of consumption}}{2}$$

$$15 \text{ units per day} = \frac{X \text{ units/day} + 20 \text{ units per day}}{2} \quad \text{or} \quad X = 10 \text{ units per day.}$$

2. Re-order Quantity (ROQ) or Economic Order Quantity (EOQ) =

$$\sqrt{\frac{2 \times 5,000 \text{ units} \times ₹ 20}{5}} = 200 \text{ units}$$

6.2 Inventory Stock-Out

Stock out is said to be occurred **when an inventory item could not be supplied due to insufficient stock in the store**. The stock-out situation costs to the entity not only in financial terms but in non-financial terms also. Due to stock out an entity not only loses overheads costs and profit but reputation (goodwill) also due to non-fulfilment of commitment. Though it may not be a monetary loss in short term but in long term it could be a reason for financial loss.

While deciding on the level of inventory, a trade-off between the stock out cost and carrying cost is made so that overall inventory cost can be minimized.

ILLUSTRATION 7

M/s Tyrotubes trades in four-wheeler tyres and tubes. It stocks sufficient quantity of tyres of almost every vehicle. In year end 2022-23, the report of sales manager revealed that M/s Tyrotubes experienced stock-out of tyres.

The stock-out data is as follows:

Stock-out of Tyres	No. of times of Stock Out
100	2
80	5
50	10
20	20
10	30
0	33

M/s Tyrotubes loses ₹ 150 per unit due to stock-out and spends ₹ 50 per unit on carrying of inventory.

DETERMINE optimum safest stock level.

SOLUTION

Computation of Stock-out and Inventory carrying cost

Safety Stock Level (units) (1)	Stock-out (units) (2)	Probability (3)	Stock-out cost (₹) (4) = (2) x ₹ 150	Expected stock-out cost (₹) (5) = (3)x(4)	Inventory carrying cost (₹) (6) = (1)x₹ 50	Total cost (₹) (7) = (5)+(6)
100	0	0.33	0	0	5,000	5,000
80	20	0.02	3,000	60	4,000	4,060
50	50	0.02	7,500	150		
	30	0.05	4,500	225		
			12,000	375	2,500	2,875
20	80	0.02	12,000	240		
	60	0.05	9,000	450		
	30	0.10	4,500	450		
			25,500	1,140	1,000	2,140
10	90	0.02	13,500	270		
	70	0.05	10,500	525		

	40	0.10	6,000	600		
	10	0.20	1,500	300		
			31,500	1,695	500	2,195
0	100	0.02	15,000	300		2,700
	80	0.05	12,000	600		
	50	0.10	7,500	750		
	20	0.20	3,000	600		
	10	0.30	1,500	450		
			39,000	2,700	0	2,700

At safety stock level of 20 units, total cost is least i.e., ₹ 2,140.

Working Note:

Computation of Probability of Stock-out

Stock-out (units)	100	80	50	20	10	0	Total
Nos. of times	2	5	10	20	30	33	100
Probability	0.02	0.05	0.10	0.20	0.30	0.33	1.00

Explanation:

Stock-out means the demand of an item that could not be fulfilled because of insufficient stock level.

Safety stock is the level of stock of any item which is maintained in excess of lead time consumption. It is kept as cushion against any unexpected demand for that item.

Safety stock level	Impact
100 units	Any unexpected demand up-to 100 units can be met.
80 units	Stock out will only arise if unexpected demand will be for 100 units. In this case 20 units will remain unsatisfied. The probability of any unexpected demand for 100 units is 0.02.

50 units	Any unexpected demand beyond 50 units will be remain unsatisfied. If unexpected demand for 100 units arises (probability is 0.02) 50 units will be unsatisfied. Similarly, if unexpected demand for 80 units arises (probability is 0.05), 30 units will be unsatisfied.
20 units	Any unexpected demand beyond 20 units will be remain unsatisfied. If unexpected demand for 100 units arises (probability is 0.02), 80 units will remain unsatisfied. If unexpected demand for 80 units arises (probability is 0.05), 60 units will remain unsatisfied. Similarly, when unexpected demand for 50 units arises (probability is 0.10), 30 units will remain unsatisfied.
10 units	Any unexpected demand beyond 10 units will be remain unsatisfied. If unexpected demand for 100 units arises (probability is 0.02), 90 units will remain unsatisfied. If unexpected demand for 80 units arises (probability is 0.05), 70 units will remain unsatisfied. If unexpected demand for 50 units arises (probability is 0.10), 40 units will remain unsatisfied. Similarly, when unexpected demand for 20 units arises (probability is 0.20), 10 units will remain unsatisfied.
0 unit	When no safety stock level is maintained, any unexpected demand cannot be satisfied. If unexpected demand for 100 units arises (probability is 0.02), 100 units will remain unsatisfied. If unexpected demand for 80 units arises (probability is 0.05), 80 units will remain unsatisfied. If unexpected demand for 50 units arises (probability is 0.10), 50 units will remain unsatisfied. If unexpected demand for 20 units arises (probability is 0.20), 20 units will remain unsatisfied. Similarly, unexpected demand for 10 units (probability is 0.30), 10 units will remain unsatisfied.

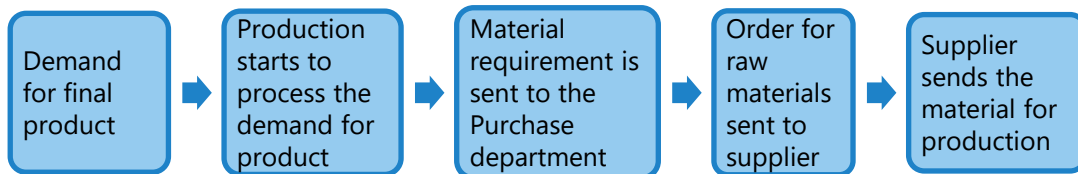
6.3 Just In Time (JIT) Inventory Management

JIT is a system of inventory management with an approach to have zero inventories in stores. According to this approach material should *only be purchased when it is actually required for production.*

JIT is based on two principles

- (i) Produce goods only when it is required and
- (ii) the products should be delivered to customers at the time only when they want.

It is also known as 'Demand pull' or 'Pull through' system of production. In this system, production process actually starts after the order for the products is received. Based on the demand, production process starts and the requirement for raw materials is sent to the purchase department for purchase. This can be understood with the help of the following diagram:



6.4 Inventory Control- On the basis of Relative Classification

ABC Analysis	•On the basis of value and frequency of inventory
Fast, Slow and Non Moving (FSN)	•On the basis of inventory turnover
Vital, Essential and Desirable (VED)	•On the basis of importance of inventory
High, Medium and Low (HML)	•On the basis of price of an item of inventory

(1) ABC Analysis: This system exercises discriminating control over different items of inventory on the basis of the investment involved. Usually the items are classified into three categories according to their relative importance, namely, their value and frequency of replenishment during a period.

- (i) **'A' Category:** *This category of items consists of only a small percentage i.e., about 10% of the total items handled by the stores but require heavy investment about 70% of inventory value, because of their **high prices or heavy requirement** or both. Items under this category can be controlled effectively by using a regular system which ensures neither over-stocking nor shortage of materials for production. Such a system plans its total material requirements by making budgets. The stocks of materials are controlled by fixing certain levels like maximum level, minimum level and re-order level.*
- (ii) **'B' Category:** *This category of items is relatively less important; they may be 20% of the total items of material handled by stores. The percentage of investment required is about 20% of the total investment in inventories. In the case of these items, as the sum involved is **moderate**, the same degree of control as applied in 'A' category of items is not warranted. The orders for the items, belonging to this category may be placed after reviewing their situation periodically.*
- (iii) **'C' Category:** *This category of items does not require much investment; it may be about 10% of total inventory value but they are nearly 70% of the total items handled by store. For these categories of items, there is no need of exercising constant control. Orders for items in this group may be placed either after six months or once in a year, after ascertaining consumption requirements. In this case the objective is to economies on ordering and handling costs.*

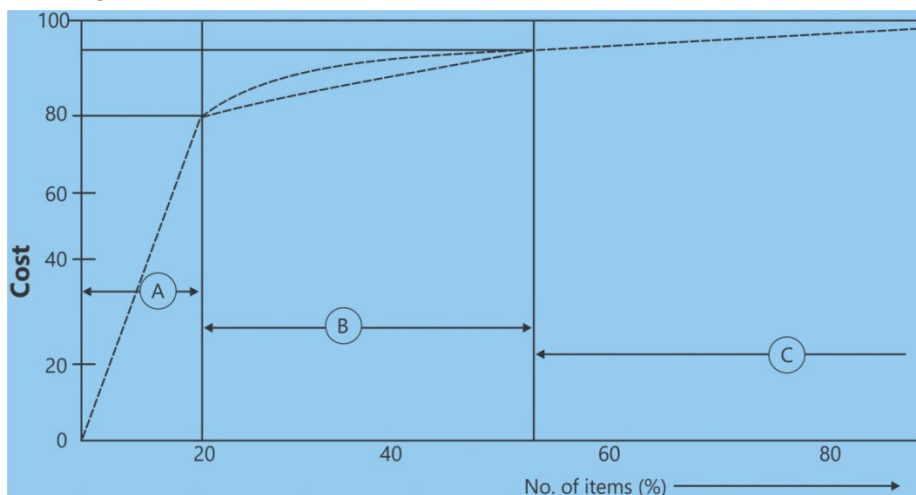


ILLUSTRATION 8

From the following details, DRAW a plan of ABC selective control:

Item	Units	Unit cost (₹)
1	7,000	5.00
2	24,000	3.00
3	1,500	10.00
4	600	22.00
5	38,000	1.50
6	40,000	0.50
7	60,000	0.20
8	3,000	3.50
9	300	8.00
10	29,000	0.40
11	11,500	7.10
12	4,100	6.20

SOLUTION**Statement of Total Cost and Ranking**

Item	Units	% of Total units	Unit cost (₹)	Total cost (₹)	% of Total cost	Ranking
1	7,000	3.1963	5.00	35,000	9.8378	4
2	24,000	10.9589	3.00	72,000	20.2378	2
3	1,500	0.6849	10.00	15,000	4.2162	7
4	600	0.2740	22.00	13,200	3.7103	8
5	38,000	17.3516	1.50	57,000	16.0216	3
6	40,000	18.2648	0.50	20,000	5.6216	6

7	60,000	27.3973	0.20	12,000	3.3730	9
8	3,000	1.3699	3.50	10,500	2.9513	11
9	300	0.1370	8.00	2,400	0.6746	12
10	29,000	13.2420	0.40	11,600	3.2605	10
11	11,500	5.2512	7.10	81,650	22.9502	1
12	4,100	1.8721	6.20	25,420	7.1451	5
	2,19,000	100		3,55,770	100	

Basis for selective control (Assumed)

₹ 50,000 & above -- 'A' items

₹ 15,000 to 50000 -- 'B' items

Below ₹ 15,000 -- 'C' items

On this basis, a plan of A B C selective control is given below:

Ranking	Item Nos.	% of Total units	Cost (₹)	% of Total Cost	Category
1	11	5.2512	81,650	22.9502	
2	2	10.9589	72,000	20.2378	
3	5	17.3516	57,000	16.0216	
Total	3	33.5617	2,10,650	59.2096	A
4	1	3.1963	35,000	9.8378	
5	12	1.8721	25,420	7.1451	
6	6	18.2648	20,000	5.6216	
7	3	0.6849	15,000	4.2162	
Total	4	24.0181	95,420	26.8207	B
8	4	0.2740	13,200	3.7103	
9	7	27.3973	12,000	3.3730	
10	10	13.2420	11,600	3.2605	

11	8	1.3699	10,500	2.9513	
12	9	0.1370	2,400	0.6746	
Total	5	42.4202	49,700	13.9697	C
Grand Total	12	100	3,55,770	100	

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

- Continuity in production:* It ensures that, without there being any danger of interruption of production for want of materials or stores, minimum investment will be made in inventories of stocks of materials or stocks to be carried.
- Lower cost:* The cost of placing orders, receiving goods and maintaining stocks is minimised specially if the system is coupled with the determination of proper economic order quantities.
- Less attention required:* Management time is saved since attention need to be paid only to some of the items rather than all the items, as would be the case if the ABC system was not in operation.
- Systematic working:* With the introduction of the ABC system, much of the work connected with purchases can be systematized on a routine basis, to be handled by subordinate staff.

ILLUSTRATION 9

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

No. of varieties of inventory	%	% value of inventory holding (average)	% of inventory usage (in end-product)
3,875	96.875	20	5
110	2.750	30	10
15	0.375	50	85
4,000	100.00	100	100

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

SOLUTION

Classification of the items of inventory as per ABC analysis

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

(2) Fast Moving, Slow Moving and Non-Moving (FSN) Inventory: It is also known as FNS (Fast, Normal and Slow moving) classification of inventory analysis. Under this system, inventories are controlled by classifying them **on the basis of frequency of usage**. The classification of items into these three categories

depends on the nature and managerial discretion. A threshold range on the basis of inventory turnover is decided and classified accordingly.

- (i) **Fast Moving-** This category of items is placed nearer to store issue point and the stock is reviewed frequently for making of fresh orders.
- (ii) **Slow Moving-** This category of items is stored little far and stock is reviewed periodically for any obsolescence, and may be shifted to Non-moving category.
- (iii) **Non-Moving-** This category of items is kept for disposal. This category of items is reported to the management and an appropriate provision for loss may be created.

Some of the reasons for slow moving and non-moving inventories are stated below:

- (i) Failure of production management to communicate the updated requirement to the stores management
- (ii) Technological upgradation in terms of new machine requiring new kind of material or existing material becoming obsolete.
- (iii) Lack of periodic review of inventories.

By careful observation, timely identification and adoption of inventory management techniques such as maintenance of minimum level or just in time approach, one can manage slow moving and non-moving inventories. We may calculate inventory turnover ratio and present the reports of comparison of actual and standards with variations, if any to the management.

(3) Vital, Essential and Desirable (VED): Under this system of inventory analysis, inventories are classified **on the basis of its criticality for the production function and final product**. Generally, this classification is done for spare parts which are used for production.

- (i) **Vital-** Items are classified as vital when its unavailability can interrupt the production process and cause a production loss. Items under this category are strictly controlled by setting re-order level.
- (ii) **Essential-** Items under this category are essential but not vital. The unavailability may cause sub standardisation and loss of efficiency in production process. Items under this category are reviewed periodically and get the second priority.

- (iii) **Desirable-** Items under this category are optional in nature, unavailability does not cause any production or efficiency loss.

For instance, in hospital administration, stock of medicines and essential chemicals are categorized as VED or FSN inventory. In case of life saving, rare and critical drugs, they are being categorized as vital inventory. They are the ones whose unavailability can interrupt smooth service. Those inventories which are optional or substitutes, not leading to loss in efficiency would be categorized as desirable inventories. FNS categorization helps the store keepers in hospitals to keep a check on medicines whose expiry date is close and needs to be disposed off at the earliest. The quantity of slow-moving drugs are maintained accordingly.

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

6.5 Using Ratio Analysis

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

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

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

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

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

$$\text{Average no. of days of Inventory holding} = \frac{365 \text{ days} / 12 \text{ months}}{\text{Inventory Turnover Ratio}}$$

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

ILLUSTRATION 10

The following data are available in respect of material X for the year ended 31st March, 2023.

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

CALCULATE:

- (i) Inventory turnover ratio, and
- (ii) The number of days for which the average inventory is held.

SOLUTION

Inventory turnover ratio

$$\begin{aligned} \text{(Refer to working note)} &= \frac{\text{Cost of stock of raw material consumed}}{\text{Average stock of raw material}} \\ &= \frac{₹2,50,000}{₹1,00,000} = 2.5 \end{aligned}$$

Average number of days for which the average inventory is held

$$= \frac{365}{\text{Inventory turnover ratio}} = \frac{365 \text{ days}}{2.5} = \mathbf{146 \text{ days}}$$

Working Note:

	(₹)
Opening stock of raw material	90,000
Add: Material purchases during the year	2,70,000
Less: Closing stock of raw material	<u>1,10,000</u>
Cost of stock of raw material consumed	<u>2,50,000</u>

ILLUSTRATION 11

From the following data for the year ended 31st March, 2023, CALCULATE the inventory turnover ratio of the two items and put forward your comments on them.

	Material A (₹)	Material B (₹)
Opening stock 1.04.2022	10,000	9,000
Purchase during the year	52,000	27,000
Closing stock 31.03.2023	6,000	11,000

SOLUTION

First of all, it is necessary to find out the material consumed:

Cost of materials consumed	Material A (₹)	Material B (₹)
Opening stock	10,000	9,000
Add: Purchases	52,000	27,000
	62,000	36,000
Less: Closing stock	6,000	11,000
Materials consumed	56,000	25,000
Average inventory: (Opening Stock + Closing Stock) ÷ 2	8,000	10,000
Inventory Turnover ratio: (Consumption ÷ Average inventory)	7 times	2.5 times
Inventory Turnover (Number of Days in a year/IT ratio)	52 days	146 days

Comments: Material A is moving faster than Material B.

6.6 Physical Control

- (i) **Two Bin System:** Under this system, each bin is divided into two parts –
- (I) smaller part to stock the quantity equal to the minimum stock or even the re-ordering level, and
 - (II) the other part to keep the remaining quantity.

Issues are made out of the larger part; but as soon as it becomes necessary to use quantity out of the smaller part of the bin, fresh order is placed. "Two Bin System" is supplemental to the record of respective quantities on the bin card and the stores ledger card.

- (ii) **Establishment of system of budgets:** To control investment in the inventories, it is necessary to know in advance about the inventories requirement during a specific period (usually a year). The exact quantity of various types of inventories and the time when they would be required can be known by studying carefully production plans and production schedules. Based on this, inventories requirement budget can be prepared. Such a budget will discourage the unnecessary investment in inventories.

- (iii) **Perpetual inventory records and continuous stock verification:** Perpetual inventory represents a system of records maintained by the stores department. **It, in fact, comprises of: (i) Bin Cards, and (ii) Stores Ledger.**

The success of perpetual inventory depends upon the following:

- (a) The Stores Ledger showing quantities and amount of each item.
- (b) Stock Control cards (or Bin Cards).
- (c) Reconciling the quantity balances shown by (a) & (b) above.
- (d) Checking the physical balances of a number of items every day systematically and by rotation.
- (e) Explaining promptly the causes of discrepancies, if any, between physical balances and the book figures.
- (f) Making corrective entries wherever required after step (e) and
- (g) Removing the causes of the discrepancies referred to in step (e)

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

- (1) Physical stocks can be counted and book balances adjusted as and when desired without waiting for the entire stock-taking to be done.
- (2) Quick compilation of Profit and Loss Account (for interim period) due to prompt availability of stock figures.
- (3) Discrepancies are easily located and thus corrective action can be promptly taken to avoid their recurrence.
- (4) A systematic review of the perpetual inventory reveals the existence of surplus, dormant, obsolete and slow-moving materials, so that remedial measures may be taken in time.
- (5) Fixation of the various stock levels and checking of actual balances in hand with these levels assist the store keeper in maintaining stocks within limits and in initiating purchase requisitions for correct quantity at the appropriate time.

(iv) Continuous Stock Verification: The checking of physical inventory is an essential feature of every sound system of material control. The system of continuous stock-taking consists of **physical verification of items of inventory**. The stock verification may be done by internal audit department but are independent of the store and production staff. Stock verification is done at appropriate interval of time without prior notice. The element of surprise is essential for effective control of the system.

Disadvantages of Annual/ Periodic Stock Taking: Annual stock-taking, however, has certain inherent shortcomings which tend to detract from the usefulness of such physical verification. For instance, since all the items have to be covered in a given number of days, either the production department has to be shut down during those days to enable thorough checking of stock or else the verification must be of limited character.

On the contrary, continuous stock taking is holding more advantages. Some of them are discussed below:

Advantages of continuous stock-taking:

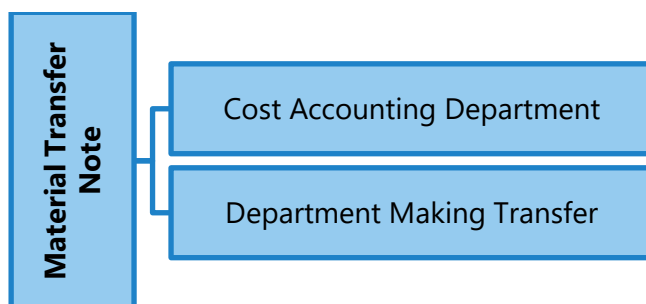
1. Closure of normal functioning is not necessary.
2. Stock discrepancies are likely to be brought to the notice and corrected much earlier than under the annual stock-taking system.
3. The system generally has a sobering influence on the stores staff because of the element of surprise present therein.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

**7. MATERIAL ISSUE PROCEDURE**

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

- (i) Issue against Material Requisition Note:** It is the **voucher of the authority as regards to the issue of materials** for use in the factory or in any of its departments. After receipt of material requisition slip, store keeper ensures that requisition is properly authorized and requisitioned quantity is within the quantity specified in bill of materials. After satisfied with the documents, store keeper issue materials and keeps one copy of the MRN to maintain the necessary records.
- (ii) Transfer of Material:** The **surplus material arising on a job** or other units of production may sometime be unsuitable for transfer to store because of its bulk, heavy weight, brittleness or some other reason. It may, however, be possible to find some alternative use for such materials by transferring them to some other job instead of returning them to the store.

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



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

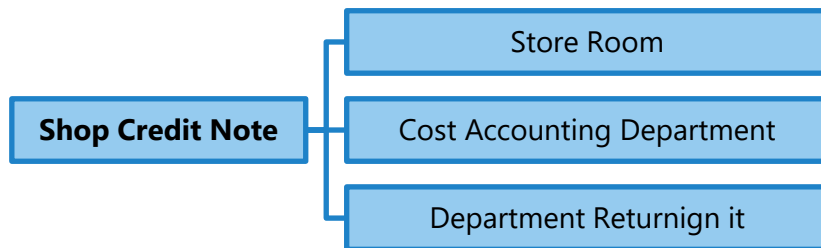
Format of a material requisition note may vary on the basis of industrial peculiarities, management information system (MIS) and accounting system in place.

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

Unless this is done, the surplus material may be misappropriated or misapplied to some purpose, other than that for which it was intended. The

material cost of the job against which the excess material was originally drawn in that case, would be overstated, unless the job is given credit for the surplus arising thereon.

The surplus material, when it is returned to the storeroom, should be accompanied by a document known as a **Shop Credit Note or alternatively as a Stores Debit Note**. This document should be made out; by the department returning the surplus material and it should be in triplicate to be used as follows:



Format of a shop credit note may vary on the basis of industrial peculiarities, management information system (MIS) and accounting system in place.

8. VALUATION OF MATERIAL ISSUES

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

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

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

8.1 Cost Price Methods

- (i) **Specific Price Method:** This method is useful, especially when **materials are purchased for a specific job or work order**, as such materials are **issued** subsequently to that specific job or work order **at the price at which they were purchased**.

To use this method, it is necessary to store each lot of material separately and maintain its separate account.

Advantages and Disadvantages

Advantages	Disadvantages
The cost of materials issued for production purposes to specific jobs represent actual and correct costs.	This method is difficult to operate, specially when purchases and issues are numerous.
This method is best suited for non-standard and specific products.	

- (ii) **First-in First-out (FIFO) Method:** It is a **method of pricing the issues of materials, in the order in which they are purchased**. In other words, the materials are issued in the order in which they arrive in the store or the items longest in stock are issued first. Thus each issue of material only recovers the purchase price which does not reflect the current market price.

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

Advantages and disadvantages

Advantages	Disadvantages
It is simple to understand and easy to operate.	If the prices fluctuate frequently, this method may lead to clerical error.
Material cost charged to production represents actual cost with which the cost of production should have been charged.	Since each issue of material to production is related to a specific purchase price, the costs charged to the same job are likely to show a variation from period to period.
In the case of falling prices, the use of this method gives better results.	In the case of rising prices, the real profits of the concern being low, while the profits in the books will appear high. This may lead to inability of the firm to meet the materials purchase demand at the current market price.
Closing stock of material will be represented very closely at current market price.	

The application of FIFO method is illustrated below:

Material Received and Issued

Lot No.	Date	Quantity Kg.	Lot No.	Rate (₹)	Amount (₹)
1.	July 3	600		1.00	600.00
2.	July 13	800		1.20	960.00
3.	July 23	600		0.90	540.00
4.	August 5	400		1.10	440.00
5.	August 6	1200		0.80	960.00
	July 8		400 Kgs. out of (1)	1.00	400.00

	July 12		200 Kgs. out of (1)	1.00	200.00
	July 22		600 Kgs. out of (2)	1.20	720.00
	July 25		200 Kgs. out of (2)	1.20	240.00
			200 Kgs. out of (3)	0.90	180.00
	August 8		400 Kgs. out of (3)	0.90	360.00
			400 Kgs. out of (4)	1.10	440.00
			200 Kgs. out of (5)	0.80	160.00

The stock in hand after 8th August will be 1,000 kgs. This will be out of lot number (5) and its value will be ₹ 800, i.e., @ ₹ 0.80 per kg.

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

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

Advantages and Disadvantages

Advantages	Disadvantages
The cost of materials issued will be either nearer to and or will reflect the current market price. Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.	Calculation under LIFO system becomes complicated and cumbersome when frequent purchases are made at highly fluctuating rates.

The use of the method during the period of rising prices does not reflect undue high profit in the income statement as it was under the first-in-first-out or average method. In fact, the profit shown here is relatively lower because the cost of production takes into account the rising trend of material prices.	Costs of different similar batches of production carried on at the same time may differ a great deal.
In the case of falling prices profit tends to rise due to lower material cost, yet the finished products appear to be more competitive and are at market price.	In time of falling prices, there will be need for writing off stock value considerably to stick to the principle of stock valuation, i.e., the cost or the market price whichever is lower.
Over a period, the use of LIFO helps to iron out the fluctuations in profits.	This method of valuation of material is not acceptable to the income tax authorities.
In the period of inflation LIFO will tend to show the correct profit and thus avoid paying undue taxes to some extent.	

It may be noted that Last in First out (LIFO) is not permitted under Accounting Standard (AS)-2: Valuation of Inventories and Ind AS- 2: Inventories. However, for the purpose of academic knowledge LIFO method is included in this Study Material

ILLUSTRATION 12

The following transactions in respect of material Y occurred during the six months ended 30th September, 2022:

Month	Purchase (units)	Price per unit (₹)	Issued Units
April	200	25	Nil
May	300	24	250
June	425	26	300
July	475	23	550
August	500	25	800
September	600	20	400

Required:

- The Chief Accountant argues that the value of closing stock remains the same no matter which method of pricing of material issues is used. Do you agree? Why or why not? EXPLAIN. Detailed stores ledgers are not required.
- STATE when and why would you recommend the LIFO method of pricing material issues?

SOLUTION

- Total number of units purchased = 2,500

Total number of units issued = 2,300

The closing stock at the end of six months' period i.e., on 30th September, 2022 will be 200 units

Upto the end of August 2022, total purchases coincide with the total issues i.e., 1,900 units. It means that at the end of August 2022, there was no closing stock. In the month of September 2022, 600 units were purchased out of which 400 units were issued. Since there was only one purchase and one issue in the month of September, 2022 and there was no opening stock on 1st September 2022, the Closing Stock of 200 units is to be valued at ₹ 20 per unit.

In the view of this, the argument of the Chief Accountant appears to be correct. Where there is only one purchase and one issue in a month with no opening stock, the method of pricing of material issues becomes irrelevant. Therefore, in the given case one should agree with the argument of the

Chief Accountant that the value of closing stock remains the same no matter which method of pricing the issue is used.

It may, however, be noted that the argument of Chief Accountant would not stand if one finds the value of the Closing Stock at the end of each month.

- (b)** LIFO method has an edge over FIFO or any other method of pricing material issues due to the following advantages:
- (i) The cost of the materials issued will be either nearer or will reflect the current market price. Thus, the cost of goods produced will be related to the trend of the market price of materials. Such a trend in price of materials enables the matching of cost of production with current sales revenues.
 - (ii) The use of the method during the period of rising prices does not reflect undue high profit in the income statement, as it was under the first-in-first-out or average method. In fact, the profit shown here is relatively lower because the cost of production takes into account the rising trend of material prices.
 - (iii) In the case of falling prices, profit tends to rise due to lower material cost, yet the finished products appear to be more competitive and are at market price.
 - (iv) During the period of inflation, LIFO will tend to show the correct profit and thus, avoid paying undue taxes to some extent.

ILLUSTRATION 13

The following information is provided by Sunrise Industries for the fortnight of April, 2023:

Material Exe:

Stock on 1-4-2023 100 units at ₹ 5 per unit.

Purchases

5-4-2023, 300 units at ₹ 6

8-4-2023, 500 units at ₹ 7

12-4-2023, 600 units at ₹ 8

Issues

6-4-2023, 250 units

10-4-2023, 400 units

14-4-2023, 500 units

Required:

(A) *CALCULATE using FIFO and LIFO methods of pricing issues:*

(a) *the value of materials consumed during the period*

(b) *the value of stock of materials on 15-4-2023.*

(B) *EXPLAIN why the figures in (a) and (b) in part A of this question are different under the two methods of pricing of material issues used. You need not draw up the Stores Ledgers.*

SOLUTION

(A) (a) Value of Material Exe consumed during the period
1-4-2023 to 15-4-2023 by using FIFO method.

Date	Description Units	Qty. (Units)	Rate (₹)	Amount (₹)
1-4-2023	Opening balance	100	5	500
5-4-2023	Purchased	300	6	1,800
6-4-2023	Issued	100	5	} 1,400
		150	6	
8-4-2023	Purchased	500	7	3,500
10-4-2023	Issued	150	6	} 2,650
		250	7	
12-4-2023	Purchased	600	8	4,800
14-4-2023	Issued	250	7	} 3,750
		250	8	
15-4-2023	Balance	350	8	2,800

Total value of material Exe consumed during the period under FIFO method comes to (₹ 1,400 + ₹ 2,650 + ₹ 3,750) ₹ 7,800 and balance on 15-4-2023 is of ₹ 2,800.

Value of material Exe consumed during the period 01-4-2023 to 15-4-2023 by using LIFO method

Date	Description	Qty. (Units)	Rate (₹)	Amount (₹)
1-4-2023	Opening balance	100	5	500
5-4-2023	Purchased	300	6	1,800
6-4-2023	Issued	250	6	1,500
8-4-2023	Purchased	500	7	3,500
10-4-2023	Issued	400	7	2,800
12-4-2023	Purchased	600	8	4,800
14-4-2023	Issued	500	8	4,000
15-4-2023	Balance	350	—	2,300*

Total value of material Exe issued under LIFO method comes to (₹ 1,500 + ₹ 2,800 + ₹ 4,000) ₹ 8,300.

*The balance 350 units on 15-4-2023 of ₹ 2,300, relates to opening balance on 1-4-2023 and purchases made on 5-4-2023, 8-4-2023 and 12-4-2023. (100 units @ ₹ 5, 50 units @ ₹ 6, 100 units @ ₹ 7 and 100 units @ ₹ 8).

(b) As shown in (a) above, the value of stock of materials on 15-4-2023:

Under FIFO method ₹ 2,800

Under LIFO method ₹ 2,300

(B) Total value of material Exe issued to production under FIFO and LIFO methods comes to ₹ 7,800 and ₹ 8,300 respectively. The value of closing stock of material Exe on 15-4-2023 under FIFO and LIFO methods comes to ₹ 2,800 and ₹ 2,300 respectively.

The reasons for the difference of ₹ 500 (₹ 8,300 – ₹ 7,800) as shown by the following table in the value of material Exe, issued to production under FIFO and LIFO is as follows:

Date	Quantity Issued	Value	Total	Value	Total
		FIFO		LIFO	
	(Units)	(₹)	(₹)	(₹)	(₹)
6-4-2023	250	1,400		1,500	
10-4-2023	400	2,650		2,800	
14-4-2023	500	3,750	7,800	4,000	8,300

- On 6-4-2023, 250 units were issued to production. Under FIFO their value comes to ₹ 1,400 (100 units × ₹ 5 + 150 units × ₹ 6) and under LIFO ₹ 1,500 (250 × ₹ 6). Hence, ₹ 100 more was charged to production under LIFO.
- On 10-4-2023, 400 units were issued to production. Under FIFO their value comes to ₹ 2,650 (150 × ₹ 6 + 250 × ₹ 7) and under LIFO ₹ 2,800 (400 × ₹ 7). Hence, ₹ 150 more was charged to production under LIFO.
- On 14-4-2023, 500 units were issued to production. Under FIFO their value comes to ₹ 3,750 (250 × ₹ 7 + 250 × ₹ 8) and under LIFO ₹ 4,000 (500 × ₹ 8). Hence, ₹ 250 more was charged to production under LIFO.

Thus, the total excess amount charged to production under LIFO comes to ₹ 500.

The reasons for the difference of ₹ 500 (₹ 2,800 – ₹ 2,300) in the value of 350 units of Closing Stock of material Exe under FIFO and LIFO are as follows:

- In the case of FIFO, all the 350 units of the closing stock belongs to the purchase of material made on 12-4-2023, whereas under LIFO these units were from opening balance and purchases made on 5-4-2023, 8-4-2023 and 12-4-2023.
- Due to different purchase price paid by the concern on different days of purchase, the value of closing stock differed under FIFO and LIFO. Under FIFO 350 units of closing stock were valued @ ₹ 8 p.u. Whereas under LIFO first 100 units were valued @ ₹ 5 p.u., next 50 units @ ₹ 6 p.u., next 100 units @ ₹ 7 p.u. and last 100 units @ ₹ 8 p.u.

Thus, under FIFO, the value of closing stock increased by ₹ 500.

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

This method of valuing inventory is different from other methods of valuing issues, as the base stock of materials are valued at the original cost, whereas, materials other than the base are valued using other methods like FIFO, LIFO etc. This method is not an independent method as it uses FIFO or LIFO.

Advantages and disadvantages of this method depend upon the use of the other method viz., FIFO or LIFO.

8.2 Average Price Methods

- (i) **Simple Average Price Method:** Under this method, materials issued are valued at average price, which is calculated by dividing the total of rates at which different lot of materials are purchased by total number of lots. In this method quantity purchased in each lot is ignored. However, the price of stock of that lot which is completely sold out is not considered for taking average price.

Example - 1: During the month of April, a company has made five purchases as follows:

1st April, 200 units @ ₹10 each;

5th April, 150 units @ ₹12 each;

14th April, 210 units @ ₹12 each;

21st April, 50 units @ ₹15 each and

28th April, 140 units @ ₹ 11 each.

The issue price under Simple Average Price Method would be calculated as below:

$$\frac{₹10 + ₹12 + ₹12 + ₹15 + ₹11}{5 \text{ lots}} = ₹ 12 \text{ each}$$

This method is suitable when the materials are received in uniform lots of similar quantity, and prices do not fluctuate considerably.

Advantages and Disadvantages:

Advantages	Disadvantages
This method is simple to use for an entity which orders materials in a lot of standard quantity, as only price per lot is taken to calculate average price	This method does not provide right stock valuation when standard quantity for purchase in a lot is not specified.
In a stable price environment, this method gives a price which approximates to the current market price.	When price of materials fluctuates and the entity chooses to customise the order quantity, the price under this method may differ substantially from the current market price.

- (ii) **Weighted Average Price Method:** Unlike Simple Average Price method, this method gives due weightage to quantities also. Under this method, issue price is calculated by dividing sum of products of price and quantity by total number quantities.

Example - 2: During the month of April, a company has made five purchases as follows:

1st April, 200 units @ ₹10 each;

5th April, 150 units @ ₹12 each;

14th April, 210 units @ ₹12 each;

21st April, 50 units @ ₹15 each and

28th April, 140 units @ ₹ 11 each.

The issue price under Weightage Average Price Method would be calculated as below:

$$\begin{aligned}
 & \{(\text{₹ } 10 \times 200 \text{ units}) + (\text{₹ } 12 \times 150 \text{ units}) + (\text{₹ } 12 \times 210 \text{ units}) \\
 & + (\text{₹ } 15 \times 50 \text{ units}) + (\text{₹ } 11 \times 140 \text{ units})\} \\
 = & \frac{\quad}{(200 + 150 + 210 + 50 + 140) \text{ units}} \\
 = & \frac{\text{₹ } 8,610}{750 \text{ units}} = \text{₹ } 11.48 \text{ each}
 \end{aligned}$$

This method is useful in case when quantity purchased under each lot is different and price fluctuates frequently.

Advantages and Disadvantages:

Advantages	Disadvantages
It smoothenes the price fluctuations, if at all it is there, due to material purchases.	Material cost does not represent actual cost price and therefore, a different profit or loss will arise out of such a pricing method.
Issue prices need not be calculated for each issue unless new lot of materials is received.	It may be difficult to compute, since every time lot is received, it would require re-computation of issue prices.

8.3 Market Price Methods

- (i) **Replacement Price Method:** Replacement price is defined as **the price at which it is possible to purchase an item, identical to that which is being replaced or revalued**. Under this method, materials issued are valued at the replacement cost of the items. This method pre-supposes the determination of the replacement cost of materials at the time of each issue; viz., the cost at which identical materials could be currently purchased. The **product cost under this method is at current market price**, which is the main objective of the replacement price method.

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

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

8.4 Notional Price Methods

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

- (i) Current prices,
- (ii) Anticipated market trends, and
- (iii) Discount available and transport charges etc.

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

Advantages	Disadvantages
The use of the standard price method simplifies the task of valuing issues of materials.	The use of standard price does not reflect the market price and thus results in a different or incorrect profit or loss.
It facilitates the control of material cost and the task of judging the efficiency of purchase department.	The fixation of standard price becomes difficult when prices fluctuate frequently
It reduces the clerical work.	

- (ii) **Inflated Price Method:** In case material suffers loss in weight due to natural or climatic factors, *e.g.*, evaporation, the issue price of the material is inflated to cover up the losses.
- (iii) **Re-use Price Method:** When materials are rejected and returned to the stores or a processed material is put to some other use, other than for the purpose it is meant, then such materials are priced at a rate quite different from the price paid for them originally. There is no final procedure for valuing use of material.



9. VALUATION OF RETURNS & SHORTAGES

9.1 Valuation of Materials Returned to the Vendor

Generally, materials are checked for quality, before dispatching to the store; and if any issues arise such as not meeting the quality requirements or any specification or are considered unfit for production due to any reason, due notice is made and materials are returned to the vendor. However, even if any substandard quality is noticed, before or after reaching the store, such materials can also be returned to the vendor.

The price of the materials to be returned to the vendor should include its invoice price plus freight, receiving and handling charges etc. *Strictly speaking, the materials returned to the vendor should be returned at the stores ledger price and not at invoice price.* But in practice, only invoice price is considered and the gap between the invoice price and stores ledger price is charged as overhead. In stores ledger, the defective or sub-standard materials are shown in the issue column at the rate shown in the ledger, and the difference between issue price and invoice cost is debited to an inventory adjustment account.

9.2 Valuation of Materials Returned to Stores

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

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

9.3 Valuation of Shortages during Physical Verification

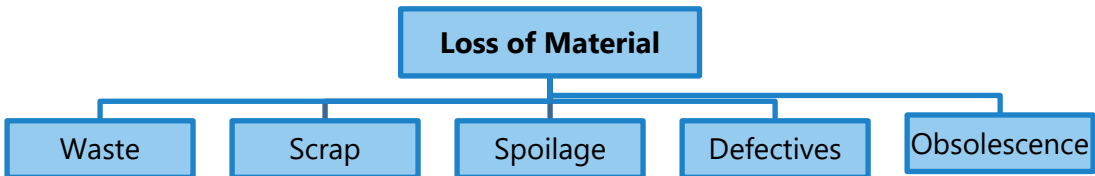
Materials found short during physical verification should be entered in the issue column and valued at the rate as per the method adopted, i.e., FIFO or any other.

[Kindly refer Illustration 14 at Page no. 2.68]



10. TREATMENT OF NORMAL AND ABNORMAL LOSS OF MATERIALS

Loss of materials during handling, storage, process may occur any of the following forms:



- (i) **Waste:** The portion of raw material which is lost during storage or production and discarded. The waste may or may not have any value.

Treatment of Waste

Normal- Cost of normal waste is absorbed by good production units.

Abnormal- The cost of abnormal loss is transferred to Costing Profit and loss account.

- (ii) **Scrap:** The materials that result from production which are discarded and disposed-off without further treatment. Generally, scrap has either no value or insignificant value. Sometimes, it may be reintroduced into the process as raw material.

Treatment of Scrap

Normal- The cost of scrap is borne by good units and income arises on account of realisable value is deducted from the cost.

Abnormal- The scrap account should be charged with full cost. The credit is given to the job or process concerned. The profit or loss in the scrap account, on realisation, will be transferred to the Costing Profit and Loss Account.

- (iii) **Spoilage:** It is the term used for materials which are badly damaged in manufacturing operations, that do not meet the specification required by the customers and they cannot be rectified economically and hence taken out of the process to be disposed off in some manner without further processing.

Treatment of Spoilage

Normal- Normal spoilage (i.e., which is inherent in the operation) costs are included in costs, either by charging the loss due to spoilage to the production order or by charging it to the production overhead so that it is spread over all the products.

Any value realised from spoilage is credited to production order or production overhead account, as the case may be.

Abnormal- The cost of abnormal spoilage (i.e., arising out of causes not inherent in manufacturing process) is charged to the Costing Profit and Loss Account. When spoiled work is the result of rigid specification, the cost of spoiled work is absorbed by good production while the cost of disposal is charged to production overhead.

- (iv) **Defectives:** It signifies those units or portions of production which do not meet the quality standards. Defectives arise due to sub-standard materials, bad-supervision, bad-planning, poor workmanship, inadequate-equipment and careless inspection.

The defectives which can be re-made as per the quality standard by using additional materials are known as reworks. Reworks include repairs, reconditioning and refurbishing.

Defectives which cannot be brought up to the quality standards are known as rejects. The rejects may either be disposed-off or re-cycled for production process.

Treatment of Defectives:

Normal- An amount equal to the cost less realisable value on sale of defectives are charged to material cost of good production.

Abnormal- Material cost of abnormal defectives are not included in material cost but treated as loss after giving credit to the realisable value of such defectives. The material cost of abnormal loss is transferred to costing profit and loss account.

Reclamation of loss from defective units

In the case of articles that have been spoiled, it is necessary to take steps to reclaim as much of the loss as possible. For this purpose:

- (i) All defective units should be sent to a place fixed for the purpose;
- (ii) These should be dismantled;
- (iii) Goods and serviceable parts should be separated and taken back into the stock;
- (iv) Parts which can be made serviceable by further work should be separated and sent to the workshop for the purpose and taken into stock after the defects have been removed; and
- (v) Parts which cannot be made serviceable should be collected in one place for being melted or sold off.

Printed forms should be used to record quantities for all purposes aforementioned.

Difference between Waste and Scrap

Waste	Scrap
1. It is connected with raw material or inputs to the production process.	1. It is the loss connected with the output
2. Waste of materials may be visible or invisible.	2. Scraps are generally identifiable and has physical substance.
3. Generally, waste has no recoverable value.	3. Scraps are termed as by-products and has small recoverable value.

Difference between Scrap and Defectives

Scrap	Defectives
1. It is the loss connected with the output	1. This type of loss is connected with the output as well as the input.
2. Scraps are not intended but cannot be eliminated due to the nature of material or process itself.	2. Defectives also are not intended but can be eliminated through a proper control system.
3. Generally, scraps are not used or rectified.	3. Defectives can be used after rectification.
4. Scraps have insignificant recoverable value.	4. Defectives are sold at a lower value from that of the good one.

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

The problem of accounting for defective work is in relation to the costs of rectification or rework.

- (v) **Obsolescence:** Obsolescence is defined as "the loss in the intrinsic value of an asset due to its supersession". In simple words, obsolescence refers to the loss in the value of an asset due to technological advancements.

Treatment: Materials may become obsolete under any of the following circumstances:

- (i) where it is a spare part or a component of a machinery that is used in manufacturing and is now obsolete;
- (ii) where it is used in the manufacturing of a product which has now become obsolete;
- (iii) where the material itself is replaced by another material due to either improved quality or fall in price.

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

ILLUSTRATION 14

Imbrios India Ltd. is recently incorporated start-up company back in the year 2019. It is engaged in creating Embedded products and Internet of Things (IoT) solutions for the Industrial market. It is focused on innovation, design, research and development of products and services. One of its embedded products is LogMax, a system on module (SoM) Carrier board for industrial use. It is a small, flexible and embedded computer designed as per industry specifications. In the beginning of the month of September 2022, company entered into a job agreement of providing 4800 LogMax to NIT, Mandi. Following details w.r.t. issues, receipts, returns of Store Department handling Micro-controller, a component used in the designated assembling process have been extracted for the month of September, 2022:

Sep. 1	Opening stock of 6,000 units @ ₹ 285 per unit
Sep. 8	Issued 4875 units to mechanical division vide material requisition no. Mech 009/22
Sep. 9	Received 17,500 units @ ₹ 276 per unit vide purchase order no. 159/22
Sep. 10	Issued 12,000 units to technical division vide material requisition no. Tech 012/22
Sep. 12	Returned to stores 2375 units by technical division against material requisition no. Tech 012/22.
Sep. 15	Received 9,000 units @ ₹ 288 per units vide purchase order no. 160/2222
Sep. 17	Returned to supplier 700 units out of quantity received vide purchase order no. 160/22.
Sep. 20	Issued 9,500 units to technical division vide material requisition no. Tech 165/22

On 25th September, 2022, the stock manager of the company expressed his need to leave for his hometown due to certain contingency and immediately left the job same day. Later, he also switched his phone off.

As the company has the tendency of stock-taking every end of the month to check and report for the loss due to rusting of the components, the new stock manager, on 30th September, 2022, found that 900 units of Micro-controllers were missing which was apparently misappropriated by the former stock manager. He, further, reported loss of 300 units due to rusting of the components.

From the above information you are required to prepare the Stock Ledger account using 'Weighted Average' method of valuing the issues.

SOLUTION

Store Ledger of Imbrios India Ltd. (Weighted Average Method)

Date	Receipts			Issues			Balance of Stock		
Sep.	Qty (kg.)	Rate (₹)	Amount (₹)	Qty (kg.)	Rate (₹)	Amount (₹)	Qty (kg.)	Rate (₹)	Amount (₹)
1	-	-	-	-	-	-	6,000	285.00	17,10,000
8	-	-	-	4,875	285.00	13,89,375	1,125	285.00	3,20,625
9	17,500	276.00	48,30,000	-	-	-	18,625	276.54	51,50,625
10	-	-	-	12,000	276.54	33,18,480	6,625	276.54	18,32,145
12	2,375	276.54	6,56,783	-	-	-	9,000	276.54	24,88,928
15	9,000	288.00	25,92,000	-	-	-	18,000	282.27	50,80,928
17	-	-	-	700	288.00	2,01,600	17,300	282.04	48,79,328
20	-	-	-	9,500	282.04	26,79,380	7,800	282.04	21,99,948
30	-	-	-	900*	282.04	2,53,836	6,900	282.04	19,46,112
30	-	-	-	300**	-	-	6,600	294.87	19,46,112

* 900 units is abnormal loss, hence it will be transferred to Costing Profit & Loss A/c.

** 300 units is normal loss; hence it will be absorbed by good units.



11. CONSUMPTION OF MATERIALS

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

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

11.1 Identification of Materials

For the identification of consumption of materials with products of cost centres the following points should be noted:

1. It is required that the concern should follow **coding system** for all materials, so that each material is identified by unique code number.
2. It is required that **each product of a cost centre should be given a unique code number** so that the direct material issued for production of particular product of a cost centre can be collected against the code number of that product.

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

$$\text{Overhead absorption rate of cost centre} = \frac{\text{Cost for cost centre}}{\text{Base relating to cost centre}} \\ (\text{e.g. labour hrs. or machine hrs.})$$

3. Each issue of materials should be recorded. One way of doing this is to use a material requisition note. This note shows the details of materials issued for the product of cost centre or the cost centre which is to be charged with cost of materials.
4. A material return note is required for recording the excess materials returned to the store. This note is required to ensure that original product of cost centre is credited with the cost of material which was not used and that the stock records are updated.
5. A material transfer note is required for recording the transfer of materials from one product of cost centre to other or from one cost centre to other cost centre.
6. The cost of materials issued would be determined according to stock valuation method used.

11.2 Monitoring Consumption of Materials

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

Format of Material Abstract

Week Ending.....

Material requisition or Transfer Note or Returned Note No.	Amount (₹)	Product Nos.						Total for Product	Overheads (Indirect Material charged)
		101	102	103	104	105	106		
		(₹)	(₹)	(₹)	(₹)	(₹)	(₹)		(₹)
	—	—	—	—	—	—	—	—	—
Total									

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

11.3 Basis for Consumption Entries in Financial Accounts

Every manufacturing organisation assigns material costs to the products for two purposes.

Firstly, for external financial accounting requirements, in order to allocate the material costs incurred during the period between cost of goods produced and inventories; **secondly to provide useful information for managerial decision-making** requirements. In order to meet external financial accounting requirements, it may not be necessary to accurately trace material costs to individual products.

Some products costs may be overstated and others may be understated. But this may not matter for financial accounting purposes, as long as total of individual materials costs transactions are recorded i.e., transactions between cost centre within the firm are recorded in a manner that facilitates analysis of costs for assigning them to cost units.

The consumption entries in financial accounts are made on the basis of total cost of purchases of materials after adjustment for opening and closing stock of materials.

Following equation is applicable here:

$$\text{Consumption of Materials} = \text{Opening Stock of materials} + \text{Purchases} - \text{Closing Stock of materials}$$

The stock of materials is taken at cost or net realisable value, whichever is less.

SUMMARY

- ◆ **Material Control:** It is the systematic control over the procurement, storage and usage of materials to maintain even flow of materials and avoiding at the same time excessive investment in inventories.
- ◆ **Material Requisition Note:** Document used to authorize and record the issue of materials from store.
- ◆ **Purchase Requisition Note:** Document is prepared by the storekeeper to initiate the process of purchases.
- ◆ **Purchase Order:** It is a written request to the supplier to supply certain specified materials at specified rates and within a specified period.
- ◆ **Goods Received Note:** This document is prepared by receiving department which unpacks the goods received and verify the quantities and other details.
- ◆ **Material Transfer Note:** This document is prepared when the material is transferred from one department to another.
- ◆ **Material Return Note:** It is a document given with the goods being returned from factory back to the stores.
- ◆ **Bin Card:** A prime entry record of the quantity of stocks, kept on in/out/balance, held in designated storage areas.
- ◆ **Stores Ledger:** A ledger containing a separate account for each item of material and component stocked in store giving details of the receipts, issues and balance both in terms of quantity and value.
- ◆ **Minimum Level:** It is the minimum quantity, which must be retained in stock
$$\text{ROL} - (\text{Avg. consumption} \times \text{Avg. Lead time})$$
- ◆ **Maximum Level:** It is the maximum limit up to which stock can be stored at any time
$$\text{ROL} + \text{ROQ} - (\text{Min consumption} \times \text{Min Lead Time})$$

- ♦ **Re order Level:** It is the level at which new order needs to be placed

$$\text{Maximum lead time} \times \text{Maximum Usage}$$

Or

$$\text{Minimum level} + (\text{Average rate of consumption} \times \text{Average time to obtain fresh supplies}).$$
- ♦ **Average Inventory Level** = Minimum level + 1/2 Re-order quantity

Or

$$= \frac{\text{Maximum level} + \text{Minimum level}}{2}$$
- ♦ **Danger Level:** The level where normal issue of materials is stopped, and only emergency materials are issued.

$$\text{Danger level} = \text{Average consumption} \times \text{Lead time for emergency purchases}.$$
- ♦ **Stock-out** = Stock out is said to be occurred when an inventory item could not be supplied due to insufficient stock in the store.
- ♦ **Just-in-time (JIT) Inventory management:** JIT is a system of inventory management with an approach to have zero inventories in stores. According to this approach material should only be purchased when it is actually required for production.
- ♦ **ABC analysis:** Items are classified into the following categories:
 - A Category:** Quantity less than 10 % but value more than 70 %
 - B Category:** Quantity less than 20 % but value about 20 %
 - C Category:** Quantity about 70 % but value less than 10%
- ♦ **Fast Moving, Slow Moving and Non-Moving (FSN) Inventory:** Under this system, inventories are controlled by classifying them on the basis of frequency of usage.
- ♦ **Vital, Essential and Desirable (VED):** Under this system of inventory analysis, inventories are classified on the basis of its criticality for the production function and final product.

- ◆ **High Cost, Medium Cost, Low Cost (HML) Inventory:** Under this system, inventory is classified on the basis of the cost of an individual item, unlike ABC analysis where inventories are classified on the basis of overall value of inventory.
- ◆ **Two bin system:** If one bin items exhausts, new order is placed and in the mean time, quantity from the smaller bin is used or issued.
- ◆ **First-in First-out method:** The materials received first are to be issued first when material requisition is received. Materials left as closing stock will be at the price of the latest purchases.
- ◆ **Last-in First-out method:** The materials purchased last are to be issued first when material requisition is received. Closing stock is valued at the oldest available stock price.
- ◆ **Simple Average Method:** Material Issue Price
$$= \frac{\text{Total of unit price of each purchase}}{\text{Total number of Purchases}}$$
- ◆ **Weighted Average Price Method:** This method gives due weightage to quantities purchased and the purchase price to determine the issue price.
$$\text{Weighted Average Price} = \frac{\text{Total cost of material in stock}}{\text{Total quantity of materials}}$$
- ◆ **Various Material Losses**
 - (a) Wastage: Portion of basic raw material lost in processing, having no recoverable value
 - (b) Scrap: The incidental material residue coming out of certain manufacturing operations, having low recoverable value.
 - (c) Spoilage: Goods damaged beyond rectification, to be sold off without further processing.
- ◆ **Defectives:** Goods which can be rectified and turned out as good units by the application of additional labour or other services.

TEST YOUR KNOWLEDGE

Multiple Choice Questions (MCQs)

1. *Direct material can be classified as*
 - (a) *Fixed cost*
 - (b) *Variable cost*
 - (c) *Semi-variable cost.*
 - (d) *Prime Cost*
2. *In most of the industries, the most important element of cost is*
 - (a) *Material*
 - (b) *Labour*
 - (c) *Overheads*
 - (d) *Administration Cost*
3. *Which of the following is considered to be the normal loss of materials?*
 - (a) *Loss due to accidents*
 - (b) *Pilferage*
 - (c) *Loss due to breaking the bulk*
 - (d) *Loss due to careless handling of materials.*
4. *In which of following methods of pricing, costs lag behind the current economic values?*
 - (a) *Last-in-first out price*
 - (b) *First-in-first out price*
 - (c) *Replacement price*
 - (d) *Weighted average price*

5. *Continuous stock taking is a part of*
- (a) *Annual stock taking*
 - (b) *Perpetual inventory*
 - (c) *ABC analysis.*
 - (d) *Bin Cards*
6. *In which of the following methods, issues of materials are priced at pre-determined rate?*
- (a) *Inflated price method*
 - (b) *Standard price method*
 - (c) *Replacement price method*
 - (d) *Market price method.*
7. *When material prices fluctuate widely, the method of pricing that gives absurd results is*
- (a) *Simple average price*
 - (b) *Weighted average price*
 - (c) *Moving average price*
 - (d) *Inflated price.*
8. *When prices fluctuate widely, the method that will smooth out the effect of fluctuations is*
- (a) *Simple average*
 - (b) *Weighted average*
 - (c) *FIFO*
 - (d) *LIFO*

9. Under the FSN system of inventory control, inventory is classified on the basis of:
- (a) Volume of material consumption
 - (d) Frequency of usage of items of inventory
 - (c) Criticality of the item of inventory for production
 - (d) Value of items of inventory
10. Form used for making a formal request to the purchasing department to purchase materials is a - :
- (a) Material Transfer Note
 - (b) Purchase Requisition Note
 - (c) Bill of Materials
 - (d) Material Requisition Note

Theoretical Questions

1. STATE how normal and abnormal loss of material arising during storage are treated in Cost Accounts?
2. DISTINGUISH clearly between Bin cards and Stores Ledger.
3. DISCUSS the accounting treatment of defectives in Cost Accounts.
4. EXPLAIN the concept of "ABC Analysis" as a technique of inventory control.
5. DISTINGUISH between Re-order level and Re-order quantity.
6. EXPLAIN how is slow moving and non-moving item of stores detected and what steps are necessary to reduce such stocks?
7. WRITE short notes on any three of the following:
 - (i) Danger Level
 - (ii) Just in Time Inventory Management
 - (iii) Maximum stock level and Minimum Stock level
 - (iv) Obsolescence

Practical Problems

1. Anil & Company buys its annual requirement of 36,000 units in 6 instalments. Each unit costs ₹ 1 and the ordering cost is ₹25. The inventory carrying cost is estimated at 20% of unit value. FIND the total annual cost of the existing inventory policy. CALCULATE, how much money can be saved by Economic Order Quantity?
2. A Company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2022-23:
 - (i) Annual demand of Alpha 8,000 units
 - (ii) Cost of placing an order ₹ 200 per order
 - (iii) Cost per unit of Alpha ₹ 400
 - (iv) Carrying cost p.a. 20%

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

Required:

- (i) COMPUTE the economic order quantity
 - (ii) STATE whether the quantity discount offer can be accepted.
3. The complete Gardener is deciding on the economic order quantity for two brands of lawn fertilizer - Super Grow and Nature's Own. The following information is collected:

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

Required:

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

- (ii) For the EOQ, WHAT is the sum of the total annual relevant ordering costs and total annual relevant carrying costs for Super Grow and Nature's own?
- (iii) For the EOQ, COMPUTE the number of deliveries per year for Super Grow and Nature's own.
4. A Company uses three raw materials A, B and C for a particular product for which the following data apply:

Raw Material	Usage per unit of Product (Kgs.)	Re-order quantity (Kgs.)	Price per Kg.	Delivery period (in weeks)			Re-order level (Kgs)	Minimum level (Kgs.)
				Minimum	Average	Maximum		
A	10	10,000	10	1	2	3	8,000	?
B	4	5,000	30	3	4	5	4,750	?
C	6	10,000	15	2	3	4	?	2,000

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

- (i) Minimum stock of A,
- (ii) Maximum stock of B,
- (iii) Re-order level of C,
- (iv) Average stock level of A.
5. (a) EXE Limited has received an offer of quantity discounts on its order of materials as under:

Price per ton (₹)	Ton (Nos.)
1,200	Less than 500
1,180	500 and less than 1,000
1,160	1,000 and less than 2,000
1,140	2,000 and less than 3,000
1,120	3,000 and above.

The annual requirement for the material is 5,000 tons. The ordering cost per order is ₹ 1,200 and the stock holding cost is estimated at 20% of material cost per annum. You are required to COMPUTE the most economical purchase level.

(b) WHAT will be your answer to the above question if there are no discounts offered and the price per ton is ₹ 1,500?

6. *From the details given below, CALCULATE:*

(i) Re-ordering level

(ii) Maximum level

(iii) Minimum level

(iv) Danger level.

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

Cost of placing a purchase order is ₹ 4,000

Number of units to be purchased during the year is 5,00,000

Purchase price per unit, inclusive of transportation cost is ₹ 50

Annual cost of storage per unit is ₹ 10.

*Details of lead time : Average - 10 days, Maximum - 15 days Minimum- 5 days,
for emergency purchases- 4 days.*

Rate of consumption: Average: 1,500 units per day,

Maximum: 2,000 units per day.

7. *G. Ltd. produces a product which has a monthly demand of 4,000 units. The product requires a component X which is purchased at ₹ 20. For every finished product, one unit of component is required. The ordering cost is ₹ 120 per order and the holding cost is 10% p.a.*

You are required to CALCULATE:

- (i) Economic order quantity.
- (ii) If the minimum lot size to be supplied is 4,000 units, what is the extra cost, the company has to incur?
- (iii) What is the minimum carrying cost, the company has to incur?

8. 'AT' Ltd. furnishes the following store transactions for September, 2022:

1-9-22	Opening balance	25 units value ₹ 162.50
4-9- 22	Issues Req. No. 85	8 units
6-9- 22	Receipts from B & Co. GRN No. 26	50 units @ ₹ 5.75 per unit
7-9- 22	Issues Req. No. 97	12 units
10-9- 22	Return to B & Co.	10 units
12-9- 22	Issues Req. No. 108	15 units
13-9- 22	Issues Req. No. 110	20 units
15-9- 22	Receipts from M & Co. GRN. No. 33	25 units @ ₹ 6.10 per unit
17-9- 22	Issues Req. No. 121	10 units
19-9- 22	Received replacement from B & Co. GRN No. 38	10 units
20-9- 22	Returned from department, material of M & Co. MRR No. 4	5 units
22-9- 22	Transfer from Job 182 to Job 187 in the dept. MTR 6	5 units
26-9- 22	Issues Req. No. 146	10 units
29-9- 22	Transfer from Dept. "A" to Dept. "B" MTR 10	5 units
30-9- 22	Shortage in stock taking	2 units

PREPARE the priced stores ledger on FIFO method and STATE how would you treat the shortage in stock taking.

9. The following information is extracted from the Stores Ledger:

Material X

Opening Stock Nil

Purchases:

Jan. 1 100 @ ₹ 1 per unit

Jan. 20 100 @ ₹ 2 per unit

Issues:

Jan. 22 60 for Job W 16

Jan. 23 60 for Job W 17

Complete the receipts and issues valuation by adopting the First-In-First-Out, Last-In-First-Out and the Weighted Average Method. TABULATE the values allocated to Job W 16, Job W 17 and the closing stock under the methods aforesaid and discuss from different points of view which method you would prefer.

Case Scenarios

- The purchase committee of A Ltd. has been entrusted to review the material procurement policy of the company. The chief marketing manager has appraised the committee that the company at present produces a single product X by using two raw materials A and B in the ratio of 3:2. Material A is perishable in nature and has to be used within 10 days from Goods received note (GRN) date otherwise material becomes obsolete. Material B is durable in nature and can be used even after one year. Material A is purchased from the local market within 1 to 2 days of placing order. Material B, on the other hand, is purchased from neighbouring state and it takes 2 to 4 days to receive the material in the store.

The purchase price of per kilogram of raw material A and B is ₹30 and ₹44 respectively exclusive of taxes. To place an order, the company has to incur an administrative cost of ₹1,200. Carrying cost for Material A and B is 15% and 5% respectively. At present material A is purchased in a lot of 15,000 kg. to avail 10% discount on market price. GST applicable for both the materials is 18% and the input tax credit is availed.

The sales department has provided an estimate that the company could sell 30,000 kg. in January 2024 and also projected the same trend for the entire year.

The ratio of input and output is 5:3. Company works for 25 days in a month and production is carried out evenly.

The following queries/ calculations to be kept ready for purchase committees' reference:

- (i) *For the month of January 2024, what would be the quantity of the materials to be requisitioned for both material A and B:*
 - (a) 9,000 kg & 6,000 kg respectively
 - (b) 18,000 kg & 12,000 kg respectively
 - (c) 27,000 kg & 18,000 kg respectively
 - (d) 30,000 kg & 20,000 kg respectively.
- (ii) *The economic order quantity (EOQ) for both the material A & B:*
 - (a) 13,856 kg & 16,181 kg respectively
 - (b) 16,197 kg & 17,327 kg respectively
 - (c) 16,181 kg & 17,165 kg respectively
 - (d) 13,197 kg & 17,165 kg respectively
- (iii) *What would the maximum stock level for material A:*
 - (a) 18,200 kg.
 - (b) 12,000 kg.
 - (c) 16,000 kg.
 - (d) 16,200 kg.
- (iv) *Calculate saving/ loss in purchase of Material A if the purchase order quantity is equal to EOQ.*
 - (a) Profit of ₹ 3,21,201.
 - (b) Loss of ₹ 3,21,201.
 - (c) Profit of ₹ 2,52,500.
 - (d) Loss of ₹ 2,52,500.

- (v) What would the minimum stock level for material A:
- (a) 1,800 kg.
 - (b) 1,200 kg.
 - (c) 600 kg.
 - (d) 2,400 kg.

ANSWERS

Answers to the MCQs

1.	(b)	2.	(a)	3.	(c)	4.	(b)	5.	(b)	6.	(b)
7.	(a)	8.	(b)	9.	(b)	10.	(b)				

Answers to the Theoretical Questions

- Please refer paragraph 10
- Please refer paragraph 5.2
- Please refer paragraph 10
- Please refer paragraph 6.4
- Please refer paragraph 6.1
- Please refer paragraph 6.4
- Please refer paragraph 6.1, 6.3, 6.1, 10

Answers to the Practical Problems

1. (a) **Total Annual Cost in Existing Inventory Policy**

	(₹)
Ordering cost (6 orders @ ₹ 25)	150
Carrying cost of average inventory $(36,000 \div 6) = 6,000$ units per order	

Average inventory = 3,000 units	
Carrying cost = 20% of ₹ 1 × 3,000 = 3,000 × 0.20	600
Total cost	A 750

(b) **Total Annual Cost in E.O.Q**

$$EOQ = \sqrt{\frac{2 \times 36,000 \times 25}{\text{₹}1 \times 20\%}} = 3000 \text{ units}$$

	(₹)
No. of orders = 36,000 ÷ 3,000 units = 12 orders	
Ordering cost (12 × ₹ 25) =	300
Carrying cost of average inventory (3,000 × 0.20) ÷ 2 =	300
Total Cost	B 600
Savings due to E.O.Q ₹ (750 – 600) (A – B)	150

Note: As the units purchase cost of ₹ 1 does not change in both the computation, the same has not been considered to arrive at total cost of inventory for the purpose of savings.

2. (i) Calculation of Economic Order Quantity

$$EOQ = \sqrt{\frac{2AO}{C}} = \sqrt{\frac{2 \times 8,000 \text{ units} \times \text{₹}200}{\text{₹}400 \times 20 / 100}} = \mathbf{200 \text{ units}}$$

(ii) Evaluation of Profitability of Different Options of Order Quantity

(a) When EOQ is ordered

		(₹)
Purchase Cost	(8,000 units × ₹ 400)	32,00,000
Ordering Cost	[(8,000 units/200 units) × ₹ 200]	8,000
Carrying Cost	(200 units × ₹400 × 1/2 × 20/100)	8,000
Total Cost		32,16,000

(b) When Quantity Discount is accepted

		(₹)
Purchase Cost	(8,000 units × ₹ 384*)	30,72,000
Ordering Cost	[(8,000 units/4000 units) × ₹ 200]	400
Carrying Cost	(4000 units × ₹ 384 × ½ × 20/100)	1,53,600
Total Cost		32,26,000

*Unit Cost ₹400

Less Quantity Discount @ 4% = 16

Purchase Cost = 400 - 16 = ₹384

Advise – The total cost of inventory is lower if EOQ is adopted. Hence, the company is advised not to accept the quantity discount.

3.
$$EOQ = \sqrt{\frac{2AO}{C}}$$

Where,

A = Annual Demand

O = Ordering cost per order

C = Inventory carrying cost per unit per annum

(i) **Calculation of EOQ**

Super Grow	Nature's Own
$EOQ = \sqrt{\frac{2 \times 2,000 \times 1,200}{480}}$ $= \sqrt{10,000} \text{ or } 100 \text{ bags}$	$EOQ = \sqrt{\frac{2 \times 1,280 \times 1,400}{560}}$ $= \sqrt{6,400} \text{ or } 80 \text{ bags}$

- (ii) Total annual relevant cost = Total annual relevant ordering costs +
Total annual relevant carrying cost

	Super Grow	Nature's Own
Number of Orders = Annual Requirement ÷ EOQ	2,000/100 = 20 orders	1,280/80 = 16 orders
Ordering Cost	20 × 1200 = ₹ 24000	16 × 1400 = ₹22,400
Carrying Cost	$\frac{1}{2} \times 100 \times 480 =$ ₹24,000	$\frac{1}{2} \times 80 \times 560 =$ ₹22,400
Total of Ordering and Carrying Cost	= ₹ 24,000 + ₹ 24,000 = ₹ 48,000	₹ 22,400 + ₹ 22,400 = ₹ 44,800

- (iii) Number of deliveries for Super Grow and Nature's own fertilizer per year = $\frac{\text{Annual demand for fertilizer bags}}{\text{EOQ}}$

Super Grow	Nature's Own
$= \frac{2,000 \text{ bags}}{100 \text{ bags}} = 20 \text{ orders}$	$= \frac{1,280 \text{ bags}}{80 \text{ bags}} = 16 \text{ orders.}$

4. (i) **Minimum stock of A**

Re-order level – (Average rate of consumption × Average time required to obtain fresh delivery)

$$= 8,000 - (200 \times 10 \times 2) = \mathbf{4,000 \text{ kgs.}}$$

(ii) **Maximum stock of B**

Re-order level + Re-order quantity – (Minimum consumption × Minimum delivery period)

$$= 4,750 + 5,000 - (175 \times 4 \times 3)$$

$$= 9,750 - 2,100$$

$$= \mathbf{7,650 \text{ kgs.}}$$

(iii) Re-order level of C

$$\begin{aligned} & \text{Maximum delivery period} \times \text{Maximum usage} \\ &= 4 \times 225 \times 6 = 5,400 \text{ kgs.} \end{aligned}$$

OR

Re-order level of C

$$\begin{aligned} &= \text{Minimum level of C} + [\text{Average rate of consumption} \times \text{Average} \\ & \quad \text{time required to obtain fresh delivery}] \\ &= 2,000 + [(200 \times 6) \times 3] \text{ kgs} = \mathbf{5,600 \text{ kgs.}} \end{aligned}$$

(iv) Average stock level of A

$$\begin{aligned} &= \text{Minimum stock level of A} + \frac{1}{2} \text{ Re-order quantity of A} \\ &= 4,000 + \frac{1}{2} \times 10,000 = 4,000 + 5,000 = \mathbf{9,000 \text{ kgs}} \end{aligned}$$

OR

Average Stock level of A

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

(Refer to working note)

$$\frac{4,000 + 16,250}{2} = 10,125 \text{ kgs}$$

Working note:

$$\begin{aligned} \text{Maximum stock of A} &= \text{ROL} + \text{ROQ} - (\text{Minimum consumption} \times \\ & \quad \text{Minimum re-order period}) \\ &= 8,000 + 10,000 - [(175 \times 10) \times 1] = 16,250 \text{ kgs} \end{aligned}$$

5. (a)

Total annual requirement (A)	Order size (Tonne) (q)	No. of orders A/q	Cost of inventory A × Per tonne cost (₹)	Ordering cost A/q × ₹ 1200 (₹)	Carrying cost p.t. p.a 1/2 × q × 20% of cost p.t. (₹)	Total Cost (4+5+6) (₹)
1	2	3	4	5	6	7
5,000	400	12.5 (13)*	60,00,000	15,600	48,000	60,63,600
Ton			(5,000 × ₹ 1200)		(200 × ₹ 240)	
	500	10	59,00,000	12,000	59,000	59,71,000
			(5,000 × ₹ 1180)		(250 × ₹ 236)	
	1,000	5	58,00,000	6,000	1,16,000	59,22,000
			(5,000 × ₹ 1160)		(500 × ₹ 232)	
	2,000	2.5 (3)*	57,00,000	3,600	2,28,000	59,31,600
			(5,000 × ₹ 1140)		(1,000 × ₹ 228)	
	3,000	1.666 (2)*	56,00,000	2,400	3,36,000	
			(5,000 × ₹ 1120)		(1,500 × ₹ 224)	59,38,400

* Since number of orders cannot be in decimals, thus 12.5 orders are taken as 13 orders, 2.5 are taken as 3 order and 1.66 orders are taken as 2 orders.

The above table shows that the total cost of 5,000 units including ordering and carrying cost is minimum (₹ 59,22,000) when the order size is 1,000 units. Hence the most economical purchase level is 1,000 units.

- (b) If there will be no discount offer then the purchase quantity should be equal to EOQ. The EOQ is as follows:

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

where A = annual inventory requirement,

O = ordering cost per order and

C = carrying cost per unit per annum.

$$= \sqrt{\frac{2 \times 5,000 \text{ units} \times ₹1,200}{20\% \times ₹1,500}} = 200 \text{ units}$$

6. Basic Data:

A (Number of units to be purchased annually) = 5,00,000 units

O (Ordering cost per order) = ₹ 4,000

C (Annual cost of storage per unit) = ₹ 10

Purchase price per unit inclusive of transportation cost = ₹ 50

Computations:

(i) **Re-ordering level (ROL)** = Maximum usage per period × Maximum lead time

= 2,000 units per day × 15 days

= **30,000 units**

(ii) **Maximum level** = ROL + ROQ – [Min. rate of consumption × Min. lead time] (*Refer to working notes 1 and 2*)

= 30,000 units + 20,000 units – [1,000 units per day × 5 days]

= **45,000 units**

(iii) **Minimum level** = ROL – Average rate of consumption × Average re-order-period

= 30,000 units – (1,500 units per day × 10 days)

= **15,000 units**

(iv) **Danger level** = Average consumption × Lead time for emergency purchases

= 1,500 units per day × 4 days

= **6,000 units**

Working Notes:

1. Minimum rate of consumption per day

$$\text{Av. rate of consumption} = \frac{\text{Minimum rate of consumption} + \text{Maximum rate of consumption}}{2}$$

$$1,500 \text{ units per day} = \frac{X \text{ units / day} + 2,000 \text{ units per day}}{2} \text{ or } X$$

$$= 1,000 \text{ units per day.}$$

2. Re-order Quantity (ROQ) = $\sqrt{\frac{2 \times 5,00,000 \text{ units} \times ₹4,000}{10}} = 20,000 \text{ units}$

7. (a) (i) Economic order quantity:

A (Annual requirement or Component 'X')

$$= 4,000 \text{ units per month} \times 12 \text{ months}$$

$$= 48,000 \text{ units}$$

C (Purchase cost p.u.) = ₹ 20

O (Ordering cost per order) = ₹ 120

C_i (Holding cost) = 10% per annum

$$\text{E.O.Q.} = \sqrt{\frac{2AO}{C_i}} = \sqrt{\frac{2 \times 48,000 \text{ units} \times ₹120}{10\% \text{ of } ₹20}} = \mathbf{2,400 \text{ units}}$$

(ii) Extra cost incurred by the company:

A. Total cost when order size is equal 4,000 units:

Total cost = Total ordering cost + Total carrying cost

$$= \frac{A}{Q} \times O + \frac{1}{2} Q (C_i)$$

$$= \left(\frac{48,000 \text{ units}}{4,000 \text{ units}} \times ₹120 \right) + \left(\frac{1}{2} \times 4,000 \text{ units} \times 10\% \times ₹20 \right)$$

$$= ₹1,440 + ₹4,000 = ₹5,440$$

B. Total cost when order size is equal EOQ i.e. 2,400 units:

$$\begin{aligned}\text{Total cost} &= \left(\frac{48,000 \text{ units}}{2,400 \text{ units}} \times ₹120 \right) + \left(\frac{1}{2} \times 2,400 \text{ units} \times 10\% \times ₹20 \right) \\ &= ₹2,400 + ₹2,400 = ₹4,800\end{aligned}$$

Extra cost that the company has to incur = (A) – (B)

$$= ₹5,440 - ₹4,800$$

$$= ₹640$$

(iii) Minimum carrying cost: Carrying cost depends upon the size of the order. It will be minimum on the least order size. (In this part of the question the two order sizes are 2,400 units and 4,000 units. Here 2,400 units is the least of the two order sizes. At this order size carrying cost will be minimum.)

The minimum carrying cost in this case can be computed as under:

$$\text{Minimum carrying cost} = \frac{1}{2} \times 2,400 \text{ units} \times 10\% \times ₹20 = ₹2,400.$$

8. Working Notes:

1. The material received as replacement from vendor is treated as fresh supply.
2. In the absence of any information, the price of the material returned from a user department on 20-9-22 has been taken at the price of the latest issue made on 17-9-22. In FIFO method, physical flow of the material is irrelevant, and issue price is based on first in first out.
3. The issue of material on 26-9-22 is made out of the material received from a user department on 20-9-22.
4. The entries for transfer of materials from one job and department to another on 22-9-22 and 29-9-22 respectively, do not affect the store ledger. However, adjustment entries to calculation of cost of respective jobs and departments are made in cost accounts.
5. The material found short as a result of stock taking has been written off at relevant issue price.

Stores Ledger of AT Ltd. for the month of September, 2022 (FIFO Method)

	RECEIPT				ISSUE				BALANCE		
Date	GRN No MRR No.	Qty. Units	Rate (₹)	Amount (₹)	Requisition No	Qty. Units	Rate (₹)	Amount (₹)	Qty. Units	Rate (₹)	Amount (₹)
1	2	3	4	5	6	7	8	9	10	11	12
1-9-22	—	—	—	—	—	—	—	—	25	6.50	162.50
4-9-22	—	—	—	—	85	8	6.50	52	17	6.50	110.50
6-9-22	26	50	5.75	287.50	—	—	—	—	17 50	6.50 5.75	398.00
7-9-22	—	—	—	—	97	12	6.50	78	5 50	6.50 5.75	320.00
10-9-22	—	—	—	—	Return	10	5.75	57.50	40	6.50 5.75	262.50
12-9-22	—	—	—	—	108	5 10	6.50 5.75	90	30	5.75	172.50
13-9-22	—	—	—	—	110	20	5.75	115	10	5.75	57.50
15-9-22	33	25	6.10	152.50	—	—	—	—	10 25	5.75 6.10	210.00

17-9-22	—	—	—	—	121	10	5.75	57.50	25	6.10	152.50
19-9-22	38	10	5.75	57.50	—	—	—	—	25 10	6.10 5.75	210.00
20-9-22	4	5	5.75	28.75	—	—	—	—	5 25 10	5.75 6.10 5.75	238.75
26-9-22	—	—	—	—	146	5 5	5.75 6.10	59.25	20 10	6.10 5.75	179.50
30-9-22	—	—	—	—	Shortage	2	6.10	12.20	18 10	6.10 5.75	167.30

9. From the point of view of cost of material charged to each job, it is minimum under FIFO and maximum under LIFO (Refer to Tables). During the period of rising prices, the use of FIFO give rise to high profits and that of LIFO low profits. In the case of weighted average, there is no significant adverse or favourable effect on the cost of material as well as on profits.

From the point of view of valuation of closing stock, it is apparent from the above statement, that it is maximum under FIFO, moderate under weighted average and minimum under LIFO.

It is clear from the tables that the use of weighted average evens out the fluctuations in the prices. Under this method, the cost of materials issued to the jobs and the cost of material in hands reflects greater uniformity than under FIFO and LIFO. Thus, from different points of view, weighted average method is preferred over LIFO and FIFO.

Statement of receipts and issues by adopting First-in-First-Out Method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan. 1	Purchase	100	1	100	—	—	—	100	1	100
Jan. 20	Purchase	100	2	200	—	—	—	100	1	100
								100	2	200
Jan. 22	Issue to Job W 16	—	—	—	60	1	60	40	1	40
								100	2	200
Jan. 23	Issue to Job W 17	—	—	—	40	1	40	80	2	160
					20	2	40			

Statement of receipts and issues by adopting Last-In-First-Out method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan. 1	Purchase	100	1	100	—	—	—	100	1	100
Jan. 20	Purchase	100	2	200	—	—	—	100	1	100
								100	2	200
Jan. 22	Issue to Job W 16	—	—	—	60	2	120	100	1	100
								40	2	80
Jan. 23	Issue to Job W 17	—	—	—	40	2	80	80	1	80
					20	1	20			

Statement of Receipt and Issues by adopting Weighted Average method

Date	Particulars	Receipts			Issues			Balance		
		Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)	Units No.	Rate (₹)	Value (₹)
Jan. 1	Purchase	100	1	100	—	—	—	100	1	100
Jan. 20	Purchase	100	2	200	—	—	—	200	1.50	300
Jan. 22	Issue to Job W 16	—	—	—	60	1.50	90	140	1.50	210
Jan. 23	Issue to Job W 17	—	—	—	60	1.50	90	80	1.50	120

Statement of Material Values allocated to Job W 16, Job 17 and Closing Stock, under aforesaid methods

	FIFO (₹)	LIFO (₹)	Weighted Average (₹)
Material for Job W 16	60	120	90
Material for Job W 17	80	100	90
Closing Stock	160	80	120
	300	300	300

Answers to the Case Scenarios

1.

i.	(d)	ii.	(a)	iii.	(b)	iv.	(b)	v.	(c)

(i) (d) Monthly Production of X = 30,000 kgs.

$$\text{Raw Material Required} = \frac{30,000}{3} \times 5 = \mathbf{50,000 \text{ kgs.}}$$

$$\text{Material A} = \frac{50,000}{5} \times 3 = \mathbf{30,000 \text{ kg.}}$$

$$\text{Material B} = \frac{50,000}{5} \times 2 = \mathbf{20,000 \text{ kg.}}$$

(ii) (a) Calculation of Economic Order Quantity (EOQ):

$$\begin{aligned}\text{Material A} &= \sqrt{\frac{2 \times \text{Annual consumption} \times \text{Order cost}}{\text{Carrying cost per unit p.a.}}} \\ &= \sqrt{\frac{2 \times (30,000 \times 12) \times 1,200}{15\% \text{ of } 30}} = \mathbf{13,856 \text{ kg.}}\end{aligned}$$

$$\text{Material B} = \sqrt{\frac{2 \times (20,000 \times 12) \times 1,200}{5\% \text{ of } 44}} = \mathbf{16,181 \text{ kg.}}$$

(iii) (b) Calculation of Maximum Stock level: Since, the Material A is perishable in nature and it required to be used within 10 days, hence, the Maximum Stock Level shall be lower of two:**(a)** Stock equal to 10 days consumption

$$= \frac{30000}{25} \times 10 \text{ days} = 12,000 \text{ kg.}$$

(b) Maximum Stock Level for Material A:

Re-order Quantity + Re-order level – (Min consumption* × Min. lead time)

Where,

$$\text{Re-order Quantity} = 15,000 \text{ kg.}$$

$$\begin{aligned}\text{Re-order level} &= \text{Max. Consumption}^* \times \text{Max. Lead time} \\ &= 30,000/25 \times 2 \text{ days} = 2,400 \text{ kg.}\end{aligned}$$

$$\begin{aligned}\text{Maximum stock Level} &= 15,000 \text{ kg.} + 2,400 \text{ kg.} - \\ &\quad (30,000/25 \times 1 \text{ day})\end{aligned}$$

$$= 17,400 - 1,200 = 16,200 \text{ kg.}$$

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, Maximum Stock Level will be **12,000 kg.**

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

- (iv) (b) Calculation of Savings/ loss in Material A if purchase quantity equals to EOQ.

	Purchase Quantity = 15,000 kg.	Purchase Quantity = EOQ i.e. 13,856 kg.
Annual consumption	3,60,000 kg. (30,000 × 12 months)	3,60,000 kg. (30,000 × 12 months)
No. of orders [Note- (i)]	30 (3,60,000 ÷ 12,000)	30 (3,60,000 ÷ 12,000)
Ordering Cost (a)	₹36,000 (₹1200 × 30)	₹36,000 (₹1200 × 30)
Carrying Cost (b) [Note- (ii)]	₹30,375 (15% of ₹27 × 7,500)	₹31,176 (15% of ₹30 × 6,928)
Purchase Cost (c) (for good portion)	₹97,20,000 (₹27 × 3,60,000)	₹1,08,00,000 (₹30 × 3,60,000)
Loss due to obsolescence (d) [Note- (iii)]	₹24,30,000 [₹27 × (30 × 3,000)]	₹16,70,400 [₹30 × (30 × 1,856)]
Total Cost [(a) + (b) + (c) + (d)]	₹ 1,22,16,375	₹ 1,25,37,576

Purchasing of material -A at present policy of 15,000 kg. saves ₹ **3,21,201.**

Notes: (i) Since, material gets obsolete after 10 days, the quantity in excess of 10 days consumption i.e. 12,000 kg. are wasted. Hence, after 12,000 kg. a fresh order needs to be given.

(ii) Carrying cost is incurred on average stock of Materials purchased.

(iii) the excess quantity of material becomes obsolete and loss has to be incurred.

- (v) (c) Minimum Stock Level for Material A

= Re-order level – (Average Consumption Rate x Average Re-order Period)

= 2400 – (1200 x 1.5) = **600 kgs**

Re-order level = Max. Consumption* × Max. Lead time

$$= 30,000/25 \times 2 \text{ days} = 2,400 \text{ kg.}$$

Average Consumption Rate = $(30,000/25 + 30,000/25)/2$

$$= 1,200 \text{ Kg}$$

Average Re-order Period = $(1 + 2)/2 = 1.5 \text{ Days}$

Stock required for 10 days consumption is lower than the maximum stock level calculated through the formula. Therefore, Maximum Stock Level will be 12,000 kg.

(*Since, production is processed evenly throughout the month hence material consumption will also be even.)

EMPLOYEE COST AND DIRECT EXPENSES

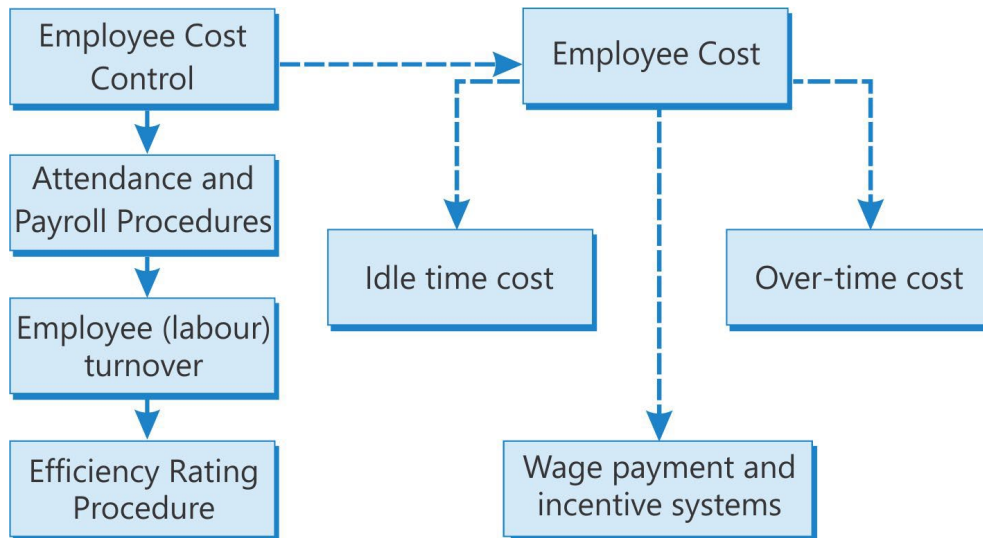


LEARNING OUTCOMES

After studying this chapter, you would be able to-

- ◆ State the meaning and importance of Employee (Labour) Cost in an organisation.
- ◆ Discuss the attendance and payroll procedures.
- ◆ State the meaning and treatment of idle time and overtime cost.
- ◆ Compute employee (labour) turnover, discuss its meaning, reasons, methods of measurement and cost impacts.
- ◆ Discuss and apply the various methods of remuneration and incentive system in calculation of wages, bonus etc.
- ◆ Discuss the efficiency rating procedures.
- ◆ Discuss the measurement and treatment of Direct expenses.

CHAPTER OVERVIEW



1. INTRODUCTION

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

Unlike other costs, employee costs are influenced by human behavior. Due to this peculiarity, divergence in employee compensation is observed across the different industries. Wages are determined on both quantitative and qualitative factors like volume of work, skills required etc. Hence, it is necessary that employees should

be monitored, measured, and compensated appropriately to achieve economy in cost, efficiency in performance and effectiveness in desired output.



2. EMPLOYEE (LABOUR) COST

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

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

Classification of Employee (Labour) Cost: Employee cost are broadly classified as direct and indirect employee cost.

(i) Direct Employee (Labour) Cost

Benefits paid or payable to the employees **which can be attributed to a cost object** in an economically feasible manner. This can be easily identified and allocated to an activity, contract, cost centre, customer, process, product etc.

(ii) Indirect Employee (Labour) Cost

Benefits paid or payable to the employees, **which cannot be directly attributable to a particular cost object** in an economically feasible manner.

Distinction between Direct and Indirect Employee Cost

Direct employee cost	Indirect employee cost
1. It is the cost incurred in payment of employees who are directly engaged in the production process.	1. Cost incurred for payment of employees who are not directly engaged in the production process.

2. Direct employee cost can be easily identified and allocated to cost unit.	2. Indirect employee cost is apportioned on some appropriate basis.
3. Direct employee cost varies with the volume of production and has positive relationship with the volume.	3. Indirect employee cost may not vary with the volume of production .



3. EMPLOYEE (LABOUR) COST CONTROL

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

The aim should be to keep the wages per unit of output as low as possible.

This can only be achieved by giving employees appropriate compensation to encourage efficiency so that optimum output can be achieved in effective manner.

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

Department	Functions
1. Personnel Department	(i) On receipt of employee requisition from the various departments it searches for the required skills and qualification. (ii) It ensures that the persons recruited possess the requisite qualification and skills required for the job. (iii) Arranges proper training for the newly recruited employees and workshops for existing employees.

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

3.1 Important Factors for the Control of Employee Cost

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

- (i) Assessment of manpower requirements.
- (ii) Control over time-keeping and time-booking.
- (iii) Time & Motion Study.
- (iv) Control over idle time and overtime.

- (v) Control over employee turnover.
- (vi) Wage and Incentive systems.
- (vii) Job Evaluation and Merit Rating.
- (viii) Employee productivity.

3.2 Collection of Employee Costs

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

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

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



4. ATTENDANCE & PAYROLL PROCEDURES

4.1 Attendance Procedure / Time-keeping

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

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

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

- (i) For the preparation of payrolls.
- (ii) For calculating overtime.
- (iii) For ascertaining and controlling employee cost.
- (iv) For ascertaining idle time.
- (v) For disciplinary purposes.
- (vi) For overhead distribution.

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

1. Manual Methods

- (a) **Attendance Register Method-** Under this method, an attendance register is kept to **record the arrival and departure time of an employee**. This method is simple and inexpensive and is suitable for small organisations. However, this method may lead to dishonest practice of time manipulation by way of recording wrong time and back date entry in collusion with time keeper.
- (b) **Metal Disc/ Token Method-** This method of time recording is very old and is almost obsolete in practice. Under this method, *each employee is allotted a metal disc or a token with a hole bearing his identification number. The token is kept or handed to the time keeper who record the token number in his register.* Like attendance register method, this method also has some disadvantages like error in recording, proxy attendance etc.

2. Mechanical/ Automated Methods

- (a) **Punch Card Attendance-** Under this method, each employee is provided a card for marking attendance. **A punch card contains data related with the employee in digital form.** In punch card attendance system, an employee needs to either insert or wave his card to a card reader which then ensures whether the correct person is logging in and/or out. This system does not require to employ any time keeper and minimises the risk of recording error and time manipulation.
- (b) **Bio-Metric Attendance system-** Under bio-metric attendance system **attendance is marked by recognizing an employee on the basis of physical and behavioural traits.** An employee's unique identity like finger print, face and retina image etc. are kept in a database which is matched at the time of marking of attendance before the attendance device for this purpose. Bio-metric attendance system includes fingerprint recognition system, face recognition system, Time and attendance tracking technology etc. This system reduces the risk of time manipulation and proxy attendance. However, it may not be suitable for small organisations due to cost associated with set-up and maintenance.

Requisites of a Good Time-Keeping System: A good time-keeping system should have following requisites:

1. System of time-keeping should be such which should not allow proxy for another employee under any circumstances.
2. There should also be a provision of recording of time of piece employees so that regular attendance and discipline may be maintained. This is necessary to maintain uniformity of flow of production.
3. Time of arrival as well as time of departure of employees should be recorded so that total time of employees may be recorded and wages may be calculated accordingly.
4. As far as possible, method of recording of time should be mechanical so that chances of disputes regarding time may not arise between employees and the time-keeper.

5. Late-comers should record late arrivals. Any relaxation by the time-keeper in this regard will encourage indiscipline.
6. The system should be simple, smooth and quick. Unnecessary queuing for marking attendance should be avoided.
7. The system should be reviewed and maintained periodically to prevent any error.

4.2 Time-Booking

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

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

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

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

For the collection of all such data, a separate record, generally known as Time (or Job) card, is kept.

The time (or job) card can be of two types:

- **One containing analysis of time with reference to each job:** A separate job card is employed in respect of a job undertaken; where a job involves several operations, a separate entry is made in respect of each operation.

Thus, the job card would record the total time spent on a particular job or operation. If a number of people are engaged on the same job or operation, the time of all those employees would be booked on the same card.

One advantage of this method is that it provides complete data on the employee content of job or operation collectively so that the computation of employee cost is greatly facilitated.

But this method has drawbacks as well. Since an employee's job timing is scattered over a number of job cards the time spent on all these jobs and idle time must be abstracted periodically for finding each employee's total time spent on different jobs and the time for which he remained idle during the period. The total of these two times (job and idle) must obviously equal his total attendance time, as shown by his attendance record.

- **The other with reference to each employee:** In this case, it would greatly facilitate reconciliation of the employee's job time with his attendance time recorded.

Under this system, a separate card would be used for each employee for each day or for each week and the time which he spends on different jobs (and also any idle time) would be recorded in the same card so that the card would have a complete history on it as to how his time had been spent during the period.

The format of job or time may vary industry to industry and according to the accounting system into used.

4.3 Payroll Procedure

Steps included in this process are as under:

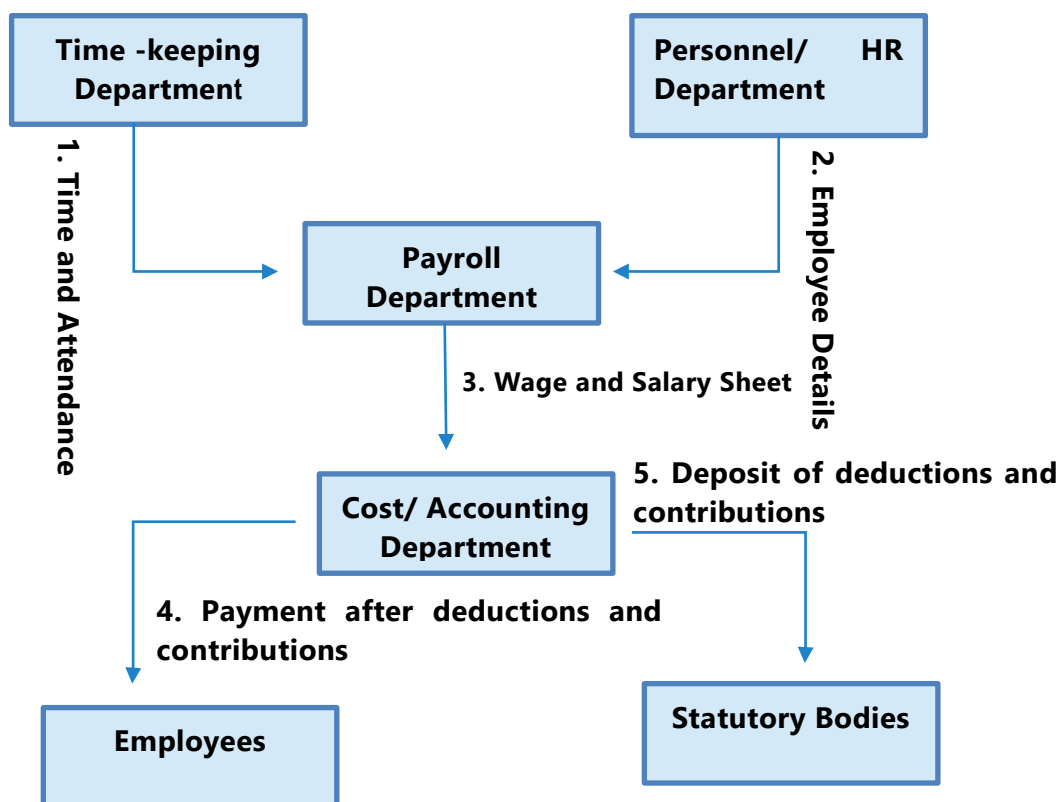


Diagram: Payroll Procedures

- 1. Time and Attendance details:** A detailed sheet of number of days or hours worked by each employee (in case of time-based payment) and units or percentage of work (in case of piece rate) *as reflected by the time keeping methods are sent to the payroll department by the time keeping department.* Further, payroll department with the help of time booking records calculate any further incentives such as overtime payment, bonus to be paid to the employees.
- 2. List of employees and other details:** *A list of employees on roll and the rate at which they will be paid is sent by the personnel/ HR department.* Payroll department should ensure that no unauthorised or bogus employee is paid.

3. **Computation of wages and other incentives:** Payroll department based on the details provided by the time keeping department and personnel department calculate wages/ salary to be paid to the employees. *Payroll department prepares pay slip for all employees authorized by the personnel department and forward the same to the cost/ accounting department for further deductions and payment.*
4. **Payment to the employees:** Cost/ accounting department deduct all statutory deduction such as employee's contribution to provident fund and employee state insurance (ESI) scheme, TDS on salary etc. *After all deductions wages/ salary is paid to the employees.*
5. **Deposit of all statutory liabilities:** All statutory deduction made from wages/ salary of the employees alongwith employer's contributions such as provident fund and employee state insurance scheme are paid to the respective statutory bodies.

The followings are generally deducted from the payroll

Type of deductions	Description
Statutory Deductions	
1. Provident fund	Employee's contribution to the Provident fund is deducted from the salary/ wages of the concerned employee.
2. Employee State Insurance Scheme (ESI)	Employee's contribution to the ESI is deducted from the salary/ wages.
3. Tax Deduction at Source (TDS)	Employer is obliged to deduct tax at source if it will be paying to the employee net salary exceeding maximum exemption limit, in equal monthly instalments to the income tax department.
4. Professional Tax	Professional tax is a state level tax imposed for carrying on business, profession or service.

Other Deductions	
1. Voluntary contribution to Provident fund	If any employee so desires may contribute over and above the contribution payable by the employer.
2. Contribution to any benevolent fund.	An employee may contribute to any benevolent fund voluntarily by putting a request to the payroll department.
3. Loan deductions	Instalments of any loan taken by the employee.
4. Other advances and dues	Other advances like festival advance and unadjusted advances taken.



5. IDLE TIME

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

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

Causes	Treatment
1. The time lost between factory gate and the place of work,	It is treated as a part of cost of production. Thus, in the case of direct workers an allowance for normal idle time is considered setting of standard hours or standard rate. In case of indirect workers, normal idle time is considered for the computation of overhead rate.
2. The interval between one job and another,	
3. The setting up time for the machine,	
4. Normal rest time, break for lunch etc.	

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

Causes	Treatment
1. Idle time may also arise due to abnormal factors like lack of coordination 2. Power failure, Breakdown of machines 3. Non-availability of raw materials, strikes, lockouts, poor supervision, fire, flood etc. 4. The causes for abnormal idle time should be further analysed into controllable and uncontrollable. (i) <i>Controllable abnormal idle time</i> refers to that time which could have been put to productive use had the management been more alert and efficient. All such time which could have been avoided is controllable idle time. (ii) <i>Uncontrollable abnormal idle time</i> refers to time lost due to abnormal causes, over which management does not have any control e.g., breakdown of machines, flood etc. may be characterised as uncontrollable idle time.	<i>Abnormal idle time</i> cost is not included as a part of production cost and is shown as a separate item in the Costing Profit and Loss Account. The cost of abnormal idle time should be further categorised into controllable and uncontrollable. For each category, the break-up of cost due to various factors should be separately shown. This would help the management in fixing responsibility for controlling idle time. Management should aim at eliminating controllable idle time and on a long-term basis reducing even the normal idle time. This would require a detailed analysis of the causes leading to such idle time.

ILLUSTRATION 1

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

(a) Basic pay	₹ 10,000 p.m.
(b) Dearness allowance	₹ 2,000 p.m.
(c) Bonus	20% of salary and D.A.
(d) Other allowances	₹ 2,500 p.m.
(e) Employer's contribution to P.F.	10% of salary and D.A.

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

SOLUTION**Statement showing computation of effective hourly cost of employee 'X'**

	Per month (₹)	Per annum (₹)
(A) Earning of Employee 'X':		
Basic pay	10,000	1,20,000
Dearness Allowance	2,000	24,000
Bonus	2,400	28,800
Employer's contribution to provident fund	1,200	14,400
Other allowances	2,500	30,000
	18,100	2,17,200
(B) Effective working hours (refer workings)		2,000 hours
(C) Effective hourly cost {(A) ÷ (B)}		₹108.60

Workings:

Calculation of effective working hours:

Annual working hours less Normal idle time = 2,400 hours – 400 hours = 2,000 hours.

ILLUSTRATION 2

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

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

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

SOLUTION**Working notes:**

(i) Total effective hours in a week:

$$[(8 \text{ hrs.} - (30 \text{ mts.} + 10 \text{ mts.})) \times 6 \text{ days}] = 44 \text{ hours}$$

(ii) Total wages for a week:

$$(\text{₹ } 100 + 120\% \text{ of ₹ } 100) \times 6 \text{ days} = \text{₹ } 1,320$$

(iii) Wage rate per hour = $1320 \div 44 \text{ hours} = \text{₹ } 30$

(iv) Time wasted waiting for job (Abnormal idle time):

$$= 44 \text{ hrs.} - (15 \text{ hrs.} + 12 \text{ hrs.} + 13 \text{ hrs.}) = 4 \text{ hrs.}$$

Allocation of wages in Cost Accounting

	(₹)
Allocated to Job X : 15 hours × ₹ 30	450
Allocated to Job Y : 12 hours × ₹ 30	360
Allocated to Job Z : 13 hours × ₹ 30	390
Charged to Costing Profit & Loss A/c : 4 hours × ₹ 30	120
Total	1,320



6. OVERTIME

Work done beyond normal working hours is known as 'overtime work'.

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

$$\text{Overtime Payment} = \text{Wages paid for overtime at normal rate} + \text{Premium (extra) payment for overtime work}$$

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

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

As per the Factories Act 1948 "Where a worker works in a factory for more than nine hours in any day or for more than forty eight hours in any week, he shall, in respect of overtime work, be entitled to wages at the rate of twice his ordinary rate of wages."

Where any workers in a factory are paid on a piece-rate basis, the time rate shall be deemed to be equivalent to the daily average of their full-time earnings for the days on which they actually worked on the same or identical job during the month immediately preceding the calendar month during which the overtime work was done, and such time rates shall be deemed to be the ordinary rates of wages of those workers

Ordinary rate of wages means the basic wages plus such allowances, including the cash equivalent of the advantage accruing through the concessional sale to workers of food grains and other articles, as the worker is for the time being entitled to, but does not include a bonus and wages for overtime work.

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

work towards the evening so that they can earn extra money in the form of overtime wages.

Causes of Overtime and Treatment of Overtime premium in cost accounting

<i>Causes</i>	<i>Treatment</i>
(1) The customer may agree to bear the entire charge of overtime because urgency of work.	(1) If overtime is resorted to at the desire of the customer, then overtime premium may be charged to the job directly.
(2) Overtime may be called for to make up any shortfall in production due to some unexpected development.	(2) If overtime is required to cope with general production programmes or for meeting urgent orders, the overtime premium should be treated as overhead cost of the particular department or cost centre which works overtime.
(3) Overtime work may be necessary to make up a shortfall in production due to some fault of management.	(3) If overtime is worked in a department due to the fault of another department, the overtime premium should be charged to the latter department.
(4) Overtime work may be resorted to, to secure an out-turn in excess of the normal output to take advantage of an expanding market or of rising demand	(4) Overtime worked on account of abnormal conditions such as flood, earthquake etc., should not be charged to cost, but to Costing Profit and Loss Account.

ILLUSTRATION 3

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

	A	B
(i) Basic Wages (₹)	10,000	16,000
(ii) Dearness Allowance	50%	50%
(iii) Contribution to provident Fund (on basic wages)	8%	8%
(iv) Contribution to Employee's State Insurance (on basic wages)	2%	2%
(v) Overtime (Hours)	10	--

The normal working hours for the month are 200. Overtime is paid at double the total of normal wages and dearness allowance. Employer's contribution to state Insurance and Provident Fund are at equal rates with employees' contributions. The two workers were employed on jobs X, Y and Z in the following proportions:

Jobs	X	Y	Z
Worker A	40%	30%	30%
Worker B	50%	20%	30%

Overtime was done on job Y.

SOLUTION

Statement showing Earnings of Workers A and B

	A (₹)	B (₹)
Basic wages	10,000	16,000
Dearness Allowance (50% of Basic Wages)	5,000	8,000
Overtime wages (Refer to Working Note 1)	1,500	--
Gross wages earned	16,500	24,000
Less: Contribution to Provident fund	(800)	(1,280)
Less: Contribution to ESI	(200)	(320)
Net wages earned	15,500	22,400

Statement of Employee Cost:

	A (₹)	B (₹)
Gross Wages (excluding overtime)	15,000	24,000
Add: Employer's contribution to PF	800	1,280
Add: Employer's contribution to ESI	200	320
Gross wages earned	16,000	25,600
Normal working hours	200	200
Ordinary wages rate per hour	80	128

Statement Showing Allocation of Wages to Jobs

	Total Wages (₹)	Jobs		
		X (₹)	Y (₹)	Z (₹)
Worker A:				
- Ordinary Wages (4: 3 : 3)	16,000	6,400	4,800	4,800
- Overtime	1,500	--	1,500	--
Worker B:				
- Ordinary Wages (5 : 2 : 3)	25,600	12,800	5,120	7,680
	43,100	19,200	11,420	12,480

Working Notes

- Normal Wages are considered as basic wages

$$\begin{aligned}
 \text{Over time} &= \frac{2 \times (\text{Basic wage} + \text{DA}) \times 10 \text{ hours}}{200} \\
 &= 2 \times \left(\frac{\text{₹}15,000}{200} \right) \times 10 \text{ hours} = \text{₹}150 \times 10 \text{ hours} = \text{₹}1,500
 \end{aligned}$$

ILLUSTRATION 4

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

	Worker 'A' paid at ₹ 200 per day of 8 hours	Worker 'B' paid at ₹ 100 per day of 8 hours	Worker 'C' paid at ₹ 300 per day of 8 hours
<i>Monday (hours)</i>	10.5	8.0	10.5
<i>Tuesday (hours)</i>	8.0	8.0	8.0
<i>Wednesday (hours)</i>	10.5	8.0	10.5
<i>Thursday (hours)</i>	9.5	8.0	9.5
<i>Friday (hours)</i>	10.5	8.0	10.5
<i>Saturday (hours)</i>	--	8.0	8.0
<i>Total (hours)</i>	49.0	48.0	57.0

In terms of an award in employee conciliation, the workers are to be paid dearness allowance on the basis of cost of living index figures relating to each month which works out @ ₹ 968 for the relevant month. The dearness allowance is payable to all workers irrespective of wages rate if they are present or are on leave with wages on all working days.

Each worker has to work for 8 hours on weekdays. Saturday and Sunday will be weekly holiday, however workers may work on Saturdays due to exigency of work for 4 hours, though full payment of 8 hours will be made with no other payments.

Overtime is paid twice of ordinary wage rate if a worker works for more than nine hours in a day. Excluding holidays, the total number of hours works out to 176 in the relevant month. The company's contribution to Provident Fund and Employees State Insurance Premium are absorbed into overheads.

CALCULATE the wages payable to each worker.

SOLUTION**(1) Calculation of hours to be paid for worker A:**

	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	1	1½	3	12
Tuesday	8	--	--	--	8
Wednesday	8	1	1½	3	12
Thursday	8	1	½	1	10
Friday	8	1	1½	3	12
Saturday	--	--	--	--	--
Total	40	4	5	10	54

Calculation of hours to be paid for worker B:

	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	---	---	---	8
Tuesday	8	---	---	---	8
Wednesday	8	---	---	---	8
Thursday	8	---	---	---	8
Friday	8	---	---	---	8
Saturday	4	4*	---	---	8
Total	44	4	---	---	48

(*Worker-B has not worked more than 9 hours in any day)

Calculation of hours to be paid for worker C:

	Normal hours	Extra hours	Overtime hours	Equivalent normal hours for overtime worked	Total normal hours
Monday	8	1	1½	3	12
Tuesday	8	---	---	---	8
Wednesday	8	1	1½	3	12
Thursday	8	1	½	1	10
Friday	8	1	1½	3	12
Saturday	8*	---	---	---	8
Total	48	4	5	10	62

(*Worker-C will be paid for equivalent 8 hours, though 4 hours of working is required on Saturday. Further, no overtime will be paid for working beyond 4 hours since it is paid for working beyond 9 hours.)

Wages payable:

	A	B	C
Basic Wages per hour (₹)	25.00	12.50	37.50
Dearness allowance per hour (₹)	5.50	5.50	5.50
Hourly rate (₹)	30.50	18.00	43.00
Total normal hours	54.00	48.00	62.00
Total Wages payable (₹)	1,647.00	864.00	2,666.00

ILLUSTRATION 5

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

<i>Before and after normal working hours</i>	<i>175% of basic wage rate</i>
<i>Sundays and holidays</i>	<i>225% of basic wage rate</i>
<i>During the previous year, the following hours were worked</i>	
- Normal time	1,00,000 hours
- Overtime before and after working hours	20,000 hours
Overtime on Sundays and holidays	5,000 hours
Total	1,25,000 hours

The following hours have been worked on job 'Z'

<i>Normal</i>	<i>1,000 hours</i>
<i>Overtime before and after working hrs.</i>	<i>100 hours.</i>
<i>Sundays and holidays</i>	<i>25 hours.</i>
Total	1,125 hours

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

- Where overtime is worked regularly throughout the year as a policy due to the workers' shortage.*
- Where overtime is worked irregularly to meet the requirements of production.*
- Where overtime is worked at the request of the customer to expedite the job.*

SOLUTION**Workings**

Basic wage rate : ₹ 100 per hour

Overtime wage rate before and after working hours : ₹ 100 × 175%

= ₹ 175 per hour

Overtime wage rate for Sundays and holidays : ₹ 100 × 225%
= ₹ 225 per hour

Computation of average inflated wage rate (including overtime premium):

Particulars	(₹)
Annual wages for the previous year for normal time (1,00,000 hrs. × ₹100)	1,00,00,000
Wages for overtime before and after working hours (20,000 hrs. × ₹175)	35,00,000
Wages for overtime on Sundays and holidays (5,000 hrs. × ₹225)	11,25,000
Total wages for 1,25,000 hrs.	1,46,25,000

Average inflated wage rate = $\frac{\text{₹1,46,25,000}}{1,25,000 \text{ hours}} = \text{₹117}$

(a) Where overtime is worked regularly as a policy due to workers' shortage:

The overtime premium is treated as a part of employee cost and job is charged at an inflated wage rate. Hence, employee cost chargeable to job Z

= Total hours × Inflated wage rate = 1,125 hrs. × ₹ 117 = ₹ **1,31,625**

(b) Where overtime is worked irregularly to meet the requirements of production:

Basic wage rate is charged to the job and overtime premium is charged to factory overheads as under:

Employee cost chargeable to Job Z: 1,125 hours @ ₹100 per hour = ₹ 1,12,500

Factory overhead: {100 hrs. × ₹ (175 – 100)} + {25 hrs. × ₹ (225 – 100)} = {₹7,500 + ₹3,125} = ₹**10,625**

(c) **Where overtime is worked at the request of the customer, overtime premium is also charged to the job as under:**

			(₹)
Job Z Employee cost	1,125 hrs. @ ₹ 100	=	1,12,500
Overtime premium	100 hrs. @ ₹ (175 – 100)	=	7,500
	25 hrs. @ ₹ (225 – 100)	=	<u>3,125</u>
Total			<u>1,23,125</u>

7. LABOUR UTILISATION

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

7.1 Identification of Utilisation of labours with Cost Centres

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

The preparation of such sheet serves the following purposes:

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

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

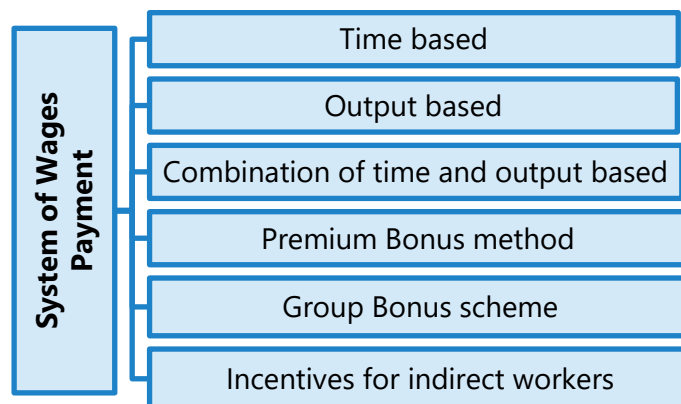
For identification of labour hours with work order or batches or capital jobs or overhead work orders the following points are to be noted:

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



8. SYSTEMS OF WAGE PAYMENT AND INCENTIVES

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



8.1 Time Based (Time Rate System)

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

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

Wages under time rate system is calculated as under:

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

8.2 Output Based (Piece Rate System)

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

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

8.3 Premium Bonus Method

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

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

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

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

Advantages and Disadvantages of Halsey Premium Plan

Advantages	Disadvantages
1. Time rate is guaranteed while there is opportunity for increasing earnings by increasing production. 2. The system is equitable in as much as the employer gets a direct return for his efforts in improving production methods and providing better equipment.	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 6

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

<i>Time Rate (per hour)</i>	<i>₹ 60</i>
<i>Time allowed</i>	<i>8 hours</i>
<i>Time taken</i>	<i>6 hours</i>
<i>Time saved</i>	<i>2 hours</i>

SOLUTION**Calculation of total earnings:**

$$= \text{Time taken} \times \text{Time rate} + 50\% (\text{Time Allowed} - \text{Time Taken}) \times \text{Time rate}$$

$$= 6 \text{ hrs.} \times ₹60 + 1/2 \times (2 \text{ hrs.} \times ₹60) \text{ or } ₹360 + ₹60 = ₹420$$

Of his total earnings, ₹360 is on account of the time worked and ₹60 is on account of his share of the premium bonus.

(ii) Rowan Premium Plan: According to this system a standard time allowance is fixed for the performance of a job and bonus is paid if time is saved.

Under Rowan System the bonus is that proportion of the time wages as time saved bears to the standard time.

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

Advantages and Disadvantages of Rowan Premium Plan

Advantages	Disadvantages
1. It is claimed to be a fool-proof system in as much as a worker can never double his earnings even if there is bad rate setting.	1. The system is a bit complicated.
2. It is admirably suitable for encouraging moderately efficient workers as it provides a better return for moderate efficiency than under the Halsey Plan.	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 appeals to the employer as being equitable.	3. The sharing principle is not generally welcomed by employees.

ILLUSTRATION 7

CALCULATE the earnings of a worker under Rowan System. The relevant data is given as below:

<i>Time rate (per Hour)</i>	<i>₹ 60</i>
<i>Time allowed</i>	<i>8 hours.</i>
<i>Time taken</i>	<i>6 hours.</i>
<i>Time saved</i>	<i>2 hours.</i>

SOLUTION

Calculation of total earnings:

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

$$= 6 \text{ hours} \times ₹60 + \frac{2 \text{ hours}}{8 \text{ hours}} \times 6 \text{ hours} \times ₹ 60 = ₹ 360 + ₹ 90 = ₹ 450$$

ILLUSTRATION 8

Two workmen, 'A' and 'B', produce the same product using the same material. Their normal wage rate is also the same. 'A' is paid bonus according to the Rowan system, while 'B' is paid bonus according to the Halsey system. The time allowed to make the product is 50 hours. 'A' takes 30 hours while 'B' takes 40 hours to complete the product. The factory overhead rate is ₹ 5 per man-hour actually worked. The factory cost for the product for 'A' is ₹ 3,490 and for 'B' it is ₹ 3,600.

Required:

- COMPUTE the normal rate of wages;
- COMPUTE the cost of materials cost;
- PREPARE a statement comparing the factory cost of the products as made by the two workmen.

SOLUTION

Step 1 : Let X be the cost of material and Y be the normal rate of wages per hour.

Step 2 : Factory Cost of Workman 'A'

	(₹)
A. Material Cost	X
B. Wages (Rowan Plan)	30 Y
C. Bonus = $\frac{30}{50} \times (50 - 30) \times Y$	12 Y
D. Overheads (30 × ₹5)	150
E. Factory Cost	3,490
Or, X + 42 Y = ₹3,490 (Given) – ₹150 = ₹3,340.....equation (i)	

Step 3 : Factory Cost of Workman 'B'

	(₹)
A. Material Cost	X
B. Wages (Halsey Plan)	40 Y
C. Bonus = 50% of (SH - AH) × R	5 Y
= 50% of (50 - 40) × R	
D. Overheads (40 × ₹5)	200
E. Factory Cost	3,600
Or, $X + 45 Y = ₹3,600$ (Given) – ₹200 = ₹3,400.....equation (ii)	

Step 4 : Subtracting equation (i) from equation (ii)

$$3Y = ₹60$$

$$Y = ₹60/3 = ₹20 \text{ per hour.}$$

- (a) The normal rate of wages: ₹20 per hour
- (b) The cost of material: $X + 45 \times ₹20 = ₹3,400$ or, $X = ₹3,400 - ₹900 = ₹2,500$
- (c) **Comparative Statement of the Factory Cost of the product made by the two workmen.**

	'A' (₹)	'B' (₹)
Material cost	2,500	2,500
Direct Wages	600	800
	(30 × ₹20)	(40 × ₹20)
Bonus	240	100
	(12 × ₹20)	(5 × ₹20)
Factory Overhead	150	200
Factory Cost	3,490	3,600

ILLUSTRATION 9

- (a) Bonus paid under the Halsey Plan with bonus at 50% for the time saved equals the bonus paid under the Rowan System. When will this statement hold good? (Your answer should contain the proof).
- (b) The time allowed for a job is 8 hours. The hourly rate is ₹8. PREPARE a statement showing:
- (i) The bonus earned
 - (ii) The total earnings of employee and
 - (iii) Hourly earnings.

Under the Halsey System with 50% bonus for time saved and Rowan System for each hour saved progressively.

SOLUTION

$$(a) \quad \text{Bonus under Halsey Plan} = \frac{50}{100} \times (SH - AH) \times R \quad (i)$$

$$\text{Bonus under Rowan Plan :} = \frac{AH}{SH} \times (SH - AH) \times R \quad (ii)$$

Bonus under Halsey Plan will be equal to the bonus under Rowan Plan when the following condition holds good:

$$\frac{50}{100} \times (SH - AH) \times R = \frac{AH}{SH} \times (SH - AH) \times R$$

$$\frac{50}{100} = \frac{AH}{SH}$$

Hence, when the actual time taken (AH) is 50% of the time allowed (SH), the bonus under Halsey and Rowan Plans is equal.

- (b) Statement of Bonus, total earnings of Employee and hourly earnings under Halsey and Rowan Systems.

SH	AH	Time saved	Basic wages (AH x ₹8) (B x ₹8)	Bonus under Halsey System $\left[\frac{50}{100} \times C \times 8 \right]$	Bonus under Rowan system $\left[\frac{B}{A} \times C \times 8 \right]$	Total Earnings under Halsey System D+E	Total Earnings under Rowan System D+F	Hourly Earnings under Halsey System G/B	Hourly Earnings under Rowan System H/B
A Hours	B Hours	C = (A-B) Hours	D (₹)	E (₹)	F (₹)	G (₹)	H (₹)	I (₹)	J (₹)
8	8	-	64	-	-	64	64	8.00	8.00
8	7	1	56	4	7	60	63	8.57	9.00
8	6	2	48	8	12	56	60	9.33	10.00
8	5	3	40	12	15	52	55	10.40	11.00
8	4	4	32	16	16	48	48	12.00	12.00
8	3	5	24	20	15	44	39	14.67	13.00
8	2	6	16	24	12	40	28	20.00	14.00
8	1	7	8	28	7	36	15	36.00	15.00

ILLUSTRATION 10

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

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

SOLUTION

$$\begin{aligned}
 \text{Total earnings (under 50\% Halsey Scheme)} &= \text{Hours worked} \times \text{Rate per hour} + \\
 &\quad \frac{1}{2} \times \text{time saved} \times \text{Rate per hour} \\
 &= 3 \text{ hours} \times ₹ 30 + \frac{1}{2} \times 1 \text{ hour} \times ₹ 30 \\
 &= ₹ 105
 \end{aligned}$$

$$\text{Effective hourly rate} = \frac{\text{Total earnings}}{\text{Hours taken}} = \frac{\text{₹ 105}}{3 \text{ hours}} = \text{₹ 35}$$

Working Note:

Let T hours be the total time worked in hours by the skilled workers (machine man P), ₹30 is the rate per hour; standard time is 4 hours per unit and effective hourly earnings rate is ₹37.50 then

$$\text{Earning (under Rowan plan)} = \text{Hours worked} \times \text{Rate per hr} + \frac{\text{Time saved}}{\text{Time allowed}} \times$$

$$\begin{aligned} & \text{Time taken} \times \text{Rate per hr} \\ \text{₹ 37.5 T} &= T \times \text{₹ 30} + \frac{(4 - T)}{4} \times T \times \text{₹ 30} \end{aligned}$$

(both sides are divided by T)

$$\text{₹ 37.5} = \text{₹ 30} + (4 - T) \times \text{₹ 7.5}$$

$$\text{₹ 37.5} = \text{₹ 30} + \text{₹ 30} - 7.5T$$

$$\text{or, ₹ 7.5 T} = \text{₹ 60} - \text{₹ 37.5}$$

$$\text{or, ₹ 7.5 T} = \text{₹ 22.5}$$

$$\text{or, T} = 3 \text{ hours.}$$

ILLUSTRATION 11

A factory having the latest sophisticated machines wants to introduce an incentive scheme for its workers, keeping in view the following:

- (i) *The entire gains of improved production should not go to the workers.*
- (ii) *In the name of speed, quality should not suffer.*
- (iii) *The rate setting department being newly established are liable to commit mistakes.*

You are required to PREPARE a suitable incentive scheme and DEMONSTRATE by an illustrative numerical example how your scheme answers to all the requirements of the management.

SOLUTION

Rowan Scheme of premium bonus (variable sharing plan) is a suitable incentive scheme for the workers of the factory. If this scheme is adopted, the entire gains due to time saved by a worker will not pass to him.

Another feature of this scheme is that *a worker cannot increase his earnings or bonus by merely increasing its work speed. The reason for this is that the bonus under Rowan Scheme is maximum when the time taken by a worker on a job is half of the time allowed.* As this fact is known to the workers, therefore, they work at such a speed which helps them to maintain the quality of output too.

Lastly, Rowan System provides a safeguard in the case of any loose fixation of the standards by the rate-setting department. It may be observed from the following illustration that in the Rowan Scheme the bonus paid will be low due to any loose fixation of standards. Workers cannot take undue advantage of such a situation. The above three features of Rowan Plan can be discussed with the help of the following illustration:

$$\begin{aligned}
 \text{(i)} \quad \text{Time allowed} &= 4 \text{ hours} \\
 \text{Time taken} &= 3 \text{ hours} \\
 \text{Time saved} &= 1 \text{ hour} \\
 \text{Rate} &= ₹5 \text{ per hour} \\
 \text{Bonus} &= \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate} \\
 &= \frac{3 \text{ hours}}{4 \text{ hours}} \times 1 \text{ hour} \times ₹5 = ₹3.75
 \end{aligned}$$

In the above illustration time saved is 1 hour and, therefore, total gain is ₹ 5. Out of ₹5 according to Rowan Plan only ₹ 3.75 is given to the worker in the form of bonus and the remaining ₹ 1.25 remains with the management. In other words, a worker is entitled for 75 percent of the time saved in the form of bonus.

- (ii) The figures of bonus in the above illustration when the time taken is 2 hours and 1 hour respectively are as below:

$$\text{Bonus} = \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{Rate}$$

$$= \frac{2 \text{ hours}}{4 \text{ hours}} \times 2 \text{ hours} \times ₹5 = ₹5$$

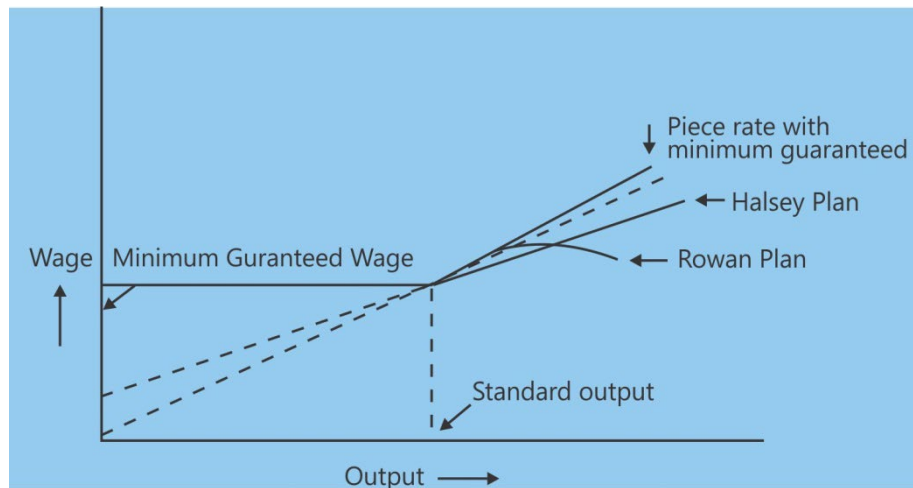
$$= \frac{1 \text{ hours}}{4 \text{ hours}} \times 3 \text{ hours} \times ₹5 = ₹3.75$$

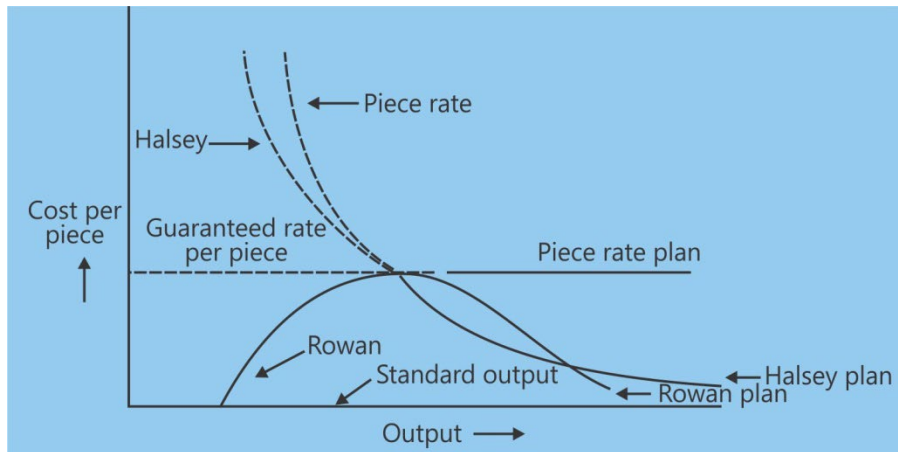
The above figures of bonus clearly show that when time taken is half of the time allowed, the bonus is maximum. When the time taken is reduced from 2 to 1 hour, the bonus figure fell by ₹1.25. Hence, it is quite apparent to workers that it is of no use to increase speed of work. This feature of Rowan Plan thus protects the quality of output.

- (iii) If the rate-setting department erroneously sets the time allowed as 10 hours instead of 4 hours, in the above illustration; then the bonus paid will be as follows:

$$\text{Bonus} = \frac{3 \text{ hours}}{10 \text{ hours}} \times 7 \text{ hours} \times ₹5 = ₹10.50$$

The bonus paid for saving 7 hours thus is ₹10.50 which is approximately equal to the wages of 2 hours. In other words, the bonus paid to the workers is low. Hence workers cannot take undue advantage of any mistake committed by the time setting department of the concern.





9. ABSORPTION OF WAGES

9.1 Elements of Wages

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

- (i) Medical facilities;
- (ii) Educational and training facilities;
- (iii) Recreational and sports facilities;
- (iv) Housing and social welfare; and
- (v) Cost of subsidised canteen and co-operative societies.

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

The monetary part of a worker's remuneration includes the basic wages, dearness allowance, overtime wages, other special allowance, if any, production bonus,

employer's contribution to the provident fund, Employees State Insurance scheme premium, contribution to pension fund, leave pay, etc.

The **basic wage** is the payment for work done, measured in terms of hours attended or the units produced, as the case may be. The basic wage rate is not normally altered unless there is a fundamental change in the working conditions or methods of manufacture.

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

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

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

9.2 Component of Wages Cost or Wages for Costing Purposes

In addition to wages (including allowances, such as D.A.) that are paid to workers, a firm may have to spend on many other items (such as premium to the ESI or provident fund or bonus).

Further, the worker does not spend all the time for which he is paid on productive work.

This is because he is entitled to weekly holiday and various type of leave. There is also a certain amount of unavoidable idle time. The question is to what extent such additional payment or cost in respect of Employee can be charged directly to unit of cost as part of direct Employee cost? Of course, in the case of indirect Employee, all such payments as also the wages paid to them, must be treated as part of overheads.

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

ILLUSTRATION 12

A worker is paid ₹10,000 per month and a dearness allowance of ₹2,000 p.m. Worker contribution to provident fund is @ 10% and employer also contributes the same amount as the employee. The Employees State Insurance Corporation premium is 6.5% of wages of which 1.75% is paid by the employees. It is the firm's practice to pay 2 months' wages as bonus each year.

The number of working days in a year are 300 of 8 hours each. Out of these the worker is entitled to 15 days leave on full pay. CALCULATE the wage rate per hour for costing purposes.

SOLUTION

	(₹)
Wages paid to worker during the year $\{(\text{₹ } 10,000 + 2,000) \times 12\}$	1,44,000
Add: Employer Contribution to:	
Provident Fund @ 10%	14,400
E.S.I. Premium @ 4.75% (6.5 – 1.75)	6,840
Bonus at 2 months' wages (Basic + DA)	24,000
Total	1,89,240

Effective hours per year: 285 days $\times$ 8 hours = 2,280 hours

Wage-rate per hour (for costing purpose): ₹1,89,240/2,280 hours = ₹83

9.3 Holiday and Leave Wages

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

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

ILLUSTRATION 13

CALCULATE the Employee hour rate of a worker X from the following data:

<i>Basic pay</i>	<i>₹ 10,000 p.m.</i>
<i>D.A.</i>	<i>₹ 3,000 p.m.</i>
<i>Fringe benefits</i>	<i>₹ 1,000 p.m.</i>

Number of working days in a year 300. 20 days are availed off as holidays on full pay in a year. Assume a day of 8 hours.

SOLUTION

(i) Effective working days in a year	300
Less: Leave days on full pay	<u>20</u>
Effective working days	280 days
Total effective working hours (280 days $\times$ 8 hours)	2,240

(ii) Total wages paid in a year	(₹)
Basic pay	1,20,000
D.A.	36,000
Fringe benefits	<u>12,000</u>
Total wages	<u>1,68,000</u>
(iii) Hourly rate : ₹1,68,000/2,240 hours	<u>₹75.00</u>

9.4 Night Shift Allowance

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

9.5 Absorption Rates of Employee Cost

Employee cost as stated above include monetary compensation and non-monetary benefits to workers.

Monetary benefits include, basic wages, D.A., overtime pay, incentive or production bonus contribution to employee provident fund, House Rent Allowance, Holiday and vacation pay etc.

The non-monetary benefits include medical facilities, subsidized canteen services, subsidized housing, education and training facilities.

Accounting of monetary and non-monetary benefits to indirect workers does not pose any problems because the total of monetary and non-monetary benefits are treated as overhead and absorbed on the basis of rate per direct employee hour, if overheads are predominantly employee oriented.

For direct workers, the ideal method is to charge jobs or units produced by supplying per hour rate calculated as below:

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

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



10. EFFICIENCY RATING PROCEDURES

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

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

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

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

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

- 1. Determining standard time/performance standards:** The first step is to determine the standard time taken by a worker for performing a particular job/task. *The standard time can be determined by using Time & Motion study or Work study techniques.* While determining the standard time for a job/task a heterogeneous group of workers is taken and contingency allowances are added for determining standard time.
- 2. Measuring Actual Performance of workers:** For computing efficiency rating it is necessary to develop a procedure for recording the actual performance of workers. The system developed should record the output of each worker along with the time taken by him.
- 3. Computation of efficiency rating:** The efficiency rating of each worker can be computed by using the above mentioned Formula.

10.1 Need for Efficiency Rating

1. As discussed earlier when a firm follows a system of payment by results, the payment has a direct relationship with the output given by a worker. The firm for making payment to worker is required to ascertain his efficiency level.
2. The efficiency rating also helps the management in preparing employee requirement budget or for preparing manpower requirements.

Example - 1: P Ltd. manufactures two products by using one grade of employees. The following estimates are available:

	Product- A	Product- B
Budgeted production (units)	3,480	4,000
Standard hours allowed per product	5	4

It is further worked out that the efficiency rating (efficiency ratio) for productive hours worked by direct workers in actually manufacturing the production is 80% then the exact standard employee-hours requirement can be worked out as follows:

	Product- A	Product- B	Total
Budgeted production (units)	3,480	4,000	
Standard hours allowed for budgeted production	17,400 (3,480 units × 5 hours)	16,000 (4,000 units × 4 hours)	33,400

Since efficiency ratio is given as 80% therefore standard employee hours required for 100% efficiency level is $\left(33,400 \text{ hours} \times \frac{100}{80}\right) = 41,750 \text{ hours}$.

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

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

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

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

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

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



11. EMPLOYEE (LABOUR) TURNOVER

11.1 Employee (Labour) Turnover

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

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

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

- (i) **Replacement Method:** This method takes into consideration *actual replacement* of employees irrespective of number of persons leaving the organisation. Employee Turnover under this method is calculated as under:

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

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

- (ii) **Separation Method:** In this method employee turnover is measured by dividing the total number of employees separated during the period by the average total number of employees on payroll during the same period. Employee Turnover under this method is calculated as under:

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

- (iii) **Flux Method:** This method takes **both the number of replacements as well as the number of separations** during the period into account for calculation of employee turnover. Employee Turnover under this method is calculated as under:

$$\frac{\left(\begin{array}{c} \text{Number of employees} \\ \text{separated} \end{array} + \begin{array}{c} \text{Number of employees} \\ \text{replaced during the period} \end{array} \right)}{\text{Average number of employees during the period on roll}} \times 100$$

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

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

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

Or

$$\frac{\text{No. of Separations} + \text{No. of Accessions}}{\text{Average no. of employees during the period on roll}} \times 100$$

Average number of employees during the period is calculated as follows:

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

Equivalent Employee (Labour) Turnover rate:

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

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

ILLUSTRATION 14

The Accountant of Y Ltd. has computed employee turnover rates for the quarter ended 31st March, 2023 as 10%, 5% and 3% respectively under 'Flux method', 'Replacement method' and 'Separation method' respectively. If the number of workers replaced during that quarter is 30, FIND OUT the number of workers for the quarter

(i) recruited and joined and (ii) left and discharged and (iii) Equivalent employee turnover rates for the year.

SOLUTION**Working Note:**

Average number of workers on roll (for the quarter):

Employee Turnover rate using Replacement method

$$= \frac{\text{No. of replacements}}{\text{Average number of workers on roll}} \times 100$$

$$\text{Or, } \frac{5}{100} = \frac{30}{\text{Average number of workers on roll}}$$

$$\text{Or, Average number of workers on roll} = \frac{30 \times 100}{5} = 600$$

(i) Number of workers recruited and joined:

Employee turnover rate (Flux method)

$$= \frac{\text{No. of Separations * (S) + No. of Accessions (A)}}{\text{Average number of workers on roll}}$$

$$\text{Or, } \frac{10}{100} = \frac{18 + A}{600} \quad \text{Or, } A = \left[\frac{6000}{100} - 18 \right] = 42$$

No. of workers recruited and joined 42.

(ii) Number of workers left and discharged:

Employee turnover rate (Separation method)

$$= \frac{\text{No. of Separations (S)}}{\text{Average number of workers on roll}} \times 100 = \frac{3}{100} = \frac{S}{600} \quad \text{Or, } S^* = 18$$

Hence, number of workers left and discharged comes to 18

(iii) Calculation of Equivalent employee turnover rates:

$$= \frac{\text{Employee Turnover rate for the quarter(s)}}{\text{Number of quarter(s)}} \times 4 \text{ quarters}$$

$$\text{Using Flux method} = \frac{10\%}{1} \times 4 = 40\%$$

$$\text{Using Replacement method} = \frac{5\%}{1} \times 4 = 20\%$$

$$\text{Using Separation method} = \frac{3\%}{1} \times 4 = 12\%$$

11.2 Causes of Employee (Labour) Turnover

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

- (a) Personal Causes;
- (b) Unavoidable Causes; and
- (c) Avoidable Causes.

(a) Personal causes: All the personal reasons which induce or compel an employee to leave his job; such causes include the following:

- (i) Change of jobs for betterment.
- (ii) Premature retirement due to ill health or old age.
- (iii) Domestic problems and family responsibilities.
- (iv) Discontent over the jobs and working environment.

In all the above cases the employee leaves the organisation at his will and, therefore, it is difficult to suggest any possible remedy in the first three cases.

But the last one can be overcome by creating conditions leading to a healthy working environment. For this, officers should play a positive role and make sure that their subordinates work under healthy working conditions.

(b) Unavoidable Causes: Unavoidable causes are those under which it becomes obligatory on the part of management to ask one or more of their employees to leave the organisation; such causes are summed up as listed below:

- (i) Seasonal nature of the business;
- (ii) Shortage of raw material, power, slack market for the product etc.;
- (iii) Change in the plant location;
- (iv) Disability, making a worker unfit for work;
- (v) Disciplinary measures;

(c) Avoidable Causes: Avoidable causes are those which require the attention of management on a continuous basis so as to keep employee turnover ratio as low as possible. The main causes under this case are indicated below:

- (i) Dissatisfaction with job, remuneration, hours of work, working conditions, etc.,
- (ii) Strained relationship with management, supervisors or fellow workers;
- (iii) Lack of training facilities and promotional avenues;
- (iv) Lack of recreational and medical facilities;
- (v) Low wages and allowances.

Proper and timely management action can reduce the employee turnover appreciably so far as avoidable causes are concerned.

11.3 Effects of Employee (Labour) Turnover

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

- (i) Even flow of production is disturbed;
- (ii) Efficiency of new workers is low; productivity of new but experienced workers is low in the beginning;
- (iii) There is increased cost of training and induction;
- (iv) New workers cause increased breakage of tools, wastage of materials, etc.
- (v) Cost of recruitment and training increases.

Cost of Employees (Labour) Turnover: Two types of costs which are associated with employee turnover are:

(a) Preventive Costs: The cost incurred to prevent employee turnover or keep it as lowest as possible. Cost incurred for prevention of employee turnover includes the following:

- (i) Cost of medical benefit provided to the employees;
- (ii) Cost incurred on employees' welfare like pension etc.
- (iii) Cost on other benefits with an objective to retain employees.

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

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

ILLUSTRATION 15

The management of B.R Ltd. is worried about their increasing employee turnover in the factory and before analyzing the causes and taking remedial steps; it wants to have an idea of the profit foregone as a result of employee turnover in the last year.

Last year sales amounted to ₹83,03,300 and P/V ratio was 20 per cent. The total number of actual hours worked by the direct employee force was 4.45 lakhs. The actual direct employee hours included 30,000 hours attributable to training new recruits, out of which half of the hours were unproductive. As a result of the delays by the Personnel Department in filling vacancies due to employee turnover, 1,00,000 potentially productive hours (excluding unproductive training hours) were lost.

The costs incurred consequent on employee turnover revealed, on analysis, the following:

Settlement cost due to leaving	₹43,820
Recruitment costs	₹26,740
Selection costs	₹12,750
Training costs	₹30,490

Assuming that the potential production lost as a consequence of employee turnover could have been sold at prevailing prices, FIND the profit foregone last year on account of employee turnover.

SOLUTION**Workings:****(i) Computation of productive hours**

Actual hours worked (given)	4,45,000
Less: Unproductive training hours	<u>15,000</u>
Actual productive hours	<u>4,30,000</u>

(ii) Productive hours lost:

Loss of potential productive hours + Unproductive training hours
 = 1,00,000 + 15,000 = 1,15,000 hours

(iii) Loss of contribution due to unproductive hours:

$$= \frac{\text{Sales value}}{\text{Actual productive hours}} \times \text{Total unproductive hours}$$

$$= \frac{₹ 83,03,300}{4,30,000 \text{ hrs}} \times 1,15,000 \text{ hours} = ₹22,20,650$$

$$\text{Contribution lost for 1,15,000 hours} = \frac{₹ 22,20,650}{100} \times 20 = ₹4,44,130$$

Computation of profit forgone on account of employee turnover

	(₹)
Contribution foregone (as calculated above)	4,44,130
Settlement cost due to leaving	43,820
Recruitment cost	26,740
Selection cost	12,750
Training costs	30,490
Profit foregone	5,57,930



12. DIRECT EXPENSES

12.1 Direct Expenses

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

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

The above list of expenses is not exhaustive, any other expenses which are directly attributable to the production or service are also included as direct expenses.

12.2 Measurement of Direct Expenses

The direct expenses are measured at invoice or agreed price net of rebate or discount but includes duties and taxes (for which input credit not available), commission and other directly attributable costs.

In case of sub-contracting, where goods are get manufactured by job workers independent of the principal entity, are measured at agreed price. Where the principal supplies some materials to the job workers, the value of such materials and other incidental expenses are added with the job charges paid to the job workers.

12.3 Treatment of Direct Expenses

Direct Expenses form part of the prime cost for the product or service to which it can be directly traceable and attributable. In case of lump-sum payment or one-time payment, the cost is amortised over the estimated production volume or benefit derived.

If the expenses incurred are of insignificant amount i.e. not material, it can be treated as part of overheads.

ILLUSTRATION 16

Aditya Ltd. is an engineering manufacturing company producing job order on the basis of specification given by the customers. During the last the month it has completed three job works namely A, B and C. The following are the items of expenditures which are incurred apart from direct materials and direct employee cost:

- (i) Office and administration cost- ₹ 3,00,000.
- (ii) Product blueprint cost for job A – ₹ 1,40,000
- (iii) Hire charges paid for machinery used for job work B- ₹ 40,000
- (iv) Salary to office attendants- ₹ 50,000

- (v) One time license fee paid for software used to make computerised graphics for job C- ₹ 50,000.
- (vi) Salary paid to marketing manager- ₹ 1,20,000.

Required:

CALCULATE direct expenses attributable to each job.

SOLUTION

Calculation of Direct expenses

Particulars	Job A (₹)	Job B (₹)	Job C (₹)
Product blueprint cost	1,40,000	--	--
Hire charges paid for machinery	--	40,000	--
license fee paid for software	--	--	50,000
Total Direct expenses	1,40,000	40,000	50,000

Note:

- (i) Office and administration cost is classified as overheads.
- (ii) Salary paid to office attendants is classified under office and administration cost.
- (iii) Salary paid to marketing manager is classified under selling overheads

SUMMARY

- ◆ **Employee Cost:** Benefits paid or payable to the employees of an entity, whether permanent or temporary for the services rendered by them. Employee cost includes payments made in cash or kind.
- ◆ **Direct Employee (Labour) Cost:** Benefits paid or payable to the employees which can be attributed to a cost object in an economically feasible manner.

- ◆ **Indirect Employee (Labour) Cost:** Benefits paid or payable to the employees, which cannot be directly attributable to a particular cost object in an economically feasible manner.
- ◆ **Idle Time:** The time for which the employer pays but obtains no direct benefit or for no productive purpose.
- ◆ **Normal Idle Time:** Time which cannot be avoided or reduced in the normal course of business. The cost of normal idle time should be charged to the cost of production.
- ◆ **Abnormal Idle Time:** It arises on account of abnormal causes and should be charged to Costing Profit and Loss account.
- ◆ **Time Keeping:** It refers to recording and keeping of the employees' attendance time.
- ◆ **Time Booking:** It is basically recording the details of work done and the time spent by an employee on each job or process.
- ◆ **Overtime:** Payment to employees, when an employee works beyond the normal working hours. Usually overtime has to be paid at double the rate of normal hours.
- ◆ **Overtime Premium:** It's the amount of extra payment paid to an employee for extra work.
- ◆ **Employee (Labour) Turnover:** It is the rate of change in employee force during a specified period due to resignation, retirement and retrenchment. If the employee turnover is high, it's a sign of instability and may affect the profitability of the firm.
- ◆ **Employee (Labour) turnover can be measured through the following methods:**

(i) Replacement Method:

$$\frac{\text{Number of employees replaced}}{\text{Average number of employees on roll}} \times 100$$

(ii) Separation Method:

$$\frac{\text{Number of employees separated during the year}}{\text{Average number of employees on rolls during the period}} \times 100$$

(iii) Flux Method:

$$\frac{\text{Number of employees separated} + \text{number of employees replaced}}{\text{Average number of employees on rolls during the period}} \times 100$$

(iv) Employee turnover due to new recruitment:

$$\frac{\text{Number of new employees joining in a period (excluding replacements)}}{\text{Average number of employees on the roll in a period}} \times 100$$

(v) Employee turnover including accessions:

$$\frac{\text{Number of new employees joining in a period (excluding replacements)}}{\text{Average number of employees on the roll in a period}} \times 100$$

OR

$$\frac{\text{Number of separations} + \text{number of accessions}}{\text{Average number of employees}} \times 100$$

- ◆ **Time Rate System:** The system of wage payment where wages to an employee is paid on the basis of time irrespective of production volume.
- ◆ **Straight Piece Work:** The system of wage payment where wages is paid on the basis of number of units produced irrespective of time spent for production. Calculation takes number of units produced by the employee multiplied by rate per unit.
- ◆ **Halsey System:** Time taken × Time rate + 50% of time saved × Time rate.
- ◆ **Rowan System:** Time taken × Rate per hour + $\frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \times \text{Rate per hour}$

TEST YOUR KNOWLEDGE

Multiple Choice Questions (MCQs)

1. *Idle time is the time under which-*
 - (a) *Full wages are paid to workers*
 - (b) *No productivity is given by the workers*
 - (c) *Both (a) and (b)*
 - (d) *None of the above*
2. *Cost of idle time due to non-availability of raw material is-*
 - (a) *Charged to overhead costs*
 - (b) *Charged to respective jobs*
 - (c) *Charged to costing profit and loss account*
 - (d) *None of the above*
3. *Time and motion study is conducted by-*
 - (a) *Time keeping department*
 - (b) *Personnel department*
 - (c) *Payroll department*
 - (d) *Engineering department*
4. *Identify, which one of the following, does not account for increasing labour productivity-*
 - (a) *Job satisfaction*
 - (b) *Motivating workers*
 - (c) *High labour turnover*
 - (d) *Proper supervision and control*
5. *Labour turnover is measured by-*
 - (a) *Number of persons replaced/ average number of workers*

- (b) *Numbers of persons separated / number of workers at the beginning of the year*
 - (c) *(Number of persons replaced + number of persons separated)/(number of persons at the beginning + the number of persons at the end of the year)*
 - (d) *None of the above*
6. *Time booking refers to a method wherein of an employee is recorded.*
- (a) *Attendance*
 - (b) *Food expenses*
 - (c) *Health status*
 - (d) *Time spent on a particular job*
7. *Employee Cost includes-*
- (a) *Wages and salaries*
 - (b) *Allowances and incentives*
 - (c) *Payment for overtime*
 - (d) *All of the above*
8. *If the time saved is less than 50% of the standard time, then the wages under Rowan and Halsey premium plan on comparison gives-*
- (a) *More wages to workers under Rowan plan than Halsey plan*
 - (b) *More wages to workers under Halsey plan than Rowan plan*
 - (c) *Equal wages under two plans*
 - (d) *None of the above*
9. *Standard time of a job is 60 hours and guaranteed time rate is ₹0.30 per hour. What is the amount of wages under Rowan plan if job is completed in 48 hours?*
- (a) *₹ 16.20*
 - (b) *₹ 17.28*
 - (c) *₹ 18.00*
 - (d) *₹ 14.40*

10. *Important factors for control of employee cost can be-*
- (a) *Time and Motion Study*
 - (b) *Control over idle time and overtime*
 - (c) *Control over employee turnover*
 - (d) *All of the above*
11. *Out of the following methods attendance is marked by recognizing an employee based on physical and behavioural traits-*
- (a) *Punch Card Attendance method*
 - (b) *Bio- Metric Attendance system*
 - (c) *Attendance Register method*
 - (d) *Token Method*
12. *If overtime is required for meeting urgent orders, the overtime premium should be charged as-*
- (a) *Respective job*
 - (b) *Overhead cost*
 - (c) *Costing P& L A/c*
 - (d) *None of above*

Theoretical Questions

1. *DISCUSS the accounting treatment of Idle time and overtime wages.*
2. *DISCUSS the effect of overtime payment on productivity.*
3. *STATE the circumstances in which time rate system of wage payment can be preferred in a factory.*
4. *DISCUSS the objectives of time keeping & time booking.*
5. *DISCUSS the two types of cost associated with labour turnover.*
6. *DESCRIBE briefly, how wages may be calculated under the following systems:*
 - (i) *Rowan system*
 - (ii) *Halsey system*

Practical Problems

1. Mr. A. is working by employing 10 skilled workers. He is considering the introduction of some incentive scheme - either Halsey Scheme (with 50% bonus) or Rowan Scheme - of wage payment for increasing the Employee productivity to cope with the increased demand for the product by 25%. He feels that if the proposed incentive scheme could bring about an average 20% increase over the present earnings of the workers, it could act as sufficient incentive for them to produce more and he has accordingly given this assurance to the workers.

As a result of the assurance, the increase in productivity has been observed as revealed by the following figures for the current month:

Hourly rate of wages (guaranteed)	₹40
Average time for producing 1 piece by one worker at the previous performance (This may be taken as time allowed)	2 hours
No. of working days in the month	25
No. of working hours per day for each worker	8
Actual production during the month	1,250 units

Required:

- (i) CALCULATE effective rate of earnings per hour under Halsey Scheme and Rowan Scheme.
 - (ii) CALCULATE the savings to Mr. A in terms of direct labour cost per piece under the schemes.
2. Wage negotiations are going on with the recognised employees' union, and the management wants you as an executive of the company to formulate an incentive scheme with a view to increase productivity.

The case of three typical workers A, B and C who produce respectively 180, 120 and 100 units of the company's product in a normal day of 8 hours is taken up for study.

Assuming that day wages would be guaranteed at ₹ 75 per hour and the piece rate would be based on a standard hourly output of 10 units, CALCULATE the earnings of each of the three workers and the employee cost

per 100 pieces under (i) Day wages, (ii) Piece rate, (iii) Halsey scheme, and (iv) The Rowan scheme.

Also CALCULATE under the above schemes the average cost of labour for the company to produce 100 pieces.

3. The following expenditures were incurred in Aditya Ltd. For the month of March 2023:

		(₹)
(i)	Paid for power & fuel	4,80,200
(ii)	Wages paid to factory workers	8,44,000
(iii)	Bill paid to job workers	9,66,000
(iv)	Royalty paid for production	8,400
(v)	Fee paid to technician hired for the job	96,000
(vi)	Administrative overheads	76,000
(vii)	Commission paid to sales staffs	1,26,000

You are required to CALCULATE direct expenses for the month.

Case Scenarios

- The board of the J Ltd. has been appraised by the General Manager (HR) that the employee attrition rate in the company has increased. The following facts has been presented by the GM(HR):
 - Training period of the new recruits is 50,000 hours. During this period their productivity is 60% of the experienced workers. Time required by an experienced worker is 10 hours per unit.
 - 20% of the output during training period was defective. Cost of rectification of a defective unit was ₹25.
 - Potential productive hours lost due to delay in recruitment were 1,00,000 hours.
 - Selling price per unit is ₹180 and P/V ratio is 20%.
 - Settlement cost of the workers leaving the organization was ₹1,83,480.

(6) Recruitment cost was ₹1,56,340

(7) Training cost was ₹1,13,180

You being an associate finance to GM(HR), has been asked the following questions:

(i) How much quantity of output is lost due to labour turnover?

(a) 10,000 units

(b) 8,000 units

(c) 12,000 units

(d) 12,600 units

(ii) How much loss in the form of contribution, the company incurred due to labour turnover?

(a) ₹4,32,000

(b) ₹4,20,000

(c) ₹4,36,000

(d) ₹4,28,000

(iii) What is the cost repairing of defective units?

(a) ₹75,000

(b) ₹15,000

(c) ₹50,000

(d) ₹25,000

(iv) Calculate the profit lost by the company due to increased labour turnover.

(a) ₹7,50,000

(b) ₹15,00,000

(c) ₹5,00,000

(d) ₹9,00,000

(v) How much quantity of output is lost due to inexperience of the new worker?

(a) 1,000 units

(b) 2,600 units

(c) 2,000 units

(d) 12,600 units

ANSWERS

Answers to the MCQs

1.	(c)	2.	(c)	3.	(d)	4.	(c)	5.	(a)	6.	(d)
7.	(d)	8.	(a)	9.	(b)	10.	(d)	11.	(b)	12.	(a)

Answers to the Theoretical Questions

1. Please refer paragraph 5 & 6
2. Please refer paragraph 6
3. Please refer paragraph 8.1
4. Please refer paragraph 4.1 & 4.2
5. Please refer paragraph 11.3
6. Please refer paragraph 8.3

Answers to the Practical Problems

1. Working Notes:

1. Actual time taken to produce 1,250 pieces

$$= \text{No. of working days in the month} \times \text{No. of working hours per day of each worker} \times \text{No. of workers}$$

$$= 25 \text{ days} \times 8 \text{ hrs.} \times 10 \text{ workers} = 2,000 \text{ hours}$$
2. Total time wages of 10 workers per month:

$$= \text{No. of working days in the month} \times \text{No. of working hours per day of each worker} \times \text{Hourly rate of wages} \times \text{No. of workers}$$

$$= 25 \text{ days} \times 8 \text{ hrs.} \times ₹40 \times 10 \text{ workers} = ₹80,000$$

3. Time saved per month:

Time allowed per piece to a worker	2 hours
No. of units produced during the month by 10 workers	1,250 pieces
Total time allowed to produce 1,250 pieces (1,250 × 2 hours)	2,500 hours
Actual time taken to produce 1,250 pieces	2,000 hours
Time saved (2,500 hours – 2,000 hours)	500 hours

4. Bonus under Halsey scheme to be paid to 10 workers:

$$\begin{aligned}\text{Bonus} &= (50\% \text{ of time saved}) \times \text{hourly rate of wages} \\ &= 50/100 \times 500 \text{ hours} \times ₹40 = ₹10,000\end{aligned}$$

Total wages to be paid to 10 workers are (₹80,000 + ₹10,000) ₹90,000, if Mr. A considers the introduction of Halsey Incentive Scheme to increase the employee productivity.

5. Bonus under Rowan Scheme to be paid to 10 workers:

$$\begin{aligned}\text{Bonus} &= \frac{\text{Time taken}}{\text{Time allowed}} \times \text{Time saved} \times \text{hourly rate} \\ &= \frac{2,000 \text{ hours}}{2,500 \text{ hours}} \times 500 \text{ hours} \times ₹40 = ₹16,000\end{aligned}$$

Total wages to be paid to 10 workers are (₹80,000 + ₹16,000) ₹96,000, if Mr. A considers the introduction of Rowan Incentive Scheme to increase the Employee productivity.

- (i) (a) Effective hourly rate of earnings under Halsey scheme:

(Refer to Working Notes 1, 2, 3 and 4)

$$\begin{aligned}&= \frac{\text{Total time wages of 10 workers} + \text{Total bonus under Halsey scheme}}{\text{Total hours worked}} \\ &= \frac{₹80,000 + ₹10,000}{2,000 \text{ hours}} = ₹45\end{aligned}$$

- (b) Effective hourly rate of earnings under Rowan scheme:

(Refer to Working Notes 1, 2, 3 and 5)

$$\begin{aligned}
 &= \frac{\text{Total time wages of 10 workers} + \text{Total bonus under Rowan scheme}}{\text{Total hours worked}} \\
 &= \frac{\text{₹ 80,000} + \text{₹16,000}}{2,000 \text{ hours}} = \text{₹48}
 \end{aligned}$$

- (ii) (a) Saving in terms of direct Employee cost per piece under Halsey scheme:

(Refer to Working Note 4)

Employee cost per piece (under time wage scheme)

$$= 2 \text{ hours} \times \text{₹40} = \text{₹80.}$$

Employee cost per piece (under Halsey scheme)

$$= \frac{\text{Total wages paid under the scheme}}{\text{Total number of units produced}} = \frac{\text{₹ 90,000}}{1,250} = \text{₹72}$$

$$\text{Saving per piece: } (\text{₹80} - \text{₹72}) = \text{₹8}$$

(b) Saving in terms of direct Employee cost per piece under Rowan Scheme:

(Refer to Working Note 5)

Employee cost per piece under Rowan scheme

$$= \text{₹96,000} / 1,250 \text{ units} = \text{₹76.80}$$

$$\text{Saving per piece} = \text{₹80} - \text{₹76.80} = \text{₹3.20}$$

2. Calculation of earnings under different wage schemes:

(i) Day wages

Worker	Day wages (₹)	Actual Output (Units)	Labour cost per 100 pieces (₹)
A	600	180	333.33
B	600	120	500.00
C	600	100	600.00
Total	1,800	400	

Average labour cost to produce 100 pieces:

$$= \frac{\text{Total wages paid}}{\text{Total output}} \times 100 = \frac{\text{₹ 1,800}}{400 \text{ units}} \times 100 = \text{₹ 450}$$

(ii) Piece rate

Worker	Actual Output (Units)	Piece rate (₹)	Wages earned (₹)	Labour cost per 100 pieces (₹)
A	180	7.50	1,350	750.00
B	120	7.50	900	750.00
C	100	7.50	750	750.00
Total	400		3,000	

Average cost of labour for the company to produce 100 pieces:

$$= \frac{\text{₹ 3,000}}{400 \text{ units}} \times 100 = \text{₹ 750}$$

(iii) Halsey Scheme

Worker	Actual Output (Units)	Std. time (Hrs.)	Actual time (Hrs.)	Time saved (Hrs.)	Bonus hours (50% of time saved)	Rate per hour (₹)	Total wages (₹)	Labour cost per 100 pieces (₹)
	A	B	C	D=B-C	E	F	G = F x (C+E)	H=G/A*100
A	180	18	8	10	5	75	975	541.67
B	120	12	8	4	2	75	750	625.00
C	100	10	8	2	1	75	675	675.00
Total	400						2,400	

Average cost of labour for the company to produce 100 pieces =

$$= \frac{\text{₹ 2,400}}{400 \text{ units}} \times 100 = \text{₹ 600}$$

(iv) Rowan Scheme:

Worker	Actual Output (Units)	Std. time (Hrs.)	Actual time (Hrs.)	Time saved (Hrs.)	Bonus hours*	Rate per hour (₹)	Total wages including bonus (₹)	Labour cost per 100 pieces (₹)
	A	B	C	D=B-C	E	F	G=F×(C+E)	H=G/A×100
A	180	18	8	10	4.44	75	933	518.33
B	120	12	8	4	2.67	75	800	666.67
C	100	10	8	2	1.60	75	720	720.00
Total	400						2,453	

$$* \text{ Bonus hours} = \frac{\text{Time Saved}}{\text{Std. Time}} \times \text{Actual time}$$

Average cost of labour for the company to produce 100 pieces

$$= \frac{₹ 2,453}{400 \text{ units}} \times 100 = ₹ 613.25$$

3. Calculation of Direct Expenses

		(₹)
(i)	Paid for power & fuel	4,80,200
(ii)	Bill paid to job workers	9,66,000
(iii)	Royalty paid for production	8,400
(iv)	Fee paid to the technician	96,000
	Total Direct expenses	15,50,600

Notes:

- (i) Wages paid to factory workers is direct employee cost.
- (ii) Administrative overhead is indirect expense.
- (iii) Commission paid to sales staffs comes under selling expenses.

Answers To The Case Scenarios

1.

i.	(c)	ii.	(a)	iii.	(b)	iv.	(d)	v.	(c)

(i) (c) Output by experienced workers in 50,000 hours

$$= \frac{50,000}{10} = 5,000 \text{ units}$$

∴ Output by new recruits = 60% of 5,000 = 3,000 units

Loss of output = 5,000 – 3,000 = 2,000 units

Total loss of output = Due to delay recruitment + Due to inexperience
= 10,000 + 2,000 = 12,000 units

(ii) (a) Contribution per unit = 20% of ₹180 = ₹ 36

Total contribution lost = ₹36 × 12,000 units = ₹ 4,32,000

(iii) (b) Cost of repairing defective units = 3,000 units × 0.2 × ₹ 25
= ₹ 15,000

(iv) (d) **Calculation of loss of profit due to labour turnover**

	(₹)
Loss of Contribution	4,32,000
Cost of repairing defective units	15,000
Recruitment cost	1,56,340
Training cost	1,13,180
Settlement cost of workers leaving	1,83,480
Profit forgone in 2022-23	9,00,000

(v) (c) Output by experienced workers in 50,000 hours

$$= \frac{50,000}{10} = 5,000 \text{ units}$$

∴ Output by new recruits = 60% of 5,000 = 3,000 units

Loss of output = 5,000 – 3,000 = 2,000 units

OVERHEADS- ABSORPTION COSTING METHOD

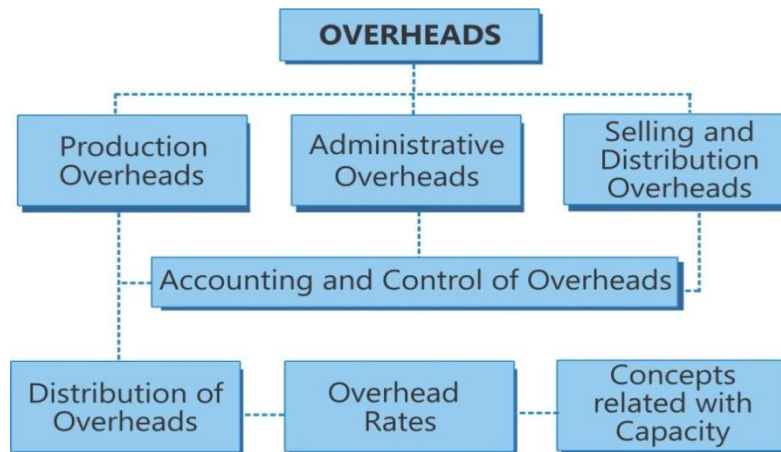


LEARNING OUTCOMES

After studying this chapter, you would be able to-

- ◆ Discuss the meaning of Overheads-Production, Administrative and Selling & Distribution.
- ◆ Discuss the meaning and methods of allocation, apportionment and absorption of overheads.
- ◆ Discuss the meaning and treatment of under-absorption and over-absorption of overheads and apply the same in cost computation.
- ◆ State the accounting and control of administrative, selling and distribution overheads.
- ◆ Discuss and apply the various methods to calculate overhead rate.

CHAPTER OVERVIEW



1. INTRODUCTION

Overheads are the expenditure which cannot be conveniently traced to or identified with any particular cost unit. *Such expenses are incurred for output generally and not for a particular work order* e.g., wages paid to watch and ward staff, heating and lighting expenses of factory etc. Overheads are also very important cost element along with direct materials and direct employees. Often in a manufacturing concern, overheads exceed direct wages or direct materials and at times even both put together. On this account, it would be a grave mistake to ignore overheads either for the purpose of arriving at the cost of a job or a product or for controlling total expenditure.

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

Overheads are incurred not only in the factory of production but also on administration, selling and distribution.



2. CLASSIFICATION OF OVERHEADS

	Description	Example
By Function		
Factory or Manufacturing or Production Overhead	Manufacturing overhead is the indirect cost incurred for manufacturing or production activity in a factory. <i>Manufacturing overhead includes all expenditures incurred from the procurement of materials to the completion of finished product.</i>	(i) Stock keeping expenses, (ii) Repairs and maintenance of plant, (iii) Depreciation of factory building, (iv) Indirect labour, (v) cost of primary packing (vi) Insurance of plant and machinery etc. Production overhead include administration costs relating to production, factory, works or manufacturing.
Office and Administrative Overheads	Office and Administrative overheads are expenditures incurred on all activities relating to <i>general management and administration</i> of an organisation. It includes formulating the policy, directing the organisation and controlling the operations of an undertaking which is not related directly to production, selling, distribution, research or development activity or function.	(i) Salary paid to office staffs, (ii) Repairs and maintenance of office building, (iii) Depreciation of office building (iv) postage and stationery, (v) Lease rental in case of operating lease (in case of finance lease, lease rental excluding finance cost) (vi) accounts and audit expenses etc.

Selling and Distribution Overheads	(i) Selling overhead: expenses related to sale of products and include all indirect expenses in <i>sales management</i> for the organisation. (ii) Distribution overhead: cost incurred on <i>making product available for sale in the market</i>.	(i) Salesmen commission, (ii) Advertisement cost, (iii) Sales office expenses etc. (i) Delivery van expenses, (ii) Transit insurance, (iii) warehouse and cold storage expenses, (iv) secondary packing expenses etc.
By Nature		
Fixed Overhead	These are the costs which are incurred for a period , and which, within certain output and turnover limits, tend to be unaffected by fluctuations in the levels of activity (output or turnover). <i>They do not tend to increase or decrease with the changes in output.</i>	(i) Salary paid to permanent employees, (ii) Depreciation of building and plant and equipment, (iii) Interest on capital, (iv) Insurance.
Variable Overhead	These costs tend to <i>vary with the volume of activity</i> . Any increase in the activity results in an increase in the variable cost and vice-versa.	(i) Indirect materials, (ii) Power and fuel, (iii) lubricants, (iv) tools and spares etc.
Semi-Variable Overheads	These costs contain both fixed and variable components and are thus partly affected by fluctuations in the level of activity.	(i) Electricity cost, (ii) water cost, (iii) telephone and internet expenses etc.

By Element		
Indirect materials	Materials which <i>do not normally form part of the finished product</i> (cost object) are known as indirect materials.	(i) Stores used for maintaining machines and buildings (lubricants, cotton waste, bricks etc.) (ii) Stores used by service departments like power house, boiler house, canteen etc.
Indirect employee cost	Employee costs which <i>cannot be allocated but can be apportioned</i> to or absorbed by cost units or cost centres is known as indirect employee.	(i) Salary paid to foreman and supervisor. (ii) Salary paid to administration staff etc.
Indirect expenses	Expenses other than direct expenses are known as indirect expenses, that cannot be directly, conveniently and wholly allocated to cost centres.	(i) Rates & taxes, (ii) insurance, (iii) depreciation, (iv) advertisement expenses etc.
By Control		
Controllable costs	These are those costs which can be controlled by the implementation of appropriate managerial influence and proper policies.	(i) Materials cost, (ii) wages and salary, (iii) power and fuel etc.
Uncontrollable costs	Overhead costs which cannot be controlled by the management even after the implementation of appropriate managerial influence and proper policies are known as uncontrollable costs.	(i) Rates and taxes, (ii) Depreciation, (iii) Interest on borrowings.

2.1 Advantages of Classification of Overheads into Fixed and Variable

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

- (a) **Controlling Expenses:** The classification of expenses into fixed and variable components helps in controlling expenses. Fixed costs are generally policy costs, which cannot be easily reduced. They are incurred irrespective of the output and hence are more or less non controllable. Variable expenses vary with the volume of activity and the responsibility for incurring such expenditure is determined in relation to the output. The management can control these costs by giving proper allowances in accordance with the output achieved.
- (b) **Preparation of Budget Estimates:** The segregation of overheads into fixed and variable part helps in the preparation of flexible budget. It enables a firm to estimate costs at different levels of activity and make comparison with the actual expenses incurred.

Suppose in October, 2022 the output of a factory was 1,000 units and the expenses were:

	(₹)
Fixed	5,00,000
Variable	4,00,000
Semi-variable (40% fixed)	<u>6,00,000</u>
	<u>15,00,000</u>

In November, 2022 the output was likely to increase to 1,200 units. In that case the budget or estimate of expenses will be:

	(₹)
Fixed	5,00,000
Variable $\left(\frac{₹ 4,00,000 \times 1,200 \text{ units}}{1,000 \text{ units}} \right)$	4,80,000

Semi-variable

Fixed, 40% of ₹ 6,00,000	2,40,000
Variable: $\left[\frac{₹ 3,60,000 \times 1,200 \text{ units}}{1,000 \text{ units}} \right]$	<u>4,32,000</u>
	<u>16,52,000</u>

It would be a mistake to think that with the output going up from 1,000 units to 1,200 units the expenses would increase proportionately to ₹ 18,00,000. This would be wrong budgeting.

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

In fact, when any change is contemplated, say, increase or decrease in production, change in the process of manufacture or distribution, it is necessary to know the total effect on cost (or revenue) and that would be impossible without a correct segregation of fixed and variable costs. The technique of marginal costing, cost volume profit relationship and break-even analysis are all based on such segregation.



3. ACCOUNTING AND CONTROL OF MANUFACTURING OVERHEADS

We have already seen that overheads are by nature those costs which cannot be directly related to a product or to any other cost unit. Yet for working out the total cost of a product or a unit of service, the overheads must be included. Thus, we have to find out a way by which the overheads can be distributed over the various units of production.

One method of working out the distribution of overheads over the various products could be to ascertain the amount of actual overheads and distribute them over the products. This, however, creates a problem since the actual amount of overheads can be known only after the financial accounts are closed. If we wait that long, the cost sheets lose their main advantages and utility to the

management. All the decisions for which cost sheets are prepared are immediate decisions and cannot be postponed till the actual overheads are known. Therefore, some method has to be found by which overheads can be included in the cost of the products, as soon as prime cost, the cost of raw materials, direct employees and other direct expenses, is ascertained.

One method is to work out pre-determined rates for absorbing overheads.

These rates are worked out before an accounting period begins by estimating the amount of overheads and the level of activity in the ensuing period. Thus, as soon as the prime cost of a product or a job is available, the various overheads are charged by these rates. Of course, this implies that the overheads are charged on an estimated basis. Later, when the actual overheads are known, the difference between the overheads charged to the products and actual overheads is worked out and adjusted.

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

1. **Estimation and Collection of Manufacturing Overheads:** The first stage is to estimate the amount of overheads, keeping in view the past figures and adjusting them for known future changes. *The sources available for the collection of factory overheads may include (a) Invoices, (b) Stores requisition, (c) Wage analysis book (d) Journal entries. etc.*
2. **Assignment of Manufacturing Overheads:** The guiding principle for assignment of manufacturing overheads to a cost object is the traceability of the overheads in an economically feasible manner.

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

- (i) **Cause and Effect:** Cause is the process or operation or activity and effect is the incurrence of cost.
- (ii) **Benefit received:** Manufacturing overheads are to be apportioned to various cost objects in proportion to the benefits received by them.

- (a) **Cost Allocation:** The term '**allocation**' refers to the **direct assignment of cost to a cost object which can be traced directly**. It implies relating overheads directly to the various departments. The estimated amount of various items of manufacturing overheads should be allocated to various cost centres or departments. For example- if a separate power meter has been installed for a department, the entire power cost ascertained from the meter is allocated to that department. The salary of the works manager cannot be directly allocated to any one department since he looks after the whole factory. It is, therefore, obvious that many overhead items will remain unallocated after this step.
- (b) **Cost Apportionment:** There are some items of estimated overheads (like the salary of the works manager) which cannot be directly allocated to the various departments and cost centres. Such unallocable expenses are to be spread over the various departments or cost centres on the basis of two principles. This is called apportionment. Thus, apportionment implies "*the allotment of proportions of items of cost to cost centres or departments*". After this stage, all the overhead costs would have been either allocated to or apportioned over the various departments.
- (c) **Re-apportionment:** Upto the last stage all overheads are allocated and apportioned to all the departments- both production and service departments. **Service departments are those departments which do not directly take part in the production of goods or providing services**. Such departments provide auxiliary services across the entity and renders services to other cost centres and in some cases to outside parties. Examples of such departments are engineering, quality control and assurance, laboratory, canteen, stores, time office, dispensary etc. The overheads of these departments are to be shared by the production departments since service departments operate primarily for the purpose of providing services to production departments. **The process of assigning service department overheads to production departments is called reassignment or re-apportionment**. At this stage, all the factory overheads are collected under production departments.

3. **Absorption:** After completing the distribution as stated above the overheads charged to department are to be recovered from the output produced in respective departments. **This process of recovering overheads of a department or any other cost center from its output is called recovery or absorption.**

Absorption of manufacturing overheads shall be as follows:

- (i) **Variable Manufacturing overheads:** The variable manufacturing overheads shall be absorbed on the basis of actual production.
- (ii) **Fixed Manufacturing overheads:** The fixed manufacturing overhead shall be absorbed on the basis of normal capacity.

The overhead expenses can be absorbed by estimating the overhead (as assigned above) and then working out an absorption rate. When overheads are estimated, their absorption is carried out by adopting a pre-determined overhead absorption rate. This rate can be calculated by using any one method as discussed in this chapter at the end.

As the actual accounting period begins, each unit of production automatically absorbs a certain amount of factory overheads through pre-determined rates. During the year a certain amount will be absorbed over the various products. This is known as the total amount of absorbed overheads.

4. **Treatment of over and under absorption of overheads:** After the year end the total amount of actual factory overheads is known. There is bound to be some difference between the actual amount of overheads and the absorbed amount of overheads. So, the overheads are generally either under-absorbed or over-absorbed. The difference has to be adjusted keeping in view of such differences and the reasons therefore.

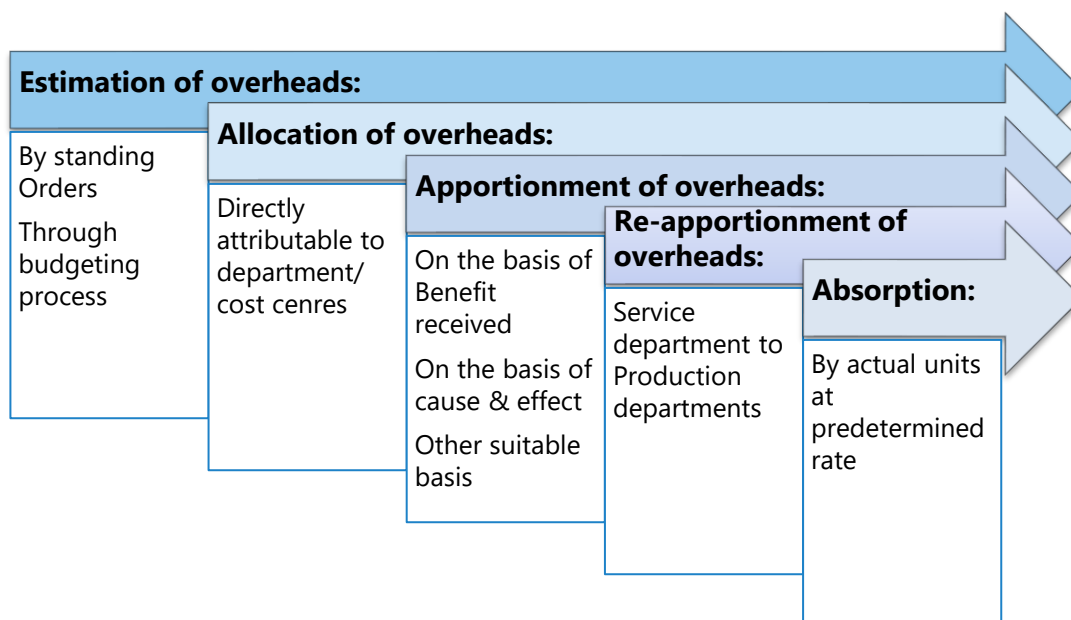
Students will thus see that the whole discussion as above is meant to serve the following two purposes:

- (a) to charge various products and services with an equitable portion of the total amount of factory overheads; and
- (b) to charge factory overheads immediately as the product or the job is completed without waiting for the figures of actual factory overheads.



4. STEPS FOR THE DISTRIBUTION OF OVERHEADS

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



4.1 Estimation and Collection of Overheads

The amount of overheads is required to be estimated. The estimation is usually done with reference to past data adjusted for known future changes. **The overhead expenses are usually collected through a system of standing orders.**

Standing Orders: In every manufacturing business, expenses are incurred on direct materials and direct labour in respect of several jobs or other units of production. Incurrence of these expenses are authorised by production orders or work orders. The term "*Standing Order*" denotes sanction for indirect expenses under various heads of expenditure.

In large factories, usually the classification of indirect expenditures is combined with a system of Standing Orders (sometimes also referred as Service "Orders"). It is a **system under which a number is allotted to each item of expense for the purpose of identification**, and the same is continued from year to year. The extent of such analysis and the nomenclature adopted are settled by the management according to the needs of the industry.

4.2 Allocation of Overheads over Various Departments or Departmentalisation of Overheads

Most of the manufacturing processes functions are performed in different departments of a factory. Some of the departments of the factory are engaged in production process while few may function as ancillary departments. The ancillary departments are service departments supporting the production departments in manufacturing, administration, selling & distribution of goods or services.

Factory overheads which are related to any of the production or service departments are allocated to these departments.

A department may be sub-divided into various cost centres for better cost control and performance evaluation. It is thus obvious that the principal object of setting up cost centres is to collect data, in respect of similar activities more conveniently. This avoids a great deal of cost analysis. When costs are collected by setting up cost centres, several items can be ascertained definitely and the element of estimation is reduced considerably. For instance, the allowance of the normal idle time or the amount to be spent on consumable stores, etc. There are two main types of cost centres - machine or personnel - depending on whether the process of manufacture is carried on at a centre by man or machine. For the convenience of recording of expenditure, cost centres are sometimes allotted a code number.

Advantages of Departmentalisation: The collection of overheads department wise gives rise to the following advantages:

- (a) *Better Estimation of Expenses:* Some expenses which relate to the departments will be estimated almost on an exact basis and, to that extent, the accuracy of estimation of overheads will be higher.

- (b) *Better Control:* For the purpose of controlling expenses in a department, it is obviously necessary that the figures in relation to each department should be separately available. It is one of the main principles of control that one should know for each activity how much should have been spent and how much is actually spent. If information about expenses is available only for factory as a whole, it will not be possible to know which department has been over spending.
- (c) *Ascertainment of Cost for each department:* From the point of view of ascertaining the cost of each job, the expenses incurred in the departments through which the job or the product has passed should be known. It is only then that the cost of the job or the product can be charged with the appropriate share of indirect expenses. It is not necessary that a job must pass through all the departments or that the work required in each department should be the same for all jobs. It is, therefore, necessary that only appropriate charge in respect of the work done in the department is made. This can be done only if overheads for each department are known separately.
- (d) *Suitable Method of Costing:* A suitable method of costing can be followed differently for each department e.g., batch costing when a part is manufactured, but single or output costing when the product is assembled.

4.3 Apportioning Overhead Expenses over Various Departments

Overheads which are related to more than one department are required to be distributed between/ among the departments. This distribution of overheads between/ among the departments is called apportionment. The example of overheads may include e.g. rent of building, power, lighting, insurance, depreciation etc. To apportioning these overheads over different departments benefiting thereby, it is necessary at first to determine the proportion of benefit received by each department and then distribute the total expenditure proportionately on that basis. But the same basis of apportionment cannot be followed for different items of overheads since the benefit of service to a department in each case has to be measured differently. Some of the bases that may be adopted for the apportionment of expenses are stated below:

Overhead Cost	Bases of Apportionment
1. (i) Rent and other building expenses (ii) Lighting and heating (conditioning) (iii) Fire precaution service (iv) Air- conditioning	Floor area, or volume of department
2. (i) Perquisites (ii) Labour welfare expenses (iii) Time keeping (iv) Personnel office (v) Supervision	Number of workers
3. (i) Compensation to workers (ii) Holiday pay (iii) ESI and PF contribution (iv) Perquisites	Direct wages
4. General overhead	Direct labour hour, or Direct wages, or Machine hours.
5. (i) Depreciation of plant and machinery (ii) Repairs and maintenance of plant and machinery (iii) Insurance of stock	Capital values
6. (i) Power/steam consumption (ii) Internal transport (iii) Managerial salaries	Technical estimates
7. Lighting expenses (light)	No. of light points, or Area or Metered units
8. Electric power (machine operation)	Horse power of machines, or Number of machine hour, or value of machines or units consumed.
9. (i) Material handling (ii) Stores overhead	Weight of materials, or volume of materials, or value of materials or unit of materials.

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

- (a) Analysis or survey of existing conditions.
- (b) Ability to pay.
- (c) Efficiency or incentive.

A concern may have predominantly only one criterion or may use all (including the service or benefit criterion) for different phases of its activity.

- (a) **Analysis or Survey of existing conditions:** At times it may not be possible to determine the advantage of an item of expenses without undertaking an analysis of expenditure. For example, lighting expenses can be distributed over departments only on the basis of the number of light points fixed in each department.
- (b) **Ability to pay:** It is a principle of taxation which has been applied in cost accounting as well for distributing the expenditure on the basis of income of the paying department, on a proportionate basis. For example, if a company is selling three different products in a territory, it may decide to distribute the expenses of the sales organisation to the amount of sales of different articles in these territories. This basis, though simple to apply, may be inequitable since the expenditure charged to an article may have no relation to the actual effort involved in selling it. Easy selling lines thus may have to bear the largest proportion of expenses while, on the other hand, these should bear the lowest charge.
- (c) **Efficiency or Incentives:** Under this method, the distribution of overheads is made on the basis of pre-determined levels of production or sales. When distribution of overhead cost is made on this basis and if the level of production exceeds the pre-determined level of production the incidence of overhead cost gets reduced and the total cost per unit of production or of sales, lowered. The opposite is the effect if the assumed levels are not reached.

Thus, the department whose sales are increasing is able to show a greater profit and thereby is able to earn greater goodwill and appreciation of the management than it would have if the distribution of overheads was made otherwise.

Difference between Allocation and Apportionment

The difference between the allocation and apportionment is important to understand because the purpose of these two methods is the identification of the items of cost to cost units or centers. However, the main difference between the above methods is given below.

Allocation	Apportionment
<i>Allocation</i> deals with the whole items of cost, which are identifiable with any one department. For example, indirect wages of three departments are separately obtained and hence each department will be charged by the respective amount of wages individually.	<i>Apportionment</i> deals with the proportions of an item of cost for example; the cost of the benefit of a service department will be divided between those departments which has availed those benefits.
<i>Allocation</i> is a direct process of charging expenses to different cost centres	<i>Apportionment</i> is an indirect process because there is a need for the identification of the appropriate portion of an expense to be borne by the different departments benefited.

- The allocation or apportionment of an expense is not dependent on its nature, but the relationship between the expense and the cost centre decides that whether it is to be allocated or apportioned.
- Allocation is a much wider term than apportionment.

4.4 Re-apportionment of Service Department Overheads over Production Departments

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

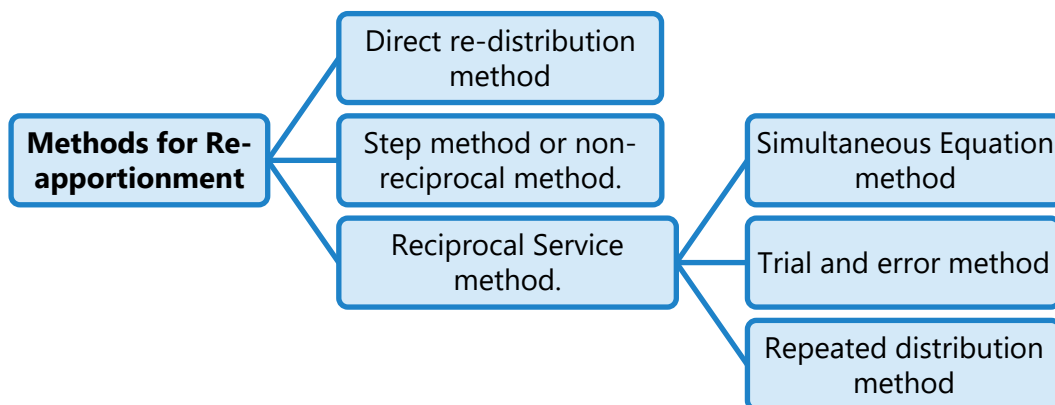
Cost of the Service Departments:	Basis
1. Maintenance and Repair shop 2. Planning and progress 3. Tool room	Direct labour hours, Machine hours, Direct labour wages, Asset value x Hours worked
4. Canteen and Welfare 5. Hospital and Dispensary 6. Personnel Department	No of direct workers No. of employees etc.
7. Time-keeping	No. of card punched, No. of employees
8. Computer Section	Computer hours, Specific allocation to departments
9. Power House (electric lighting cost)	Floor area, Cubic content, No. of electric Points, Wattage.
10. Power House (electric power cost)	Horse power, Kwh, Horse power × Machine hours, Kwh × Machine hours
11. Stores Department	No. of requisitions, Weight or value of Materials issued.
12. Transport Department	Crane hours, Truck hours, Truck mileage, Truck tonnage, Truck ton-hours, Tonnage handled. No. of packages of Standard size
13. Fire Protection	Capital values
14. Inspection	Inspection hours

Notes:

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

Methods for Re-apportionment: The re-apportionment of service department expenses over the production departments may be carried out by using any one of the following methods:

- (i) Direct re-distribution method.
- (ii) Step method of secondary distribution or non-reciprocal method.
- (iii) Reciprocal Service method.



- (i) **Direct Re-Distribution Method:** Service department costs under this method are apportioned over the production departments only, **ignoring the services rendered by one service department to the other.** To understand the applications of this method, go through the illustration which follows.

ILLUSTRATION 1

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

Production Departments:	(₹)	(₹)
Dept. -A	30,00,000	
Dept. -B	26,00,000	
Dept. -C	24,00,000	80,00,000
Service Departments:	(₹)	(₹)
Stores	4,00,000	
Time-keeping and Accounts	3,00,000	
Power	1,60,000	
Canteen	1,00,000	9,60,000

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

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

PREPARE a statement apportioning the costs of service departments over the production departments using direct re-distribution method.

SOLUTION

Secondary Overhead Distribution Statement

Items of cost (as per primary distribution summary)	Basis of apportionment	Total (₹)	Production Departments		
			A (₹)	B (₹)	C (₹)
Cost as per primary distribution summary		80,00,000	30,00,000	26,00,000	24,00,000
Stores (5:3:2)	Value of Store requisition	4,00,000	2,00,000	1,20,000	80,000
Time-keeping and Accounts (4:3:3)	No. of workers	3,00,000	1,20,000	90,000	90,000
Power (3:3:2)	H.P. of Machine	1,60,000	60,000	60,000	40,000
Canteen (4:3:3)	No. of workers	1,00,000	40,000	30,000	30,000
		89,60,000	34,20,000	29,00,000	26,40,000

- (ii) **Step Method or Non-Reciprocal Method:** This method gives cognizance to the services rendered by service department to another service department. Therefore, as compared to previous method, this method is more complicated because a sequence of apportionments has to be selected here. **The sequence here begins with the department that renders maximum number of services to the other service department(s).** In other words, the cost of the

service department that serves the largest number of services to the other service department(s) and production department(s) is distributed first. After this, the cost of service department serving the next largest number of departments is apportioned.

This process continues till the cost of last service department is apportioned. The cost of last service department is apportioned among production departments only.

Some authors are of the view that the cost of service department with largest amount of cost should be distributed first.

ILLUSTRATION 2

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

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

PREPARE a statement apportioning the costs of service departments over the production departments using step method.

SOLUTION

Summary of Overhead Distribution

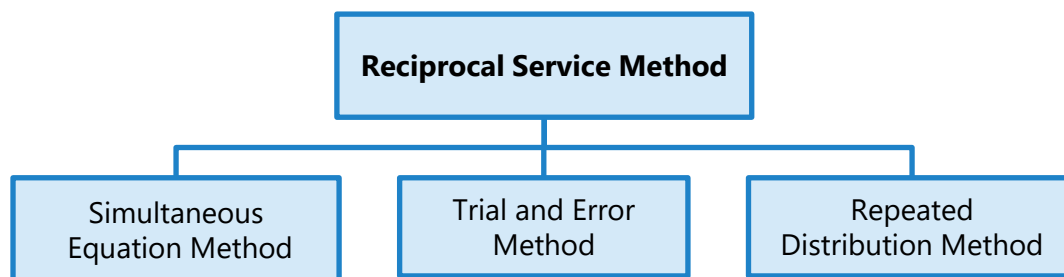
Departments	X (₹)	Y (₹)	A (₹)	B (₹)
Amount as given above	2,00,000	1,50,000	3,00,000	3,20,000
Expenses of service dept.-X is apportioned among other departments- Y, A and B in the ratio (5:8:7)	(2,00,000)	50,000	80,000	70,000
		2,00,000	3,80,000	3,90,000

Expenses of Dept.-Y appportioned between department A and B in the ratio (2:3)	-	(2,00,000)	80,000	1,20,000
Total	Nil	Nil	4,60,000	5,10,000

(iii) Reciprocal Service Method: This method recognises the fact that where there are two or more service departments they may render services to each other and, therefore, these **inter-departmental services are to be given due weight** while re-distributing the expenses of the service departments.

The methods available for dealing with reciprocal services are:

- (a) Simultaneous equation method;
- (b) Trial and error method;
- (c) Repeated distribution method.



(a) Simultaneous Equation Method:

According to this method firstly, *the costs of service departments are ascertained*. These costs are then re-distributed to production departments on the basis of given percentages. (Refer to the following illustration to understand the method)

ILLUSTRATION 3

Service departments' expenses

	(₹)
<i>Boiler house</i>	<i>3,00,000</i>
<i>Pump room</i>	<i>60,000</i>
<i>Total</i>	<i>3,60,000</i>

The allocation basis is:

	Production Department		Service Department	
	A	B	Boiler House	Pump Room
<i>Boiler House</i>	60%	35%	-	5%
<i>Pump Room</i>	10%	40%	50%	-

SOLUTION

The total expenses of the two service departments will be determined as follows:

Let B stand for Boiler House expenses and P for Pump Room expenses.

Then

$$B = 3,00,000 + 0.50 P$$

$$P = 60,000 + 0.05 B$$

Substituting the value of B,

$$\begin{aligned} P &= 60,000 + 0.05 (3,00,000 + 0.5 P) \\ &= 60,000 + 15,000 + 0.025 P \\ &= 75,000 + 0.025 P \end{aligned}$$

$$P - 0.025P = 75,000$$

$$P = \left(\frac{75,000}{0.975} \right) = ₹ 76,923$$

The total of expenses of the Pump Room is ₹76,923 and that of the Boiler House is ₹3,38,462 i.e., ₹3,00,000 + 0.5 × ₹ 76,923.

The expenses will be allocated to the production departments as under:

	Production Department	
	Dept.-A	Dept.-B
Boiler House (60% and 35% of ₹ 3,38,462)	2,03,077	1,18,462
Pump Room (10% and 40% of ₹ 76,923)	7,692	30,769
Total	2,10,769	1,49,231

The total of expenses apportioned to A and B is ₹ 3,60,000.

(b) Trial and Error Method:

According to this method the cost of one service cost centre is apportioned to another service cost centre. The cost of another service centre *plus* the share received from the first cost centre is again apportioned to the first cost centre. This process is repeated till the amount to be apportioned becomes negligible, that means **repeated distribution method is followed to the extent of service departments only**. All apportioned amounts for each service cost centre are added to get the total apportioned cost. These **total service cost centre costs are redistributed to the production departments**. Trial and error method and Simultaneous equation method gives the same result. (Refer to the following illustration to understand this method.)

ILLUSTRATION 4

Sanz Ltd., is a manufacturing company having three production departments, 'A', 'B' and 'C' and two service departments 'X' and 'Y'. The following is the budget for December 2022:

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

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

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

	A	B	C	X	Y
Service Dept. 'X' (%)	45	15	30	–	10
Service Dept. 'Y' (%)	60	35	–	5	–

Required:

- PREPARE a statement showing distribution of overheads to various departments.
- PREPARE a statement showing re-distribution of service departments expenses to production departments using Trial and error method.

SOLUTION

(i) Overhead Distribution Summary

	Basis	Total (₹)	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Direct materials	Direct	–	–	–	–	2,00,000	1,00,000
Direct wages	Direct	–	–	–	–	1,00,000	2,00,000
Factory rent (2:1:2:1:2)	Area	4,00,000	1,00,000	50,000	1,00,000	50,000	1,00,000
Power (10:16:16:3:5)*	H.P. × Machine Hrs.	2,50,000	50,000	80,000	80,000	15,000	25,000

Depreciation (2:4:2:1:1)	Capital value	1,00,000	20,000	40,000	20,000	10,000	10,000
Other overheads (1:2:4:1:1)	Machine hrs.	9,00,000	1,00,000	2,00,000	4,00,000	1,00,000	1,00,000
		16,50,000	2,70,000	3,70,000	6,00,000	4,75,000	5,35,000

*{(1000×50) : (2000×40) : (4000×20) : (1000×15) : (1000×25)}

(50000 : 80000 : 80000 : 15000 : 25000)

(ii) Redistribution of Service Department's expenses:

	Service Departments	
	X (₹)	Y (₹)
Overheads as per primary distribution	4,75,000	5,35,000
(i) Apportionment of Dept-X expenses to Dept-Y (10% of ₹ 4,75,000)	---	47,500
	---	5,82,500
(ii) Apportionment of Dept-Y expenses to Dept-X [5% of (₹ 5,35,000 + ₹ 47,500)]	29,125	---
(i) Apportionment of Dept-X expenses to Dept-Y (10% of ₹ 29,125)	---	2,913
(ii) Apportionment of Dept-Y expenses to Dept-X (5% of ₹ 2,913)	146	---
Total	5,04,271	5,85,413

Distribution of Service departments' overheads to Production departments

	Production Departments		
	A (₹)	B (₹)	C (₹)
Overhead as per primary distribution	2,70,000	3,70,000	6,00,000
Dept- X (90% of ₹ 5,04,300)	2,26,900	75,600	1,51,300
Dept- Y (95% of ₹ 5,85,400)	3,51,300	2,04,900	---
	8,48,200	6,50,500	7,51,300

(c) Repeated Distribution Method:

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

ILLUSTRATION 5

Taking all the information from Illustration 4 above, PREPARE a statement showing re-distribution of service departments' expenses to production departments using repeated distribution method. Also CALCULATE machine hour rates of the production departments 'A', 'B' and 'C'.

SOLUTION**Redistribution of Service Department's expenses using 'repeated distribution method':**

	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Total overheads {Refer (i) of Solution to Illustration 4}	2,70,000	3,70,000	6,00,000	4,75,000	5,35,000
Dept. X overhead apportioned in the ratio (45:15:30: —:10)	2,13,750	71,250	1,42,500	(4,75,000)	47,500
Dept. Y overhead apportioned in the ratio (60:35: —:5: —)	3,49,500	2,03,875	—	29,125	(5,82,500)

Dept. X overhead apportioned in the ratio (45:15:30: —:10)	13,106	4,369	8,738	(29,125)	2,912
Dept. Y overhead apportioned in the ratio (60:35: —:5: —)	1,747	1,019	—	146	(2,912)
Dept. X overhead apportioned in the ratio (45:15:30: —:10)	65	22	44	(146)	15
Dept. Y overhead apportioned in the ratio (60:35: —:5: —)	9	6	-	-	(15)
	8,48,177	6,50,541	7,51,282	—	—

Calculation of machine hour rate:

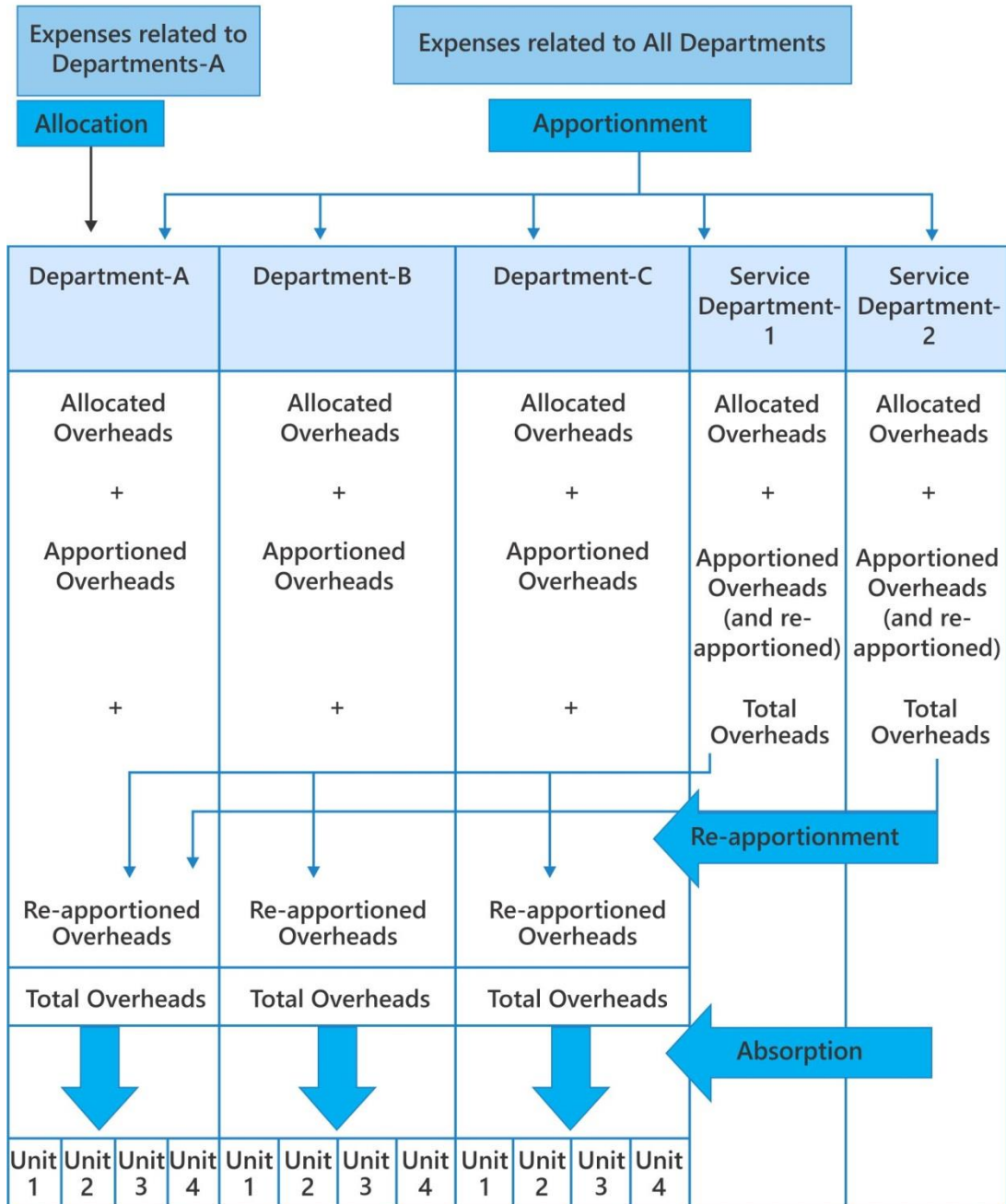
		A	B	C
A	Total overheads (₹)	8,48,177	6,50,541	7,51,282
B	Machine hours	1,000	2,000	4,000
C	Machine hour rate (₹) [A ÷ B]	848.18	325.27	187.82

4.5 Absorbing Overheads over Cost Units, Products, etc.

Collection of the figure of overheads for the factory as a whole or for various departments is not enough. It is clearly necessary to ascertain *how much of the overheads is to be debited to the cost of the various jobs, products etc.* This process is called *absorbing the overhead to cost units*. We take up below the various implications of this process. However, if only one uniform type of work is done, the task is easy and under such a situation the overhead expenses to be absorbed may be calculated by dividing actual overheads by the number of units of work done or estimated overheads by the estimated output.

The whole process of overhead distribution and absorption to units produced is depicted in the synopsis as below:

Synopsis of Allocations, Apportionment, Re-apportionment and Absorption





5. METHODS OF ABSORBING OVERHEADS TO VARIOUS PRODUCTS OR JOBS

The method selected for charging overheads to products or jobs should be such as will ensure:

- (i) that the total amount charged (or recovered) in a period does not differ materially from the actual expenses incurred in the period. and
- (ii) that the amount charged to individual jobs or products is equitable. In case of factory overhead, this means:
 - (a) that the time spent on completion of each job should be taken into consideration;
 - (b) that a distinction should be made between jobs done by skilled workers and those done by unskilled workers. and
 - (c) that jobs done by manual labour and those done by machines should be distinguished.

In addition, the methods should be capable of being used conveniently; and yield uniform result from period to period as far as possible; any change that is apparent should reflect a change in the underlying situation such as substitution of human labour by machines.

Several methods are commonly employed either individually or jointly for computing the appropriate overhead rate. The more common of these are:

Methods of Absorption of Overheads

Percentage
of direct
materials

Percentage
of prime
cost

Percentage
of direct
labour cost

Labour
hour
rate

Machine
hour
rate

Rate per
unit of
output

- (1) *Percentage of direct materials,*
- (2) *Percentage of prime cost,*
- (3) *Percentage of direct labour cost,*
- (4) *Labour hour rate,*
- (5) *Machine hour rate and*
- (6) *Rate per unit of Output*

5.1 Percentage of Direct Material Cost

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

$$\text{Overhead rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Budgeted Direct Material cost of all products}} \times 100$$

5.2 Percentage of Prime Cost Method

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

$$\text{Overhead rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Prime cost}} \times 100$$

Example for the above two methods:

Suppose for a given period, actual figures are estimated as follows:

	₹
Direct materials	2,00,000
Direct labour	1,00,000
Factory overheads	90,000

The percentage of factory overheads to direct materials will be 45%, to prime cost 30%. If, on a job, material cost is ₹ 10,000 and direct labour is ₹7,000 the cost, after absorbing factory overhead, will be as follows:

- (i) ₹ 17,000 + 45% ₹ 10,000 or ₹ 21,500,
- (ii) ₹ 17,000 + 30% ₹ 17,000 or ₹ 22,100, and

One can see how, with a different method, the works cost comes out to be different. Of these methods, the first and second are generally considered to be unsuitable on account of the following reasons:

- (i) Manufacturing overhead expenses are mostly a function of time i.e., time is the determining factor for the incurrence and application of manufacturing overhead expenses. That they are so would be clear if we recall that overhead expenses, specially manufacturing expenses, can in the ultimate analysis be regarded as expenditure incurred in providing the necessary facilities and service to workers employed in the productive process. The question of facilities and service made available to workers naturally is dependent on the length of time during which workers make use of the facilities. It may, therefore, be said that *the job or product on which more time has been spent would entail larger manufacturing expenses than the job requiring less time. The factor is ignored altogether by the first method and largely by the second method.*
- (ii) Overheads are neither related to the prime cost nor to direct material cost except to a very small extent. Thus, if the percentage of material cost is used when there are two jobs requiring the same operational time but using material having varying prices, their manufacturing overhead cost would be different whereas this should not normally be so.

The method of absorbing overhead costs on the basis of prime cost also does not take into consideration the time factor. The fact that the amount includes labour cost in addition to material cost does not render the prime cost to be more suitable; infact, the results are liable to be more misleading because of the cumulative error of using both the labour and material cost as the basis of allocation of overhead expenses, on neither of which they are already dependent.

- (iii) Since material prices are prone to frequent and wide fluctuations, the manufacturing overheads, if based on material cost or prime cost, also would fluctuate violently from period to period.
- (iv) The skill of the workers involved and whether machines were used or not, are ignored when these methods are used.

Percentage of materials cost may, however, be used for the limited purpose of absorbing material handling and store overheads.

5.3 Percentage of Direct Labour Cost

Formula to be used under this method is:

Direct Labour Cost Percentage Rate

$$\text{Overhead rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Direct Labour cost}} \times 100$$

Advantages	Disadvantages
(i) The method is simple and economical to apply.	(i) It gives rise to certain inaccuracies due to the time factor not being given full importance.
(ii) The time factor is given recognition even if indirectly.	(ii) Where machinery is used to some extent in the process of manufacture, an allowance for such a factor is not made.
(iii) Total expenses recovered will not differ much from the estimated figure since total wages paid are not likely to fluctuate much.	(iii) It does not provide for varying skills of workers

5.4 Labour Hour Rate Method

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

the amount of factory overheads is divided by the total number of direct labour hours. Suppose factory overheads are estimated at ₹90,000 and labour hours at 1,50,000. The overhead absorption rate will be ₹0.60. If 795 direct labour hours are spent on a job, ₹477 will be absorbed as overhead. It can be calculated for each category of workers.

Formula to be used under this method is:

$$\text{Direct Labour Hour Rate} = \frac{\text{Total Production Overheads of a Department}}{\text{Direct Labour Hour}} \times 100$$

5.5 Machine Hour Rate Method

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

- (i) **Direct Machine hour rate:** According to the first method, ***only the expenses directly or immediately connected with the operation of the machine are taken into account*** e.g., power, depreciation, repairs and maintenance, insurance, etc. The rate is calculated by dividing the estimated total of these expenses for a period by the estimated number of operational hours of the machines during the period.
- (ii) **Comprehensive Machine hour rate:** It will be obvious, however, that in addition to the expenses stated above there may still be other manufacturing expenses such as supervision charges, shop cleaning and lighting, consumable stores and shop supplies, shop general labour, rent and rates, etc. incurred for the department as a whole and, hence, not charged to any particular machine or group of machines. In order to see that such expenses are not left out of production costs, one should include a portion of such expenses to compute the machine hour rate. Alternatively, the overheads not directly related to machines may be absorbed on the basis of Productive Labour Hour Rate Method or any other suitable method.

Note: Sometimes even it is preferred to add the wages paid to the machine operator in order to get a comprehensive rate of working a machine for one hour.

By the machine hour rate method, manufacturing overhead expenses are charged to production on the basis of number of hour machines are used on jobs or work orders. Here each machine or group of machines is treated as a cost centre.

Overheads apportioned to a production department are further apportioned to machines or group of machines. These apportioned costs are divided by the estimated productive machine hour to get machine hour rate.

The steps involved in determining of Machine hour rate are as follows:

Step 1: Calculate total of overheads apportioned to a production department (as discussed earlier in this chapter)



Step 2: Apportion further these overheads to machines or group of machines in the department.



Step 3: Allocate machine specific costs (directly identifiable with the machine)



Step 4: Estimate total productive hours for the machine



Step 5: Aggregate overheads as apportioned in step-2 and allocated in step-3 and divide it by Estimated total productive hours



Step 6: The resultant figure is machine hour rate

The above costs are further divided into fixed cost or standing charges and variable cost. Costs which remain constant irrespective of operation of machine are treated as fixed cost or standing charges. Examples of fixed cost include insurance premium for machine, rent for premises, supervisor's salary, depreciation (if relates to effluxion of time) etc.

Costs which vary with the operation of the machine are treated as variable cost. Examples of variable cost include cost for power, cost for consumables (lubricants, oils etc.), repairs and maintenance, depreciation (if it relates to activity) etc.

Advantages and disadvantages of Machine hour rate:

Advantages	Disadvantages
(1) Where machines are the main factor of production, it is usually the best method of charging machine operating expenses to production.	(1) Additional data concerning the operation time of machines, not otherwise necessary, must be recorded and maintained.
(2) The under-absorption of machine overheads would indicate the extent to which the machines have been idle.	(2) As general department rates for all the machines in a department may be suitable, the computation of a separate machine hour rate for each machine or group of machines would mean further additional work.
(3) It is particularly advantageous where one operator attends to several machines (e.g. automatic screw manufacturing machine), or where several operators are engaged on the machine e.g. the belt press used in making conveyer belts.	

5.6 Rate Per Unit of Output Method

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

$$\text{Overheads Rate} = \frac{\text{Amount of overheads}}{\text{Number of units}}$$



6. TYPES OF OVERHEAD RATES

The overhead rates may be of the following types:

Type of Overhead Rates			
1. Normal Rate	2. Pre-determined Rate	3. Blanket Rate	4. Departmental Rate

1. **Normal Rate:** This rate is calculated by dividing the actual overheads by actual base. It is also known as actual rate.

It is calculated by the following formula:

$$\text{Normal overhead Rate} = \frac{\text{Actual amount of overheads}}{\text{Actual base}}$$

2. **Pre-determined Overhead Rate:** This rate is determined in advance by estimating the amount of the overhead for the period in which it is to be used. It is computed by the following formula:

$$\text{Pre-determined Rate} = \frac{\text{Budgeted amount of overheads}}{\text{Budgeted base}}$$

The amount of overhead rate of expenses for absorbing them to production may be estimated on the following three bases.

- (1) The figure of the **previous year or period may be adopted** as the overhead rate to be charged to production in the current year. The assumption is that the value of production as well as overheads will remain constant or that the two will change, proportionately.
- (2) The overhead rate for the year may be determined on the basis of **estimated expenses and anticipated volume of production activity.**

For instance, if expenses are estimated at ₹10,000 and output at 4,000 units, the overhead rate will be ₹2.50 per unit.

- (3) The **overhead rate for a year may be fixed** on the basis of the normal volume of the business.

3. **Blanket Overhead Rate:** Blanket overhead rate refers to the **computation of one single overhead rate for the whole factory**. It is to be distinguished from the departmental overhead rate which refers to a separate rate for each individual cost centre or department. The use of blanket rate may be proper in certain factories producing only one major product in a continuous process or where the work performed in every department is fairly uniform or standardised.

This overhead rate is computed as follows:

$$\text{Blanket Rate} = \frac{\text{Total overheads for the factory}}{\text{Total number of units of base for the factory}}$$

A blanket rate should be applied in the following cases:

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

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

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

This overhead rate is determined by the following formula:

$$\text{Departmental overhead Rate} = \frac{\text{Overheads of department or cost centre}}{\text{Corresponding base}}$$

ILLUSTRATION 6

A machine costing ₹ 1,00,00,000 is expected to run for 10 years. At the end of this period its scrap value is likely to be ₹ 9,00,000. Repairs during the whole life of the machine are expected to be ₹ 18,00,000 and the machine is expected to run 4,380 hours per year on the average. Its electricity consumption is 15 units per hour, the rate per unit being ₹ 5. The machine occupies one-fourth of the area of the department and has two points out of a total of ten for lighting. The foreman has to devote about one sixth of his time to the machine. The monthly rent of the department is ₹ 30,000 and the lighting charges amount to ₹ 8,000 per month. The foreman is paid a monthly salary of ₹ 19,200. FIND OUT the machine hour rate, assuming insurance is @ 1% p.a. and the expenses on oil, etc., are ₹ 900 per month.

SOLUTION

Total number of hours per annum- 4,380

Total number of hours per month- 365

Computation of Machine Hour Rate

	Per month (₹)	Per hour (₹)
Fixed costs (Standing Charges)		
Depreciation (Refer working note-1)	75,833	
Rent (₹30,000 × ¼)	7,500	
Lighting charges {(₹8,000 × 2 points) ÷ 10 points}	1,600	
Foreman's salary (₹19,200 × 1/6)	3,200	
Sundry expenses (oil etc.)	900	
Insurance {(1% of ₹ 1,00,00,000) ÷ 12 months}	8,333	
	97,366	266.76
Variable costs:		
Repairs (Refer working note -2)		41.10
Electricity (15 units × ₹ 5)		75.00
Machine Hour rate		382.86

Working Notes:

$$\begin{aligned}
 (1) \quad \text{Depreciation per month} &= \frac{\text{Cost of Machine} - \text{Scrap value}}{\text{Life of the machine}} \\
 &= \frac{\text{₹}1,00,00,000 - \text{₹}9,00,000}{(10 \text{ years} \times 12 \text{ months})^*} = \text{₹}75,833
 \end{aligned}$$

*In the question the life of the machine is given as 10 years and it is also mentioned the machine will run for 4,380 hours per annum. The depreciation can be calculated either on the basis of time i.e. 10 years or on the basis of activity of 43,800 hours (4,380 hours p.a.)

$$(2) \quad \text{Repairs for the whole life is ₹}18,00,000, \text{ which can be linked to activity level of } 43,800 \text{ hours. Thus, Repairs cost per hour} = \frac{\text{₹}18,00,000}{43,800 \text{ hours}} = \text{₹}41.10$$

ILLUSTRATION 7

A machine shop cost centre contains three machines of equal capacities. To operate these three machines nine operators are required i.e. three operators on each machine. Operators are paid ₹20 per hour. The factory works for forty eight hours in a week which includes 4 hours set up time. The work is jointly done by operators. The operators are paid fully for the forty eight hours. In additions they are paid a bonus of 10 per cent of productive time. Costs are reported for this company on the basis of thirteen four-weekly period.

The company for the purpose of computing machine hour rate includes the direct wages of the operator and also recoups the factory overheads allocated to the machines. The following details of factory overheads applicable to the cost centre are available:

- *Depreciation 10% per annum on original cost of the machine. Original cost of the each machine is ₹52,000.*
- *Maintenance and repairs per week per machine is ₹60.*
- *Consumable stores per week per machine are ₹75.*
- *Power: 20 units per hour per machine at the rate of 80 paise per unit. No power is used during the set-up hours.*

- *Apportionment to the cost centre: Rent per annum ₹5,400, Heat and Light per annum ₹9,720, foreman's salary per annum ₹12,960 and other miscellaneous expenditure per annum ₹18,000.*

Required:

CALCULATE the cost of running one machine for a four week period.

SOLUTION

Effective Machine hour for four-week period

= Total working hours – unproductive set-up time

= {(48 hours × 4 weeks) – {(4 hours × 4 weeks)}}

= (192 – 16 hours) = 176 hours.

(i) Computation of cost of running one machine for a four week period

		(₹)	(₹)
(A)	Standing charges (per annum)		
	Rent	5,400	
	Heat and light	9,720	
	Forman's salary	12,960	
	Other miscellaneous expenditure	18,000	
	Standing charges (per annum)	46,080	
	Total expenses for one machine for four week period $\left(\frac{₹46,080}{3 \text{ machines} \times 13 \text{ four-week period}} \right)$		1,181.54
	Wages (48 hours × 4 weeks × ₹ 20 × 3 operators)		11,520.00
	Bonus {(176 hours × ₹ 20 × 3 operators) × 10%}		1,056.00
	Total standing charges		13,757.54

(B)	Machine Expenses		
	Depreciation $\left(₹52,000 \times 10\% \times \frac{1}{13 \text{ four - week period}} \right)$		400.00
	Repairs and maintenance (₹60 × 4 weeks)		240.00
	Consumable stores (₹75 × 4 weeks)		300.00
	Power (176 hours × 20 units × ₹ 0.80)		2,816.00
	Total machine expenses		3,756.00
(C)	Total expenses (A) + (B)		17,513.54

(ii) Machine hour rate = $\frac{₹ 17,513.54}{176 \text{ hours}} = ₹99.51$



7. TREATMENT OF UNDER-ABSORBED AND OVER-ABSORBED OVERHEADS IN COST ACCOUNTING

Overhead expenses are usually applied to production on the basis of pre-determined rates. Production overheads are to be determined in advance for fixing selling price, quote tender price and to formulate budgets etc.

$$\text{Pre-determined overhead rate} = \frac{\text{Estimated / Normal overheads for the period}}{\text{Budgeted Number of units during the period}}$$

The actual overhead rate will rarely coincide with the pre-determined overhead rate, due to variation in pre-determined overhead rate and actual overhead rate. Such a variation may arise due to any one of the following situations:

- Estimated overheads for the period under consideration may remain the same or they coincide with actual overheads but the number of units produced during the period is either more or less in comparison with budgeted figure. In the former case actual overhead rate will be less and in the latter case, actual overhead rate will be more than the pre-determined

overhead rate, hence over-absorption and under-absorption will occur respectively.

- (ii) Similarly, if the number of units actually produced during the period remains the same as budgeted figure but the actual overheads incurred are more or less than the estimated overheads for the period, then a situation of under-absorption or over-absorption will arise respectively.
- (iii) If changes occur in different proportion both in the actual overheads and in the number of units produced during the period, then a situation of under or over-absorption (depending upon the situation) will arise.
- (iv) If the changes in the numerator (i.e. in actual overheads) and denominator (i.e. in number of units produced) occur uniformly (without changing the proportion between the two) then a situation of neither under nor of over-absorption will arise.

Such over or under-absorption as arrived at under different situations may also be termed as overhead variance. The amount of over-absorption being represented by a credit balance in the accounts and the amount of under-absorption as a debit balance.

The situations of under/ over absorption can be summarized as below:

When the absorbed amount is less than the actual amount it is called under-absorption. Similarly, when the absorbed amount is more than the actual amount it is called over-absorption.

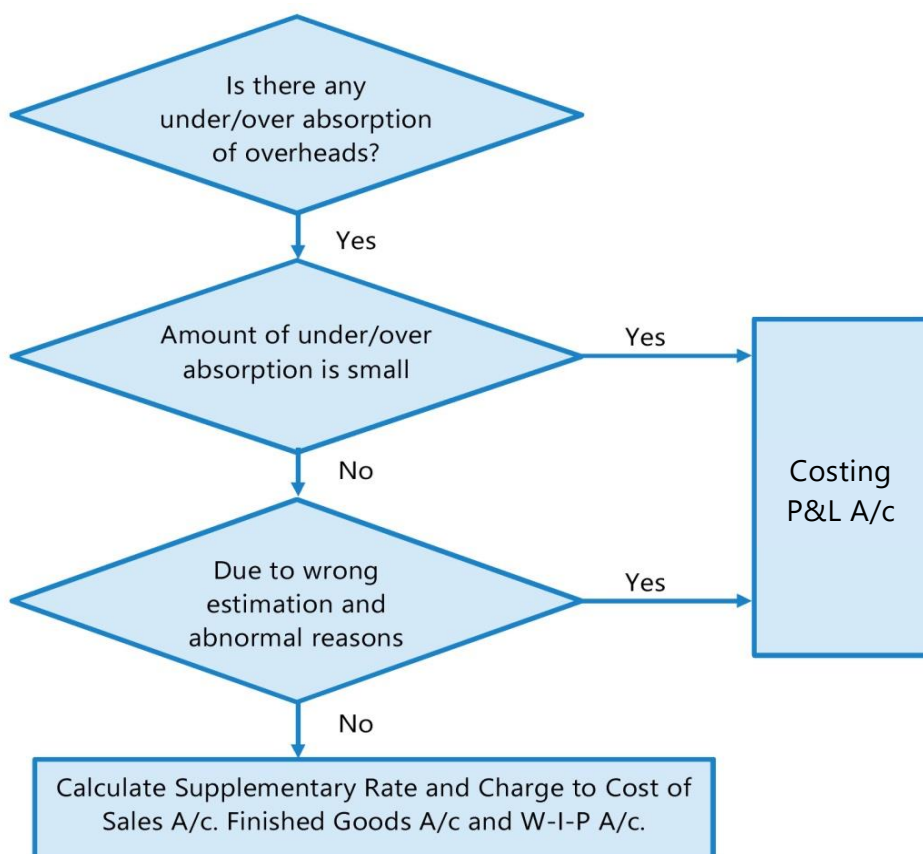
Budgeted Figure		Actual Figure		Absorbed Amount (₹)	Difference (₹)	Result Under/Over absorption
(₹)	Units	(₹)	Units			
1	2	3	4	$5 = 1/2 \times 4$	$6 = 3 - 5$	
100	100	110	100	100	10	Under-absorption
100	100	90	100	100	-10	Over-absorption
100	100	100	90	90	10	Under-absorption
100	100	100	110	110	-10	Over-absorption

100	100	90	90	90	0	No under/over-absorption
100	100	110	110	110	0	No under/over-absorption
100	100	110	90	90	20	Under-absorption
100	100	90	110	110	-20	Over-absorption

In above example Pre-determined rate is $\frac{₹100}{100\text{units}} = ₹1$

Treatment of under/ over absorption of overheads in cost accounting:

Treatment of such under/ over absorption of overheads can be understood with the help of the following flow chart:



As regards the treatment of such debit or credit balances, the **general view is that if the balances are small they should be transferred to the Costing Profit and Loss Account** and the cost of individual products should not be increased or reduced as these would be representing normal cost.

Where, however the *difference is large and due to wrong estimation (estimation is wrong due to unavoidable reasons)*, it would be desirable to adjust the cost of products manufactured, as otherwise the cost figures would convey a misleading impression. Such adjustments usually take the form of supplementary rates. Supplementary rate is calculated as below:

$$\text{Supplementary rate} = \frac{\text{Under / Over - absorbed OH}}{\text{Units produced}}$$

Supplementary overhead rate as calculated above is applied to finished goods, semi-finished goods (WIP) and goods finished and sold. Therefore, under/ over absorbed overheads are distributed among the unsold stock of finished goods, semi-finished goods (WIP) and cost of sales (goods produced and sold).

The accounting is done as follows:

In case of Under-absorption:

	Accounts	Dr/Cr	Calculation of amount
1.	Stock of Finished goods A/c	Debit	Units of Finished stock × Supplementary rate per unit
2.	Stock of Semi-finished goods (WIP) A/c	Debit	Equivalent completed units × Supplementary rate per unit
3.	Cost of Sales A/c	Debit	Units sold × Supplementary rate per unit

In case of Over-absorption:

	Accounts	Dr/Cr	Calculation of amount
1.	Stock of Finished goods A/c	Credit	Units of Finished stock × Supplementary rate per unit
2.	Stock of Semi-finished goods (WIP) A/c	Credit	Equivalent completed units × Supplementary rate per unit
3.	Cost of Sales A/c	Credit	Units sold × Supplementary rate per unit

However, over or under recovery of overheads due to abnormal reasons (such as abnormal over or under capacity utilisation) should be transferred to the Costing Profit and Loss Account.

ILLUSTRATION 8

The total overhead expenses of a factory is ₹ 4,46,380. Taking into account the normal working of the factory, overhead was recovered in production at ₹ 1.25 per hour. The actual hours worked were 2,93,104. STATE 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 the cost of indirect materials and indirect labour and the remaining 50% was due to factory inefficiency.

SOLUTION

Calculation of under/ over- absorption of overhead

	(₹)
Actual factory overhead expenses incurred	4,46,380
Overheads absorbed (2,93,104 hours × ₹ 1.25)	3,66,380
Under-absorption of overhead	80,000

Reasons for unabsorbed overheads

- (i) 50% of the unabsorbed overhead was on account of increase in the cost of indirect material and indirect labour.
- (ii) 50% of the unabsorbed overhead was due to factory inefficiency.

Treatment of unabsorbed overheads in Cost Accounting

1. Unabsorbed overhead amounting to ₹ 40,000, which were due to increase in the cost of indirect material and labour should be charged to units produced by using a supplementary rate.

$$\text{Supplementary rate} = \frac{\text{₹ 40,000}}{(7,800 + 200) \text{ units}} = \text{₹ 5 per unit}$$

The sum of ₹ 40,000 (unabsorbed overhead) should be distributed by using a supplementary rate among cost of sales, finished goods and work-in progress A/cs. The amount to be debited is calculated as below:

	(₹)
Stock of finished goods [(7,800-7,000) × ₹ 5]	4,000
Work-in progress (200 units × ₹ 5)	1,000
Cost of sales (7,000 units × ₹ 5)	35,000
Total	40,000

1. The use of cost of sales figure, would reduce the profit for the period by ₹ 35,000 and will increase the value of stock of finished goods and work-in-progress by ₹ 4,000 and ₹ 1,000 respectively.
2. The balance amount of unabsorbed overheads of ₹ 40,000 due to factory inefficiency should be debited to Costing Profit & Loss Account, as this is an abnormal loss.



8. ACCOUNTING AND CONTROL OF ADMINISTRATIVE OVERHEADS

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

8.1 Accounting of Administrative Overheads

There are three distinct methods of accounting of administrative overheads, which are briefly discussed below:

(a) Apportioning Administrative Overheads between Production and Sales

Departments: According to this method administrative overheads are apportioned over production and sales departments. The reason for the apportionment of overhead expenses over these departments, recognises the fact that administrative overheads are incurred for the benefit of both of these departments. Therefore, each department should be charged with the proportionate share of the same. When this method is adopted, administrative overheads lose their identity and get merged with production and selling and distribution overheads.

Disadvantages:

- (1) It is difficult to find suitable bases of administrative overhead apportionment over production and sales departments.
- (2) Lot of clerical work is involved in apportioning overheads.
- (3) It is not justified to apportion total administrative overheads only over production and sales departments when other equally important department like finance is also there.

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

Disadvantages:

- (1) Cost of products is understated as administrative overheads are not charged to costs.

- (2) The exclusion of administrative overheads from cost of products is against sound accounting principle.
- (c) **Treating Administrative Overheads as a separate addition to Cost of Production/ Sales:** This method considers administration as a separate function like production and sales and, as such costs relating to formulating the policy, directing the organisation and controlling the operations are taken as a separate charge to the cost of the jobs or a product, sold along with the cost of other functions. The bases which are generally used for apportionment are:
- (i) Works cost
 - (ii) Sales value or quantity
 - (iii) Gross profit on sales
 - (iv) Quantity produced
 - (v) Conversion cost, etc.

8.2 Control of Administrative Overheads

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

- (i) **Classification and analysis of overheads by administrative departments according to their functions, and a comparison with the accomplished results:** According to this method the expenses incurred by each administrative department are collected under a standing order for each class of expenditure. These are compared with similar figures of the previous period in relation to accomplishment. Such a comparison will reveal efficiency or inefficiency of the concerned department.

However, this method provides only a limited degree of control and comparison does not give useful results if the level of activity is not constant during the periods under comparison. To overcome this difficulty, overhead absorption rates may also be compared from period to period; the

extent of over or under absorption will reveal the efficiency or otherwise of the department. It may be possible to compare the cost of a service department with that of similar services obtainable from outside and a decision may be taken whether it is economical to continue the department or entrust the work to outsiders.

- (ii) **Control through Budgets:** According to this method, administration budgets (monthly or annually) are prepared for each department. The budgeted figures are compared with actual ones to determine variances. The variances are analysed and responsibility assigned to the concerned department to control these variances.
- (iii) **Control through Standard:** Under this method, standards of performance are fixed for each administrative activity, and the actual performance is compared with the standards set. In this way, standards serve not only as yardstick of performance but also facilitate control of costs.

ILLUSTRATION 9 (Reverse Calculation of Factory Overhead and Administrative overheads)

In an engineering company, the factory overheads are recovered on a fixed percentage basis on direct wages and the administrative overheads are absorbed on a fixed percentage basis on factory cost.

The company has furnished the following data relating to two jobs undertaken by it in a period:

	Job 101	Job 102
	(₹)	(₹)
<i>Direct materials</i>	54,000	37,500
<i>Direct wages</i>	42,000	30,000
<i>Selling price</i>	1,66,650	1,28,250
<i>Profit percentage on Total Cost</i>	10%	20%

Required:

- (i) *COMPUTATION of percentage recovery rates of factory overheads and administrative overheads.*

- (ii) *CALCULATION of the amount of factory overheads, administrative overheads and profit for each of the two jobs.*
- (iii) *Using the above recovery rates DETERMINE the selling price of job 103. The additional data being:*

Direct materials	₹ 24,000
Direct wages	₹ 20,000
Profit percentage on selling price	12-½%

SOLUTION

- (i) **Computation of percentage recovery rates of factory overheads and administrative overheads.**

Let the factory overhead recovery rate as percentage of direct wages be F and administrative overheads recovery rate as percentage of factory cost be A.

Factory Cost of Jobs:

Direct materials + Direct wages + Factory overhead

For Job 101 = ₹ 54,000 + ₹ 42,000 + ₹ 42,000F

For Job 102 = ₹ 37,500 + ₹ 30,000 + ₹ 30,000F

Total Cost of Jobs:

Factory cost + Administrative overhead

For Job 101 = (₹ 96,000 + ₹ 42,000F) + (₹ 96,000 + ₹ 42,000F) A = ₹ 1,51,500*

For Job-102 = (₹ 67,500 + ₹ 30,000F) + (₹ 67,500 + ₹ 30,000F) A = ₹ 1,06,875**

The value of F & A can be found using following equations

$$\begin{array}{l} \text{₹ } 96,000 + \text{₹ } 42,000F + \text{₹ } 96,000A + \\ \text{₹ } 42,000AF \end{array} = \text{₹ } 1,51,500 \quad \dots \text{eqn (i)}$$

$$\begin{array}{l} \text{₹ } 67,500 + \text{₹ } 30,000F + \text{₹ } 67,500A + \\ \text{₹ } 30,000AF \end{array} = \text{₹ } 1,06,875 \quad \dots \text{eqn (ii)}$$

Multiply equation (i) by 5 and equation (ii) by 7

$$\begin{array}{rcll} ₹ 4,80,000 & + & ₹ 2,10,000F & + ₹ 4,80,000A & + \\ ₹ 2,10,000AF & & & & = ₹ 7,57,500 \text{ ...eqn (iii)} \end{array}$$

$$\begin{array}{rcll} ₹ 4,72,500 & + & ₹ 2,10,000F & + ₹ 4,72,500A & + \\ ₹ 2,10,000AF & & & & = ₹ 7,48,125 \text{ ...eqn (iv)} \end{array}$$

$$\begin{array}{rcll} - & - & - & - & - \\ \hline ₹ 7,500 & + & ₹ 7,500A & & = ₹ 9,325 \\ ₹ 7,500 A & = & ₹ 9,325 - ₹ 7,500 & & \end{array}$$

$$A = 0.25$$

Now put the value of A in equation (i) to find the value of F

$$₹ 96,000 + ₹ 42,000F + ₹ 24,000 + ₹ 10,500F = ₹ 1,51,500$$

$$₹ 52,500F = ₹ 1,51,500 - ₹ 1,20,000$$

$$F = 0.6$$

On solving the above relations: $F = 0.60$ and $A = 0.25$

Hence, percentage recovery rates of:

Factory overheads = 60% of wages and

Administrative overheads = 25% of factory cost.

Working note:

$$\text{Total Cost} = \frac{\text{Selling price}}{(100\% + \text{Percentage of profit})}$$

$$*\text{For Job 101} = \frac{₹1,66,650}{(100\% + 10\%)} = ₹ 1,51,500$$

$$**\text{For Job 102} = \frac{₹1,28,250}{(100\% + 20\%)} = ₹ 1,06,875$$

(ii) Statement of jobs, showing amount of factory overheads, administrative overheads and profit:

	Job 101	Job 102
	(₹)	(₹)
Direct materials	54,000	37,500
Direct wages	42,000	30,000
Prime cost	96,000	67,500
<i>Factory overheads</i>		
60% of direct wages	25,200	18,000
Factory cost	1,21,200	85,500
<i>Administrative overheads</i>		
25% of factory cost	30,300	21,375
Total cost	1,51,500	1,06,875
<i>Profit (10% & 20% respectively)</i>	15,150	21,375
Selling price	1,66,650	1,28,250

(iii) Selling price of Job 103

	(₹)
Direct materials	24,000
Direct wages	20,000
Prime cost	44,000
Factory overheads (60% of Direct Wages)	12,000
Factory cost	56,000
Administrative overheads (25% of factory cost)	14,000
Total cost	70,000
Profit margin (balancing figure)	10,000
Selling price $\left[\frac{\text{Total Cost}}{87.5\%} \right]$	80,000



9. ACCOUNTING AND CONTROL OF SELLING AND DISTRIBUTION OVERHEADS

Selling cost or overhead expenses are the expenses incurred for the purpose of promoting the marketing and sales of different products. Distribution expenses, on the other hand, are expenses relating to delivery and dispatch of goods sold. Examples of selling and distribution expenses have been considered earlier in this booklet. From the definitions it is clear that the two types of expenses represent two distinct type of functions. Some concerns group together these two types of overhead expenses into one composite class, namely, selling and distribution overhead, for the purpose of Cost Accounting.

9.1 Accounting of Selling and Distribution Overheads

The collection and accumulation of each expense is made by means of appropriate standing orders in the usual way. Where it is decided to apportion a part of the administrative overhead to the selling division the same should also be collected through appropriate standing orders.

As in the case of administrative overheads, it is not easy to determine an entirely satisfactory basis for computing the overhead rate for absorbing selling overheads. The bases usually adopted are:

- (a) Sales value of goods;
- (b) Cost of goods sold;
- (c) Gross Profit on sales; and
- (d) Number of orders or units sold.

It is considered that the sale value is ordinarily the most logical basis, there being some connection between the amount of sales and the amount of expenses incurred to achieve them. The cost of production, however, is not as satisfactory basis as it may not have any direct relationship with the selling and distribution cost.

The basis of gross profit on sales results in a larger share of the selling overhead being applied to goods yielding a large margin of profit and vice versa. The basis

therefore follows the principle of 'ability to pay, it may not reflect costs or incurred efforts.

An estimated amount per unit - The best method for absorbing selling and distributing expenses over various products is to separate fixed expenses from variable expenses. Apportion the fixed expenses according to the benefit derived by each product and thus ascertaining the fixed expenses per unit. We give below some of the fixed expenses and the basis of apportionment:

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

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

The total of fixed expenses apportioned in this manner, divided by the number of units sold or likely to be sold, will give the fixed expenses per unit. To this should be added the variable expenses which will be different for each product. These expenses are, packaging, freight outwards, insurance in transit, commission payable to salesmen, rebate allowed to customers, etc. All these items will be worked out per unit for each product separately. These items added to fixed expenses per unit will give an estimated amount of the selling and distribution expenses per unit.

9.2 Control of Selling and Distribution Overheads

Control of selling and distribution expenses is a difficult task. The reasons for this are as follows:

1. The incidence of selling and distribution overheads depends mainly on external factors, such as distance of market, extent and nature of competition, terms of sales, etc. which are beyond the control of management.
2. These overheads are dependent upon the customers, behaviour, their liking and disliking, tastes etc. Therefore, as such control over the overheads may result in loss of customers.
3. These expenses being of the nature of policy costs are not amenable to control.

In spite of the above difficulties, the following methods may be used for controlling them.

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

ILLUSTRATION 10

A company which sells four products, some of these are unprofitable. Company proposes to discontinue to sale one of these products. The following information is available regarding income, costs and activity for the year ended 31st March.

	Products			
	A	B	C	D
<i>Sales (₹)</i>	30,00,000	50,00,000	25,00,000	45,00,000
<i>Cost of goods sold (₹)</i>	20,00,000	45,00,000	21,00,000	22,50,000
<i>Area of storage (Sq.ft.)</i>	50,000	40,000	80,000	30,000
<i>Number of parcels sent</i>	1,00,000	1,50,000	75,000	1,75,000
<i>Number of invoices sent</i>	80,000	1,40,000	60,000	1,20,000

Selling and Distribution overheads and the basis of allocation are:

	Amount (₹)	Basis of allocation to products
<i>Fixed Costs</i>		
<i>Rent & Insurance</i>	3,00,000	<i>Area of storage (Sq.ft.)</i>
<i>Depreciation</i>	1,00,000	<i>No. of Parcels sent</i>
<i>Salesmen's salaries & expenses</i>	6,00,000	<i>Sales Volume</i>
<i>Administrative wages and salaries</i>	5,00,000	<i>No. of invoices sent</i>
<i>Variable Costs:</i>		
<i>Packing wages & materials</i>	₹ 2 per parcel	
<i>Commission</i>	4% of sales	
<i>Stationery</i>	₹ 1 per invoice	

You are required to PREPARE Costing Profit & Loss Statement, showing the percentage of profit or loss to sales for each product.

SOLUTION**Statement of Profit or Loss on Various Products during the year ended March 31st.**

	Total (₹)	Products			
		A (₹)	B (₹)	C (₹)	D (₹)
Sales	1,50,00,000	30,00,000	50,00,000	25,00,000	45,00,000
Variable costs:					
Cost of goods sold	1,08,50,000	20,00,000	45,00,000	21,00,000	22,50,000
Commissions 4% of sales	6,00,000	1,20,000	2,00,000	1,00,000	1,80,000
Packing wages & materials @ ₹ 2 per parcel	10,00,000	2,00,000	3,00,000	1,50,000	3,50,000
Stationery @ ₹ 1 per invoice	4,00,000	80,000	1,40,000	60,000	1,20,000
Total variable costs	1,28,50,000	24,00,000	51,40,000	24,10,000	29,00,000
Contribution (Sales – variable cost)	21,50,000	6,00,000	(1,40,000)	90,000	16,00,000
Fixed Costs:					
Rent & Insurance (5:4:8:3)	3,00,000	75,000	60,000	1,20,000	45,000
Depreciation (4:6:3:7)	1,00,000	20,000	30,000	15,000	35,000
Salesmen's salaries & expenses (6:10:5:9)	6,00,000	1,20,000	2,00,000	1,00,000	1,80,000
Administrative wages & salaries (4:7:3:6)	5,00,000	1,00,000	1,75,000	75,000	1,50,000
Total Fixed costs	15,00,000	3,15,000	4,65,000	3,10,000	4,10,000
Profit or Loss (Contribution–fixed Costs)	6,50,000	2,85,000	(6,05,000)	(2,20,000)	11,90,000
Percentage of profit or Loss on sales (%)	4.33	9.50	(12.10)	(8.80)	26.4



10. CONCEPTS RELATED TO CAPACITY

- (i) **Installed/ Rated capacity:** It refers to the maximum capacity of producing goods or providing services. Installed capacity is determined either on the basis of *technical specification or through a technical evaluation*. **It is also known as theoretical capacity** and is could not be achieved in normal operating circumstances.
- (ii) **Practical capacity:** It is defined as **actually utilised capacity of a plant. It is also known as operating capacity**. This capacity takes into account loss of time due to repairs, maintenance, minor breakdown, idle time, set up time, normal delays, Sundays and holidays, stock taking etc. Generally, practical capacity is taken between 80 to 90% of the rated capacity. It is also used as a base for determining overhead rates. Practical capacity is also called net capacity or available capacity.
- (iii) **Normal capacity:** Normal capacity is the **volume of production or services achieved or achievable** on an average over a period under normal circumstances taking into account the reduction in capacity resulting from planned maintenance.

Normal capacity is determined as under:

Installed capacity		xxx
<i>Adjustments for:</i>		
(i) <i>Time lost due to scheduled preventive or planned maintenance</i>	xxx	
(ii) <i>Number of shifts or machine hours or man hours</i>		
(iii) <i>Holidays, normal shut down days, normal idle time</i>	xxx	
(iv) <i>Normal time lost in batch change over</i>	xxx	xxx
Normal Capacity		xxx

- (iv) **Actual capacity:** It is the capacity actually achieved during a given period. It is presented as a percentage of installed capacity.
- (v) **Idle capacity:** It is that part of the capacity of a plant, machine or equipment which cannot be effectively utilised in production.

- (a) **Normal Idle Capacity:** It is the difference between Installed capacity and Normal capacity.
- (b) **Abnormal Idle Capacity:** It is the difference between Normal capacity and Actual capacity utilization where the actual capacity is lower than the normal capacity.

The idle capacity may arise due to lack of product demand, non-availability of raw material, shortage of skilled labour, absenteeism, shortage of power fuel or supplies, seasonal nature of product etc.

Installed Capacity	}	Normal Idle Capacity
Normal Capacity		
Normal Capacity	}	Abnormal Idle Capacity
Actual Capacity		

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

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



11. TREATMENT OF CERTAIN ITEMS IN COSTING

- (i) **Interest and financing charges:** It includes any payment in nature of interest for use of non- equity funds and incidental cost that an entity incurs in arranging those funds. Example of interest and financing charges are

interest on borrowings, financing charges in respect of finance leases, cash discount allowed to customers. The term interest and financing charges, finance costs and borrowing costs are used interchangeably. **It does not include imputed costs.**

Interest and financing charges shall be presented in the cost statement as a separate item of cost of sales.

- (ii) **Depreciation:** Depreciation *"is the diminution in the intrinsic value of an asset due to use and/or the lapse of time."* Depreciation is thus the result of two factors viz., the use, and the lapse of time. We know that each fixed asset loses its intrinsic value due to their continuous use and as such the greater the use the higher is the amount of depreciation. The loss in the intrinsic value may also arise even if the asset in question is not in service.

Assignment of Depreciation:

It shall be traced to the cost object to the extent economically feasible. Where it is not directly traceable it should be assigned using either or two principles i.e. (i) *Cause and Effect* and (ii) *Benefit received*.

- (iii) **Packing expenses: Cost of primary packing** necessary for protecting the product or for convenient handling, should **become a part of the production cost**. The **cost of packing to facilitate the transportation** of the product from the factory to the customer should **become a part of the distribution cost**. If the cost of special packing is at the request of the customer, the same should be charged to the specific work order or the job. The cost of fancy packing necessary to attract customers is an advertising expenditure. Hence, it is to be treated as a selling overhead.
- (iv) **Fringe benefits:** These are the *additional payments or facilities provided to the workers apart from their salary and direct cost-allowances* like house rent, dearness and city compensatory allowances. These benefits are given in the form of overtime, extra shift duty allowance, holiday pay, pension facilities etc.

These indirect benefits stand to improve the morale, loyalty and stability of employees towards the organisation. If the amount of fringe benefit is considerably large, it may be recovered as direct charge by means of a

supplementary wage or labour rate; otherwise these may be collected as part of production overheads.

- (v) **Expenses on removal and re-erection of machines:** Expenses are sometime incurred on removal and re-erection of machinery in factories. *Such expenses may be incurred due to factors like change in the method of production; an addition or alteration in the factory building, change in the flow of production, etc.* **All such expenses are treated as production overheads.** When amount of such expenses is large, it may be spread over a period of time.

If such expenses are incurred due to *faulty planning* or some other abnormal factor, then they may be charged to *costing Profit and Loss Account*.

- (vi) **Bad debts:** There is no unanimity among different authors of Cost Accounting about the treatment of bad debts. One view is that 'bad debts' should be excluded from cost. According to this view bad debts are financial losses and therefore, they should not be included in the cost of a particular job or product.

According to another view it should form part of selling and distribution overheads, especially when they arise in the normal course of trading. Therefore *bad debts should be treated in cost accounting in the same way as any other selling and distribution cost.* However extra ordinarily large bad debts should not be included in cost accounts.

- (vii) **Training expenses:** Training is an essential input for industrial workers. Training expenses in fact includes wages of workers, costs incurred in running training department, loss arising from the initial lower production, extra spoilage etc. Training expenses of factory workers are treated as part of the cost of production. The training expenses of office; sales or distribution workers should be treated as office; sales or distribution overhead as the case may be. These expenses can be spread over various departments of the concern on the basis of the number of workers on roll.

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

- (viii) **Canteen expenses:** The subsidy provided or expenses borne by the firm in running the canteen should be regarded as *a production overhead*. If the canteen is meant only for factory workers therefore this expenses should be apportioned on the basis of the number of workers employed in each department. If office workers also take advantage of the canteen facility, a suitable share of the expenses should be treated as office overhead.
- (ix) **Carriage and cartage expenses:** It includes the expenses incurred on the movement (inward and outwards) and transportation of materials and goods. *Transportation expenses related to direct material may be included in the cost of direct material and those relating to indirect material (stores) may be treated as factory overheads.* Expenses related to the transportation of finished goods may be treated as distribution overhead.
- (x) **Expenses for welfare activities:** All expenses incurred on the welfare activities of employees in a company are part of general overheads. Such expenses should be apportioned between factory, office, selling and distribution overheads on the basis of number of persons involved.
- (xi) **Night shift allowance:** Workers in the factories, which operate during night time are paid some extra amount known as 'night shift allowance'. This extra amount is generally incurred due to the general pressure of work beyond normal capacity level and is treated as production overhead and recovered as such.
- If this allowance is treated as part of direct wages, the jobs/production carried at night will be costlier than jobs/production performed during the day. However, if additional expenditure on night shift is incurred to meet some specific customer order, such expenditure may be charged directly to the order concerned. If night shifts are run due to abnormal circumstances, the additional expenditure should be charged to the costing profit and loss account.
- (xii) **Research and Development Expenses:** The Terminology defines *research expenses as "the expenses of searching for new or improved products, new application of materials, or new or improved methods."* Similarly, *development expenses are defined as "the expenses of the process which begins with the implementation of the decision to produce a new or improved product."*

If research is conducted in the methods of production, the research expenses should be taken separately while computing cost of production; while the expenditure becomes a part of the administration overhead if research relates to administration. Similarly, *market research expenses* are charged to the selling and distribution overhead.

Development costs incurred in connection with a particular product should be charged directly to that product. Such expenses are usually treated as "deferred revenue expenses," and recovered as a cost per unit of the product when production is fully established.

General research expenses of a routine nature incurred on new or improved methods of manufacture or the improvement of the existing products should be charged to the general overhead.

Even in this case, if the amount involved is substantial it may be treated as a *deferred revenue expenditure*, and spread over the period during which the benefit would accrue. Expenses on fundamental research, not relating to any specific product, are treated as a part of the administration overhead. Where research proves a failure, the cost associated with it should be excluded from costs and charged to the costing Profit and Loss Account.

SUMMARY

- ◆ **Overheads:** Overheads represent expenses that have been incurred in providing certain ancillary facilities or services which facilitate or make possible the carrying out of the production process; by themselves these services are not of any use.
- ◆ **Cost allocation:** The term 'allocation' refers to assignment or allotment of an entire item of cost to a particular cost center or cost unit.
- ◆ **Cost apportionment:** Apportionment implies the allotment of proportions of items of cost to cost centres or departments.
- ◆ **Re-apportionment:** The process of assigning service department overheads to production departments is called reassignment or re-apportionment.
- ◆ **Absorption-** The process of recovering overheads of a department or any other cost center from its output is called recovery or absorption.

- ◆ **Direct re-distribution method:** Under this method service department costs are apportioned over the production departments only, ignoring the services rendered by one service department to the other.
- ◆ **Step method or Non-reciprocal method:** This method gives cognizance to the service rendered by service department to another service department. The sequence here begins with the department that renders service to the maximum number of other service departments.
- ◆ **Reciprocal service method:** These methods are used when different service departments render services to each other, in addition to rendering services to production departments. In such cases various service departments have to share overheads of each other. The methods available for dealing with reciprocal services are
 - (a) Simultaneous equation method;
 - (b) Repeated distribution method;
 - (c) Trial and error method.
- ◆ **Blanket overhead rates:** Blanket overhead rate refers to the computation of one single overhead rate for the whole factory. It is to be distinguished from the departmental overhead rate which refers to a separate rate for each individual cost centre or department.

$$\text{Blanket Overhead rate} = \frac{\text{Overhead costs for the whole factory}}{\text{Total units of the selected base}} \times 100$$

TEST YOUR KNOWLEDGE

Multiple Choice Questions (MCQs)

1. "Fixed overhead costs are not affected in monetary terms during a given period by a change in output". But this statement holds good provided:
 - (a) Increase in output is not substantial
 - (b) Increase in output is substantial
 - (c) Both (a) and (b)
 - (d) None of the above

2. capacity is defined as actually utilised capacity of a plant.
- (a) Theoretical
 - (b) Installed
 - (c) Practical
 - (d) Normal
3. The allotment of whole items of cost to cost centres or cost units is called:
- (a) Overhead absorption
 - (b) Cost apportionment
 - (c) Cost allocation
 - (d) None of the above
4. Primary packing cost is a part of:
- (a) Direct material cost
 - (b) Production Cost
 - (c) Selling overheads
 - (d) Distribution overheads
5. Director's remuneration and expenses form part of:
- (a) Production overhead
 - (b) Administration overhead
 - (c) Selling overhead
 - (d) Distribution overhead
6. Which of the following is not the classification of overhead based on its functionality?
- (a) Factory Overhead
 - (b) Administrative Overhead
 - (c) Fixed Overhead
 - (d) Selling Overhead

7. *Bad debt is an example of:*
 - (a) *Distribution overhead*
 - (b) *Production overhead*
 - (c) *Selling overhead*
 - (d) *Administration overhead*
8. *Normal capacity of a plant refers to the difference between:*
 - (a) *Maximum capacity and practical capacity*
 - (b) *Practical capacity and normal capacity*
 - (c) *Practical capacity and estimated idle capacity as revealed by long term sales trend.*
 - (d) *Maximum capacity and actual capacity*
9. *The difference between actual factory overhead and absorbed factory overhead will be usually at the minimum level, provided pre- determined overhead rate is based on:*
 - (a) *Maximum capacity*
 - (b) *Direct labour hours*
 - (c) *Machine hours*
 - (d) *Normal capacity*
10. *Which of the following overhead cost may not be apportioned on the basis of direct wages?*
 - (a) *Worker's Holiday Pay*
 - (b) *Perquisites to worker*
 - (c) *ESI contribution*
 - (d) *Managerial Salaries*

Theoretical Questions

1. *STATE what is blanket overhead rate. In which situations, blanket rate is to be used and why?*

2. *DISCUSS the step method and reciprocal service method of secondary distribution of overheads.*
3. *DISCUSS the problems of controlling the selling and distribution overheads.*
4. *DISTINGUISH between cost allocation and cost absorption.*
5. *EXPLAIN Single and Multiple Overhead Rates.*
6. *EXPLAIN how would you treat the idle capacity costs in Cost Accounts.*
7. *DISCUSS the difference between allocation and apportionment of overhead.*
8. *EXPLAIN what are the methods of re-apportionment of service department expenses over the production departments? Discuss.*

Practical Problems

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

	Total	Production Depts.		Service Depts.	
		Machine shop	Packing	Gen. Plant	Store & Maintenance
	(₹)	(₹)	(₹)	(₹)	(₹)
Allocated Overheads:					
Indirect labour	14,650	4,000	3,000	2,000	5,650
Maintenance material	5,020	1,800	700	1,020	1,500
Misc. supplies	1,750	400	1,000	150	200
Superintendent's salary	4,000	–	–	4,000	–
Cost & payroll salary	10,000	–	–	10,000	–

Overheads to be apportioned:					
Power	8,000				
Rent	12,000				
Fuel and heat	6,000				
Insurance	1,000				
Trade License fees	2,000				
Depreciation	1,00,000				
	1,64,420	6,200	4,700	17,170	7,350

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

	Floor Space (Sqft)	Radiator Sections	No. of Employees	Investment (₹)	H.P hours
Machine Shop	2,000	45	20	6,40,000	3,500
Packing	800	90	10	2,00,000	500
General Plant	400	30	3	10,000	-
Store & Maintenance	1,600	60	5	1,50,000	1,000
	4,800	225	38	10,00,000	5,000

Expenses charged to the stores and maintenance departments are to be distributed to the other departments by the following percentages:

Machine shop 50%; Packing 20%; General Plant 30%; General Plant overheads is distributed on the basis of number of employees:

PREPARE

- An overhead distribution statement.
- Distribution of the service departments' expense to production departments.

2. Modern Manufactures Ltd. has three Production Departments P_1 , P_2 , P_3 and two Service Departments S_1 and S_2 details pertaining to which are as under:

	P_1	P_2	P_3	S_1	S_2
Direct wages (₹)	3,000	2,000	3,000	1,500	195
Working hours	3,070	4,475	2,419	-	-
Value of machines (₹)	60,000	80,000	1,00,000	5,000	5,000
H.P. of machines	60	30	50	10	-
Light points	10	15	20	10	5
Floor space (sq. ft.)	2,000	2,500	3,000	2,000	500

The following figures extracted from the Accounting records are relevant:

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

The expenses of the service departments are allocated as under:

	P_1	P_2	P_3	S_1	S_2
S_1	20%	30%	40%	-	10%
S_2	40%	20%	30%	10%	-

DETERMINE the total cost of product X which is processed for manufacture in Departments P_1 , P_2 and P_3 for 4, 5 and 3 hours respectively, given that its Direct Material Cost is ₹50 and Direct Labour Cost is ₹30.

3. Deccan Manufacturing Ltd., have three departments which are regarded as production departments. Service departments' costs are distributed to these production departments using the "Step Ladder Method" of distribution. Estimates of factory overhead costs to be incurred by each department in the forthcoming year are as follows. Data required for distribution is also shown against each department:

Department	Factory overhead (₹)	Direct labour hours	No. of employees	Area in sq.m.
<i>Production:</i>				
X	1,93,000	4,000	100	3,000
Y	64,000	3,000	125	1,500
Z	83,000	4,000	85	1,500
<i>Service:</i>				
P	45,000	1,000	10	500
Q	75,000	5,000	50	1,500
R	1,05,000	6,000	40	1,000
S	30,000	3,000	50	1,000

The overhead costs of the four service departments are distributed in the same order, viz. P, Q, R and S respectively on the following basis.

Department	Basis
P	Number of employees
Q	Direct labour hours
R	Area in square metres
S	Direct labour hours

You are required to:

- (a) PREPARE a schedule showing the distribution of overhead costs of the four service departments to the three production departments; and

- (b) CALCULATE the overhead recovery rate per direct labour hour for each of the three production departments.
4. Gemini Enterprises undertakes three different jobs A, B and C. All of them require the use of a special machine and also the use of a computer. The computer is hired and the hire charges work out to ₹ 4,20,000 per annum. The expenses regarding the machine are estimated as follows:

	(₹)
Rent for a quarter	17,500
Depreciation per annum	2,00,000
Indirect charges per annum	1,50,000

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

	Job		
	A	B	C
Number of hours the machine was used:			
(a) Without the use of the computer	600	900	—
(b) With the use of the computer	400	600	1,000

You are required to COMPUTE the machine hour rate:

- (a) For the firm as a whole for the month when the computer was used and when the computer was not used.
- (b) For the individual jobs A, B and C.
5. A machine shop has 8 identical Drilling machines manned by 6 operators. The machine cannot be worked without an operator wholly engaged on it. The original cost of all these machines works out to ₹ 8 lakhs. These particulars are furnished for a 6 months period:

Normal available hours per month	208
Absenteeism (without pay) hours	18
Leave (with pay) hours	20

Normal idle time unavoidable-hours 10

Average rate of wages per worker for 8 hours a day. ₹800

Production bonus estimated 15% on wages

Value of power consumed ₹80,500

Supervision and indirect labour ₹33,000

Lighting and electricity ₹12,000

These particulars are for a year

Repairs and maintenance including consumables- 3% of value of machines.

Insurance- ₹ 40,000

Depreciation- 10% of original cost.

Other sundry works expenses- ₹ 12,000

General management expenses allocated- ₹ 54,530.

You are required to COMPUTE a comprehensive machine hour rate for the machine shop.

6. Job No. 198 was commenced on October 10, 2022 and completed on November 1, 2022. Materials used were ₹ 6,000 and labour charged directly to the job was ₹ 4,000. Other information is as follows:

Machine No. 215 used for 40 hours, the machine hour rate being ₹ 35.

Machine No. 160 used for 30 hours, the machine hour rate being ₹ 40. Six welders worked on the job for five days of 8 hours each: the Direct labour hour per welder is ₹ 20.

General expenses related to production not included for calculating either the machine hour or direct labour hour rate totaled ₹20,000, total direct wages for the period being ₹2,00,000. COMPUTE the works costs for job No. 198.

7. In a factory, overheads of a particular department are recovered on the basis of ₹ 5 per machine hour. The total expenses incurred and the actual machine hours for the department for the month of August were ₹ 80,000 and 10,000 hours respectively. Of the amount of ₹ 80,000, ₹ 15,000 became payable due to an award of the Labour Court and ₹ 5,000 was in respect of expenses of the

previous year booked in the current month (August). Actual production was 40,000 units, of which 30,000 units were sold. On analysing the reasons, it was found that 60% of the under-absorbed overhead was due to defective planning and the rest was attributed to normal cost increase. *SHOW* the treatment of over/under-absorbed overhead in the cost accounts?

8. In a manufacturing unit, factory overhead was recovered at a pre-determined rate of ₹ 25 per man-day. The total factory overhead expenses incurred and the man-days actually worked were ₹ 41.50 lakhs and 1.5 lakh man-days respectively. Out of the 40,000 units produced during a period, 30,000 were sold.

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

EXPLAIN how would unabsorbed overheads be treated in Cost Accounts?

9. A factory has three production departments. The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on the percentage of total factory overheads to total factory wages. The relevant data for a month are given below:

Department	Direct Materials (₹)	Direct Wages (₹)	Factory Overheads (₹)	Direct Labour hours	Machine hours
<i>Budget:</i>					
Machining	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	—
<i>Actual:</i>					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	—

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

Job No. CW 7083 :

Department	Direct Materials	Direct Wages (₹)	Direct Labour hours	Machine hours
Machining	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	—

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

Required:

- (i) COMPUTE the overhead absorption rate as per the current policy of the company and determine the selling price of the Job No. CW 7083.
 - (ii) Suggest any suitable alternative method(s) of absorption of the factory overheads and CALCULATE the overhead recovery rates based on the method(s) so recommended by you.
 - (iii) DETERMINE the selling price of Job CW 7083 based on the overhead application rates calculated in (ii) above.
 - (iv) CALCULATE the department-wise and total under or over recovery of overheads based on the company's current policy and the method(s) recommended by you.
10. A light engineering factory fabricates machine parts for customers. The factory commenced fabrication of 12 nos. machine parts as per customers' specifications, the expenditure incurred on the job for the week ending 21st August is as tabulated below:

	(₹)	(₹)
Direct materials (all items)		780.00
Direct labour (manual) 20 hours @ ₹ 15 per hour		300.00

<i>Machine facilities :</i>		
<i>Machine No. I : 4 hours @ ₹ 45</i>	<i>180.00</i>	
<i>Machine No. II : 6 hours @ ₹ 65</i>	<i>390.00</i>	<i>570.00</i>
<i>Total</i>		<i>1,650.00</i>
<i>Overheads @ ₹ 8 per hour on 20 manual hours</i>		<i>160.00</i>
<i>Total cost</i>		<i>1,810.00</i>

The overhead rate of ₹ 8 per hour is based on 3,000 man hours per week; similarly, the machine hour rates are based on the normal working of Machine Nos. I and II for 40 hours out of 45 hours per week.

After the close of each week, the factory levies a supplementary rate for the recovery of full overhead expenses on the basis of actual hours worked during the week. During the week ending 21st August, the total labour hours worked was 2,400 and Machine Nos. I and II had worked for 30 hours and 32.5 hours respectively.

PREPARE a Cost Sheet for the job for the fabrication of 12 nos. machine parts duly levying the supplementary rates.

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

At the end of current financial year, it has been found that actual production overheads incurred were ₹ 6,00,000. It included ₹ 45,000 on account of 'written off' obsolete stores and ₹ 30,000 being the wages paid for the strike period under an award.

The production and sales data for the current year is as under:

Production :

<i>Finished goods</i>	<i>20,000 units</i>
<i>Work-in-progress</i>	<i>8,000 units</i>
<i>(50% complete in all respects)</i>	

Sales :

<i>Finished goods</i>	<i>18,000 units</i>

The actual machine hours worked during the period were 48,000. It has been found that one-third of the under-absorption of production overheads was due to lack of production planning and the rest was attributable to normal increase in costs.

- (i) CALCULATE the amount of under-absorption of production overheads during the current year; and
 - (ii) SHOW the accounting treatment of under-absorption of production overheads.
12. A Ltd., manufactures two products A and B. The manufacturing division consists of two production departments P_1 and P_2 and two service departments S_1 and S_2 . Budgeted overhead rates are used in the production departments to absorb factory overheads to the products. The rate of Department P_1 is based on direct machine hours, while the rate of Department P_2 is based on direct labour hours. In applying overheads, the pre-determined rates are multiplied by actual hours.

For allocating the service department costs to production departments, the basis adopted is as follows:

- (i) Cost of Department S_1 to Department P_1 and P_2 equally, and
- (ii) Cost of Department S_2 to Department P_1 and P_2 in the ratio of 2 : 1 respectively.

The following budgeted and actual data are available:

Annual profit plan data:

Factory overheads budgeted for the year:

Production Departments		Service Departments	
P_1	P_2	S_1	S_2
₹ 25,50,000	₹ 21,75,000	₹ 6,00,000	₹ 4,50,000

Budgeted output in units:

Product A 50,000; B 30,000.

Budgeted raw-material cost per unit:

Product A ₹ 120; Product B ₹ 150.

Budgeted time required for production per unit:

Department P₁ : Product A : 1.5 machine hours

Product B : 1.0 machine hour

Department P₂ : Product A : 2 Direct labour hours

Product B : 2.5 Direct labour hours

Average wage rates budgeted in Department P₂ are:

Product A - ₹ 72 per hour and Product B – ₹ 75 per hour.

All materials are used in Department P₁ only.

Actual data: (for the month of July, 2022)

Units actually produced: Product A: 4,000 units

Product B: 3,000 units

Actual direct machine hours worked in Department P₁:

On product A- 6,100 hours, Product B- 4,150 hours.

Actual direct labour hours worked in Department P₂:

on product A- 8,200 hours, Product B- 7,400 hours.

<i>Costs actually incurred:</i>	<i>Product A</i>	<i>Product B</i>
<i>Raw materials</i>	<i>₹ 4,89,000</i>	<i>₹ 4,56,000</i>
<i>Wages</i>	<i>₹ 5,91,900</i>	<i>₹ 5,52,000</i>
<i>Overheads: Department P₁</i>	<i>₹ 2,31,000 S₁</i>	<i>₹ 60,000</i>
<i>P₂</i>	<i>₹ 2,04,000 S₂</i>	<i>₹ 48,000</i>

You are required to:

- (i) COMPUTE the pre-determined overhead rate for each production department.*
- (ii) PREPARE a performance report for July, 2022 that will reflect the budgeted costs and actual costs.*

Case Scenarios

1. During half year ending inter departmental review meeting of P Ltd., cost variance report was discussed and the performance of the departments were assessed. The following figures were presented.

For a period of first six months of the financial year, following information were extracted from the books:

Actual production overheads ₹ 34,08,000

The above amount is inclusive of the following payments made:

Paid as per court's order	₹ 4,50,000
Expenses of previous year booked in current year	₹ 1,00,000
Paid to workers for strike period under an award	₹ 4,20,000
Obsolete stores written off	₹ 36,000

Production and sales data for the six months are as under:

Production:

Finished goods	1,10,000 units
Works-in-progress	
(50% complete in every respect)	80,000 units

Sale:

Finished goods	90,000 units

Machine worked during the period was 3,000 hours.

At the of preparation of revenue budget, it was estimated that a total of ₹ 50,40,000 would be required for budgeted machine hours of 6,000 as production overheads for the entire year.

During the meeting, a data analytic report revealed that 40% of the over/under-absorption was due to defective production policies and the balance was attributable to increase in costs.

You were also present at the meeting; the chairperson of the meeting has asked you to be ready with the followings for the performance appraisal of the departmental heads:

- (i) *How much was the budgeted machine hour rate used to recover overhead?*
- (a) ₹ 760
 - (b) ₹ 820
 - (c) ₹ 780
 - (d) ₹ 840
- (ii) *How much amount of production overhead has been recovered (absorbed) upto the end of half year end?*
- (a) ₹ 25,20,000
 - (b) ₹ 34,08,000
 - (c) ₹ 24,00,000
 - (d) ₹ 24,60,000
- (iii) *What is the amount of overhead under/ over absorbed?*
- (a) 1,18,000 over-absorbed
 - (b) 1,18,000 under- absorbed
 - (c) 18,000 over-absorbed
 - (d) 18,000 under-absorbed
- (iv) *What is the supplementary rate for apportionment of over/under absorbed overheads over WIP, Finished goods and Cost of sales?*
- (a) ₹ 0.315 per unit
 - (b) ₹ 0.472 per unit
 - (c) ₹ 0.787 per unit
 - (d) ₹ 1 per unit
- (v) *What is the amount of over/under absorbed overhead apportioned to Work in Progress?*
- (a) ₹ 9,440
 - (b) ₹ 42,480

(c) ₹ 18,880

(d) ₹ 70,800

ANSWERS

Answers to the MCQs

1.	(a)	2.	(c)	3.	(c)	4.	(b)	5.	(b)	6.	(c)
7.	(c)	8.	(c)	9.	(d)	10	(d)				

Answers to the Theoretical Questions

1. Please refer paragraph 6
2. Please refer paragraph 4.4
3. Please refer paragraph 9.2
4. Please refer paragraph 4.3
5. Please refer paragraph 6
6. Please refer paragraph 10
7. Please refer paragraph 4.3
8. Please refer paragraph 4.4

Answers to the Practical Problems

1. (a) Overhead Distribution Statement

Particulars	Production Department		Service Department	
	Machine	Packing	General Plant	Stores & Maint.
Allocated Expenses:				
Indirect labour	4,000	3,000	2,000	5,650
Maintenance material	1,800	700	1,020	1,500

Superintendent's salary	-	-	4,000	-
Misc. supplies	400	1,000	150	200
Cost & payroll salaries	-	-	10,000	-
Total Allocated Overheads	6,200	4,700	17,170	7,350
Apportioned expenses (as per schedule below)	77,720	25,800	2,830	22,650
Total overheads	83,920	30,500	20,000	30,000

Schedule of Apportioned Expenses

Item	Basis	Total Amount	Production Depts.		Service Depts.	
			Machine shop	Packing	Gen. Plant	Store & Maint.
		(₹)	(₹)	(₹)	(₹)	(₹)
Power (7:1:-:2)	HP hours	8,000	5,600	800	-	1,600
Rent (5:2:1:4)	Floor Space	12,000	5,000	2,000	1,000	4,000
Fuel and heat (3:6:2:4)	Radiator Secs.	6,000	1,200	2,400	800	1,600
Insurance (64:20:1:15)	Investment	1,000	640	200	10	150
Trade license fees (64:20:1:15)	Investment	2,000	1,280	400	20	300
Depreciation (64:20:1:15)	Investment	1,00,000	64,000	20,000	1,000	15,000
Total		1,29,000	77,720	25,800	2,830	22,650

(b) Distribution of Service Department Expenses

	Production Depts.		Service Depts.	
	Machine shop	Packing	Gen. Plant	Store & Maint.
	(₹)	(₹)	(₹)	(₹)
Total Expense [as per (a)]	83,920	30,500	20,000	30,000
Dist. of Store & Maint. (5:2:3)	15,000	6,000	9,000	-30,000
Dist. of General plant (4:2:1)	16,571	8,286	-29,000	4,143
Dist. of Store & Maint. (5:2:3)	2,072	829	1,242	-4,143
Dist. of General plant (4:2:1)	710	355	-1,242	177
Dist. of Store & Maint. (5:2:3)	89	35	53	-177
Dist. of General plant (4:2:1)	35	18	-53	0
Total	1,18,397	46,023		

2. Statement Showing Distribution of Overheads of Modern Manufactures Ltd.

Particulars	Basis	Total	Production Departments			Service Departments	
			P ₁	P ₂	P ₃	S ₁	S ₂
		(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
Direct wages	Actual	1,695	-	-	-	1,500	195
Rent & rates	Area	5,000	1,000	1,250	1,500	1,000	250
General lighting	Light points	600	100	150	200	100	50
Indirect wages	Direct wages	1,939	600	400	600	300	39

Power	H.P.	1,500	600	300	500	100	—
Depreciation of machines	Value of machines	10,000	2,400	3,200	4,000	200	200
Sundries	Direct wages	9,695	3,000	2,000	3,000	1,500	195
		30,429	7,700	7,300	9,800	4,700	929

Redistribution of Service Department's Expenses over Production Departments

	P ₁ (₹)	P ₂ (₹)	P ₃ (₹)	S ₁ (₹)	S ₂ (₹)
Total overhead distributed as above	7,700	7,300	9,800	4,700	929
Dept. S ₁ Overheads apportioned (20:30:40:—:10)	940	1,410	1,880	-4,700	470
Dept. S ₂ overheads apportioned (40:20:30:10:—)	559.6	279.8	419.7	139.9	-1,399
Dept. S ₁ Overheads apportioned (20:30:40:—:10)	28	42	56	-139.9	13.9
Dept. S ₂ overheads apportioned (40:20:30:10:—)	6.2	3.1	4.6	-	-13.9
	9,233.8	9,034.9	12,160.3		
Working hours	3070	4475	2419		
Rate per hour	3.00	2.02	5.03		

Determination of total cost of Product 'X'

	(₹)
Direct material cost	50.00
Direct labour cost	30.00
Overhead cost (See working note)	37.19
	117.19

Working Note:

Overhead cost:

$$(\text{₹ } 3 \times 4 \text{ hrs.}) + (\text{₹ } 2.02 \times 5 \text{ hrs.}) + (\text{₹ } 5.03 \times 3 \text{ hrs.})$$

$$= \text{₹ } 12 + \text{₹ } 10.10 + \text{₹ } 15.09 = \text{₹ } 37.19$$

3. (a) Deccan Manufacturing Limited**Schedule Showing the Distribution of Overhead Costs among Departments**

	Production			Service			
	X (₹)	Y (₹)	Z (₹)	P (₹)	Q (₹)	R (₹)	S (₹)
Overhead cost	1,93,000	64,000	83,000	45,000	75,000	1,05,000	30,000
Distribution of Dept.P (100:125:85:-:50:40:50)	10,000	12,500	8,500	-45,000	5,000	4,000	5,000
Distribution of Dept.Q (4:3:4:-:6:3)	16,000	12,000	16,000	-	-80,000	24,000	12,000
Distribution of Dept.R (6:3:3:-:2:2)	57,000	28,500	28,500	-	-	-1,33,000	19,000
Distribution of Dept.S (4:3:4:-:2:2)	24,000	18,000	24,000	-	-	-	-66,000
Total	3,00,000	1,35,000	1,60,000				

(b) Calculation of overhead recovery rate

	Dept-X	Dept-Y	Dept-Z
Total apportioned overheads	₹3,00,000	₹1,35,000	₹1,60,000
Direct labour hours	4,000	3,000	4,000
Overhead recovery rate per labour hour	₹75	₹45	₹40

4. Working notes:

- (i) Total machine hours used 3,500
(600 + 900 + 400 + 600 + 1,000)
- (ii) Total machine hours without the use of computers 1,500
(600 + 900)
- (iii) Total machine hours with the use of computer 2,000
(400 + 600 + 1,000)
- (iv) Total overheads of the machine per month
- | | |
|---|--------------------|
| Rent (₹ 17,500 ÷ 3 months) | ₹ 5,833.33 |
| Depreciation (₹ 2,00,000 ÷ 12 months) | ₹ 16,666.67 |
| Indirect Charges (₹ 1,50,000 ÷ 12 months) | ₹ <u>12,500.00</u> |
| Total | ₹ <u>35,000.00</u> |
- (v) Computer hire charges for a month = ₹ 35,000
(₹ 4,20,000 ÷ 12 months)
- (vi) Overheads for using machines without computer
- $$= \frac{₹ 35,000}{3,500 \text{ hrs.}} \times 1,500 \text{ hrs.} = ₹ 15,000$$
- (vii) Overheads for using machines with computer
- $$= \frac{₹ 35,000}{3,500 \text{ hrs.}} \times 2,000 \text{ hrs.} + ₹ 35,000 = ₹ 55,000$$

(a) **Computation of Machine hour rate for the firm as a whole for a month.**

(1) When the Computer was used: $\frac{₹ 55,000}{2,000 \text{ hours}} = ₹ 27.50 \text{ per hour}$

(2) When the computer was not used: $\frac{₹ 15,000}{1,500 \text{ hrs.}} = ₹ 10 \text{ per hour}$

(b) **Computation of Machine hour rate for the individual job**

	Rate per hour	Job					
		A		B		C	
	(₹)	Hrs.	(₹)	Hrs.	(₹)	Hrs.	(₹)
Overheads							
Without Computer	10.0	600	6,000	900	9,000	-	-
With computer	27.5	400	11,000	600	16,500	1,000	27,500
Total		1,000	17,000	1,500	25,500	1,000	27,500
Machine hour rate			17		17		27.5

5. **Computation of comprehensive machine hour rate of machine shop**

Particulars	(₹)
Operator's wages (<i>Refer to working note 2</i>)	7,38,000
Production bonus (15% on wages)	1,10,700
Power consumed	80,500
Supervision and indirect labour	33,000
Lighting and electricity	12,000
Repairs and maintenance ($3\% \times ₹ 8 \text{ lakh} \times \frac{1}{2}$)	12,000
Insurance ($₹ 40,000 \times \frac{1}{2}$)	20,000

Depreciation (10% × ₹ 8 lakh × ½)	40,000
Sundry works expenses (₹12,000 × ½)	6,000
General management expenses (₹54,530 × ½)	27,265
	10,79,465

$$\begin{aligned}
 \text{Machine hour rate} &= \frac{\text{Total overheads of machine shop}}{\text{Hours of machines operation}} \\
 &= \frac{\text{₹ } 10,79,465}{7,200 \text{ hours}} \text{ (Refer to working note 1)} = \text{₹ } 149.93
 \end{aligned}$$

Working notes

1. Computation of hours, for which 6 operators are available for 6 months.

	For 6 months and 6 operators
Normal available hours (208 x 6 months x 6 operators)	7,488
Less: Absenteeism hours (18 x 6 operators)	(108)
Paid hours	7,380
Less: Leave hours (20 x 6 operators)	(120)
Less: Idle time hours (10 x 6 operators)	(60)
Effective working hours	7,200

As machines cannot be worked without an operator wholly engaged on them therefore, hours for which 6 operators are available for 6 months are the hours for which machines can be used. Hence 7,200 hours represent effective working hours.

2. Computation of operator's wages

$$\text{Average rate of wages: } \frac{\text{₹ } 800}{8 \text{ hours}} = \text{₹ } 100 \text{ per hour}$$

Total wages paid to 6 operators for 6 months = 7,380 hours × ₹ 100
= ₹ 7,38,000

6. Computation for works costs for job No. 198

	(₹)	(₹)
Materials		6,000
Direct labour		4,000
		10,000
Factory overheads:		
Machine No. 215 : 40 hours @ ₹35	1,400	
Machine No. 160 : 30 hours @ ₹40	1,200	
*240 hours of welders @ ₹ 20 per hr.	4,800	
**General expenses 10% of wages	400	7,800
Work cost		17,800

* 6 welders × 5 days × 8 hours = 240 hours

** Un- apportioned expenses ₹ 20,000 which works out at 10% of direct wages.

7. Computation of Over/Under-absorbed overhead expenses during the month of August

	(₹)	(₹)
Total expenses incurred in the month of August:		80,000
Less: The amount paid according to labour court award (Assumed to be non-recurring)	15,000	
Expenses of previous year	5000	(20,000)
Net overhead expenses incurred for the month		60,000
Overhead recovered for 10,000 hours @ ₹ 5 per hour		(50,000)
Under-absorbed overheads		10,000

60% of under-absorbed overhead was due to defective planning, it will be charged to costing profit & loss account.

40% of under-absorbed overhead i.e. ₹4,000 may be distributed over Finished Goods and Cost of Sales using supplementary overhead rate:

$$\text{Supplementary rate} = \frac{\text{Under-absorbed OH}}{\text{Units produced}}$$

$$= \frac{\text{₹4,000}}{40,000 \text{ units}} = \text{₹0.10}$$

Amount of under-absorbed overheads charged to finished goods

$$= 10,000 \text{ units} \times \text{₹0.10} = \text{₹1,000}$$

Amount of under-absorbed overheads charged to cost of sales

$$= 30,000 \text{ units} \times \text{₹0.10} = \text{₹3,000}$$

8. Computation of unabsorbed overheads

Man-days worked	1,50,000
	(₹)
Overhead actually incurred	41,50,000
Less: Overhead absorbed @ ₹ 25 per man-day	37,50,000
(₹ 25 × 1,50,000)	_____
Unabsorbed overheads	4,00,000
Unabsorbed overheads due to defective planning (i.e. 60% of ₹ 4,00,000)	<u>2,40,000</u>
Balance of unabsorbed overhead	<u>1,60,000</u>

Treatment of unabsorbed overheads in Cost Accounts

- (i) The unabsorbed overheads of ₹ 2,40,000 due to defective planning to be treated as abnormal and therefore be charged to Costing Profit and Loss Account.

- (ii) The balance unabsorbed overheads of ₹1,60,000 be charged to production i.e., 40,000 units at the supplementary overhead absorption rate i.e., ₹ 4 per unit (Refer to Working Note)

(₹)

Charge to Costing Profit and Loss Account as part of the cost of unit sold	1,20,000
(30,000 units @ ₹ 4 p.u.)	
Add: To closing stock of finished goods	40,000
(10,000 units @ ₹ 4 p.u.)	
Total	<u>1,60,000</u>

Working Note:

$$\text{Supplementary overhead absorption rate} = \frac{\text{₹ 1,60,000}}{40,000 \text{ units}} = \text{₹ 4 p.u.}$$

9. (i) Computation of overhead absorption rate
(as per the current policy of the company)

Department	Budgeted factory Overheads	Budgeted direct wages
	(₹)	(₹)
Machinery	3,60,000	80,000
Assembly	1,40,000	3,50,000
Packing	1,25,000	70,000
Total	6,25,000	5,00,000

$$\text{Overhead absorption rate} = \frac{\text{Budgeted factory overheads}}{\text{Budgeted direct wages}} \times 100$$

$$= \frac{\text{₹ 6,25,000}}{\text{₹ 5,00,000}} \times 100 = 125\% \text{ of Direct wages}$$

Selling Price of the Job No. CW-7083

	(₹)
Direct materials (₹ 1,200 + ₹ 600 + ₹ 300)	2,100.00
Direct wages (₹ 240 + ₹ 360 + ₹ 60)	660.00
Overheads (125% × ₹ 660)	<u>825.00</u>
Total factory cost	3,585.00
Add: Mark-up (30% × ₹ 3,585)	<u>1,075.50</u>
Selling price	<u>4,660.50</u>

(ii) Methods available for absorbing factory overheads and their overhead recovery rates in different departments**1. Machining Department**

In the machining department, the use of machine time is the predominant factor of production. Hence machine hour rate should be used to recover overheads in this department. The overhead recovery rate based on machine hours has been calculated as under:

$$\begin{aligned}
 \text{Machine hour rate} &= \frac{\text{Budgeted factory overheads}}{\text{Budgeted machine hours}} \\
 &= \frac{\text{₹ 3,60,000}}{80,000 \text{ hours}} = \text{₹ 4.50 per hour}
 \end{aligned}$$

2. Assembly Department

In this department direct labour hours is the main factor of production. Hence direct labour hour rate method should be used to recover overheads in this department. The overheads recovery rate in this case is:

$$\begin{aligned}
 \text{Direct labour hour rate} &= \frac{\text{Budgeted factory overheads}}{\text{Budgeted direct labour hours}} \\
 &= \frac{\text{₹ 1,40,000}}{1,00,000 \text{ hours}} = \text{₹ 1.40 per hour}
 \end{aligned}$$

3. Packing Department

Labour is the most important factor of production in this department. Hence direct labour hour rate method should be used to recover overheads in this department.

The overhead recovery rate in this case comes to:

Budgeted factory overhead

$$\begin{aligned} \text{Direct labour hour rate} &= \frac{\text{Budgeted factory overheads}}{\text{Direct labour hours}} \\ &= \frac{\text{₹ 1,25,000}}{50,000 \text{ hours}} = \text{₹ 2.50 per hour} \end{aligned}$$

(iii) Selling Price of Job CW-7083 [based on the overhead application rates calculated in (ii) above]

	(₹)
Direct materials	2,100.00
Direct wages	660.00
Overheads (Refer to Working note)	<u>1,078.00</u>
Factory cost	3,838.00
Add: Mark up (30% of ₹ 3,838)	<u>1,151.40</u>
Selling price	<u>4,989.40</u>

Working note:

Overhead Summary Statement

Dept.	Basis	Hours	Rate (₹)	Overheads (₹)
Machining	Machine hour	180	4.50	810
Assembly	Direct labour hour	120	1.40	168
Packing	Direct labour hour	40	2.50	100
			Total	1,078

(iv) **Department-wise statement of total under or over recovery of overheads**

(a) Under current policy

Departments

	Machining	Assembly	Packing	Total
	(₹)	(₹)	(₹)	(₹)
Direct wages (Actual)	96,000	2,70,000	90,000	
Overheads recovered @				
125% of Direct wages: (A)	1,20,000	3,37,500	1,12,500	5,70,000
Actual overheads: (B)	3,90,000	84,000	1,35,000	6,09,000
(Under)/Over recovery of overheads : (A–B)	(2,70,000)	2,53,500	(22,500)	(39,000)

(b) As per methods suggested

Basis of overhead recovery

	Machine hours	Direct labour hours (Assembly)	Direct labour hours (Packing)	Total (₹)
Hours worked	96,000	90,000	60,000	
Rate/hour (₹)	4.50	1.40	2.50	
Overhead recovered (₹): (A)	4,32,000	1,26,000	1,50,000	7,08,000
Actual overheads (₹): (B)	3,90,000	84,000	1,35,000	6,09,000
(Under)/Over recovery: (A–B)	42,000	42,000	15,000	99,000

10. Fabrication of 12 nos. machine parts (job No.....)

Date of commencement: 16th August

Date of Completion:

Cost sheet for the week ending, August 21st:

	(₹)	(₹)
Direct materials (all items)		780.00
Direct labour (manual) 20 hours @ ₹ 15 per hour		300.00
Machine facilities:		
Machine No. I : 4 hours @ ₹ 45	180.00	
Machine No. II : 6 hours @ ₹ 65	390.00	570.00
Total		1,650.00
Overheads @ ₹ 8 per hour on 20 manual hours		160.00
Total cost		1,810.00
Supplementary Rates		
Overheads 20 hours @ ₹ 2 per hour (<i>Refer WN-1</i>)	40.00	
Machine facilities: (<i>Refer WN-2</i>)		
Machine No. I - 4 hours @ ₹ 15	60.00	
Machine No. II - 6 hours @ ₹ 15	90.00	190.00
Cost		2,000.00

Working notes (WN):

- Overheads budgeted: 3,000 man-hours × ₹8 = ₹24,000

Actual hours: 2,400 man-hours

Actual rate per hour ₹24,000 ÷ 2,400 hours = ₹10

Supplementary charge ₹ 2 (₹10 – ₹ 8) per hour

2. Machine facilities:

	Machine No. I	Machine No. II
Budgeted	₹1,800 (40 × ₹45)	₹2,600 (40 × ₹65)
Actual number of hours	30	32.5
Actual rate per hour	₹60.00	₹80.00
Supplementary rate per hour	₹ 15.00 (₹60.00 – ₹45.00)	₹ 15.00 (₹80.00 – ₹65.00)

11. (i) **Amount of under-absorption of production overheads during the current year**

(₹)

Total production overheads actually incurred during the current year	6,00,000
Less : 'Written off' obsolete stores	₹ 45,000
Wages paid for strike period	₹ 30,000 <u>75,000</u>
Net production overheads actually incurred : (A)	5,25,000
Production overheads absorbed by 48,000 machine hours @ ₹ 10 per hour : (B)	<u>4,80,000</u>
Amount of under – absorption of production overheads : [(A) – (B)]	<u>45,000</u>

(ii) **Accounting treatment of under absorption of production overheads**

It is given in the statement of the question that 20,000 units were completely finished and 8,000 units were 50% complete, one third of the under-absorbed overheads were due to lack of production planning and the rest were attributable to normal increase in costs.

(₹)

1. (33 – 1/3% of ₹ 45,000) i.e., ₹ 15,000 of under-absorbed overheads were due to lack of production planning. This being abnormal, should be debited to the Costing Profit and Loss A/c. 15,000
 2. Balance (66–2/3% of ₹ 45,000) i.e., ₹ 30,000 of under-absorbed overheads should be distributed over work-in-progress, finished goods and cost of sales by using supplementary rate. 30,000
- Total under-absorbed overheads 45,000

Apportionment of unabsorbed overheads of ₹ 30,000 over, work-in progress, finished goods and cost of sales

	Equivalent Completed Units	(₹)
Work-in-Progress		
(4,000 units × ₹ 1.25)	4,000	5,000
(Refer to working note)		
Finished goods		
(2,000 units × ₹ 1.25)	2,000	2,500
Cost of sales		
(18,000 units × ₹ 1.25)	18,000	22,500
	24,000	30,000

Working Note

$$\text{Supplementary rate per unit} = \frac{\text{₹ } 30,000}{24,000} = \text{₹ } 1.25$$

12. (i) Computation of predetermined overhead rate for each production departments from budgeted data

	Production Department		Service Department	
	P ₁	P ₂	S ₁	S ₂
Budgeted factory overheads for the year in (₹)	25,50,000	21,75,000	6,00,000	4,50,000
Allocation of service department S ₁ 's costs to production departments P ₁ and P ₂ equally in (₹)	3,00,000	3,00,000	(6,00,000)	—
Allocation of service department S ₂ 's costs to production departments P ₁ and P ₂ in the ratio of 2:1 in (₹)	3,00,000	1,50,000	—	(4,50,000)
Total	31,50,000	26,25,000	—	—
Budgeted machine hours in department P ₁ (working note 1)	1,05,000	—		
Budgeted labour hours in department P ₂ (working note 1)	—	1,75,000		
Budgeted machine/ labour hour rate (₹)	30.00	15.00		

(ii) Performance report for July, 2022

(When 4,000 and 3,000 units of products A and B respectively were actually produced)

	Budgeted (₹)	Actual (₹)
Raw materials used in Dept. P₁:		
A : 4,000 units × ₹ 120	4,80,000	4,89,000
B : 3,000 units × ₹ 150	4,50,000	4,56,000
Direct labour cost (on the basis of labour hours worked in department P ₂)		
A : 4,000 units × 2 hrs. × ₹ 72	5,76,000	5,91,900
B : 3,000 units × 2.5 hrs. × ₹ 75	5,62,500	5,52,000
Overhead absorbed on machine hour basis in Dept. P₁:		
A : 4,000 units × 1.5 hrs. × ₹30	1,80,000	1,74,400*
B : 3,000 units × 1 hr. × ₹30	90,000	1,18,649*
Overhead absorbed on labour hour basis in Dept. P₂:		
A : 4,000 units × 2 hrs. × ₹ 15	1,20,000	1,31,364**
B : 3,000 units × 2.5 hrs. × ₹ 15	1,12,500	1,18,548**
	25,71,000	26,31,861

* (Refer to working note 4) ** (Refer to working note 5)

Working notes:

1.

	Product A	Product B	Total
Budgeted output (in units)	50,000	30,000	
Budgeted machine hours in Dept. P ₁	75,000 (50,000 × 1.5)	30,000 (30,000 × 1 hr.)	1,05,000

	hrs.)		
Budgeted labour hours in Dept. P ₂	1,00,000 (50,000×2 hrs.)	75,000 (30,000×2.5 hrs.)	1,75,000

2.

	Product A	Product B	Total
Actual output (in units)	4,000	3,000	
Actual machine hours utilized in Dept. P ₁	6,100	4,150	10,250
Actual labour hours utilised in Dept. P ₂	8,200	7,400	15,600

3. **Computation of actual overhead rates for each production department from actual data**

	Production Department		Service Department	
	P ₁	P ₂	S ₁	S ₂
Actual factory overheads for the month of July, 2022 in (₹)	2,31,000	2,04,000	60,000	48,000
Allocation of service Dept. S ₁ 's costs to production Dept. P ₁ and P ₂ equally in (₹)	30,000	30,000	(60,000)	—
Allocation of service Dept. S ₂ 's costs to production Dept. P ₁ and P ₂ in the ratio of 2:1 in (₹)	32,000	16,000	—	(48,000)
Total	2,93,000	2,50,000	--	--
Actual machine hours in Dept. P ₁ (working note 2)	10,250	--		
Actual labour hours in Dept. P ₂ (working note 2)	--	15,600		
Actual machine/ labour hour rate (₹)	28.59	16.02		

4. Actual overheads absorbed (based on machine hours)

$$A : 6,100 \text{ hrs} \times ₹ 28.59 = ₹ 1,74,400$$

$$B : 4,150 \text{ hrs} \times ₹ 28.59 = ₹ 1,18,649$$

5. Actual overheads absorbed (based on labour hours)

$$A : 8,200 \text{ hrs} \times ₹ 16.02 = ₹ 1,31,364$$

$$B : 7,400 \text{ hrs} \times ₹ 16.02 = ₹ 1,18,548$$

Answers To The Case Scenarios

1.

i.	(d)	ii.	(a)	iii.	(a)	iv.	(b)	v.	(c)

(i) (d) Budgeted Machine hour rate (Blanket rate)

$$= \frac{₹ 50,40,000}{6,000 \text{ hours}} = ₹ 840 \text{ per hour}$$

(ii) (a) ₹ 25,20,000**(iii) (a)**

	Amount (₹)	Amount (₹)
Total production overheads actually incurred during the period		34,08,000
Less: Amount paid to worker as per court order	4,50,000	
Expenses of previous year booked in the current year	1,00,000	
Wages paid for the strike period under an award	4,20,000	
Obsolete stores written off	36,000	10,06,000
		24,02,000

Less: Production overheads absorbed as per machine hour rate (3,000 hours × ₹ 840*)		25,20,000
Amount of over absorbed production overheads		1,18,000

* Budgeted Machine hour rate (Blanket rate) calculated in part (i)

- (iv) (b) **Accounting treatment of over absorbed production overheads:** As, 40% of the over absorbed overheads were due to defective production policies, this being abnormal, hence should be credited to Costing Profit and Loss Account.

Amount to be credited to Costing Profit and Loss Account

$$= ₹ 1,18,000 \times 40\% = ₹ 47,200.$$

Balance of over absorbed production overheads should be distributed over Works in progress, Finished goods and Cost of sales by applying supplementary rate*.

$$\text{Amount to be distributed} = ₹ 1,18,000 \times 60\% = ₹ 70,800$$

$$\text{Supplementary rate} = \frac{₹ 70,800}{1,50,000 \text{ units}} = ₹ 0.472 \text{ per unit}$$

- (v) (c) Apportionment of over absorbed production overheads over WIP, Finished goods and Cost of sales:

	Equivalent completed units	Amount (₹)
Work-in-Progress (80,000 units × 50% × 0.472)	40,000	18,880
Finished goods (20,000 units × 0.472)	20,000	9,440
Cost of sales (90,000 units × 0.472)	90,000	42,480
Total	1,50,000	70,800

ACTIVITY BASED COSTING

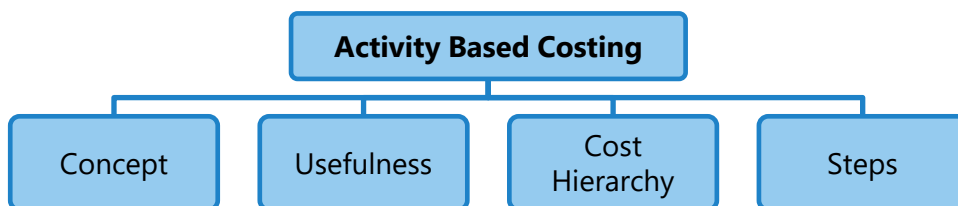


LEARNING OUTCOMES

After studying this chapter, you would be able to-

- ◆ Discuss problem of Traditional Costing System.
- ◆ Discuss usefulness of Activity Based Costing (ABC).
- ◆ Discuss Cost Allocation under ABC.
- ◆ Discuss Different level of activities under ABC.
- ◆ Understand stages, advantages, and limitations of ABC.
- ◆ Discuss various requirements in ABC implementation.
- ◆ Explain the concept of Activity Based Management (ABM).
- ◆ Explain the concept of Activity Based Budgeting (ABB).

CHAPTER OVERVIEW





1. INTRODUCTION

As discussed in chapter 4 i.e. Overhead, in Traditional Costing System, overhead costs are grouped together under cost center and then absorbed into product costs on either of the basis such as direct labour hours, machine hours, volume etc. In certain cases, this traditional costing system gives inaccurate cost information. Though, it should not be assumed that all traditional absorption costing systems are not accurate enough to give adequate information for pricing purposes or other long-run management decision purposes. Some traditional systems treat overheads in a detailed way and relate them to service cost centres as well as production cost centres. The service centre overheads are then spread over the production cost centres before absorption rates are calculated. *The main cause of inaccuracy is in the calculation of the overhead rate itself, which is usually based on direct labour hours or machine hours. These rates assume that products that take longer to make, generate more overheads and so on.*

Organisations, who do not wish to know how much it costs to make a product with precise accuracy, may be happy with traditional costing system. Others, however, fix their price on cost basis and need to determine it with reasonable accuracy. The latter organisations have been greatly benefitted from the development of activity-based costing (ABC), which is considered as a modern absorption costing method, and was evolved to give more accurate product costs.

1.1 Factors prompting the development of ABC

Various factors lead to the development of ABC include:

1. Growing overhead costs because of increasingly automated production
2. Increasing market competition, which necessitated more accurate product costs.
3. Increasing product diversity to secure economies of scope & increased market share.
4. Decreasing costs of information processing because of continual improvements and increasing application of information technology.

1.2 Usefulness/Suitability of ABC

ABC is particularly needed by organisations for product costing in the following situations:

1. **High amount of overhead:** When production overheads are high and form significant costs, ABC is more useful than traditional costing system.
2. **Wide range of products:** ABC is most suitable, when, there is diversity in the product range or there are multiple products.
3. **Presence of non-volume related activities:** When non-volume related activities e.g. material handling, inspection set-up, are present significantly and traditional system cannot be applied, ABC is a superior and better option. ABC will identify non-value-adding activities in the production process that might be a suitable focus for attention or elimination.
4. **Stiff competition:** When the organisation is facing stiff competition and there is an urgent requirement to compute cost accurately and to fix the selling price according to the market situation, ABC is very useful. *ABC can also facilitate in reducing cost by identifying non-value-adding activities in the production process that might be a suitable focus for attention or elimination.*



2. MEANING AND DEFINITION

Activity Based Costing is an accounting methodology that assigns costs to activities rather than products or services. This enables resources & overhead costs to be more accurately assigned to products & services that consume them. **ABC is a technique which involves identification of cost with each cost driving activity and making it as the basis for apportionment of costs over different cost objects/ jobs/ products/customers or services.**

ABC assigns cost to activities based on their use of resources. It then assigns cost to cost objects, such as products or customers, based on their use of activities. ABC can track the flow of activities in organization by creating a link between the activity (resource consumption) and the cost object.

CIMA defines 'Activity Based Costing' as *"An approach to the costing and monitoring of activities which involves tracing resource consumption and costing final outputs. Resources are assigned to activities, and activities to cost objects based on consumption estimates. The latter utilise cost drivers to attach activity costs to outputs."*



3. MEANING OF TERMS USED IN ABC

- (i) **Activity:** Activity, here, refers to an *event that incurs cost*.
- (ii) **Cost Object:** It is *an item for which cost measurement is required* e.g. a product or a customer.
- (iii) **Cost Driver:** It is a *factor that causes a change in the cost of an activity*. There are two categories of cost driver.
 - **Resource Cost Driver:** It is a measure of the *quantity of resources* consumed by an activity. It is used to assign the cost of a resource to an activity or cost pool.
 - **Activity Cost Driver:** It is a measure of the *frequency and intensity of demand*, placed on activities by cost objects. It is used to assign activity costs to cost objects.
- (iv) **Cost Pool:** It represents a group of various individual cost items. It consists of costs that have same cause and effect relationship. Example machine set-up.

Examples of Cost Drivers:

Business Functions	Cost Driver
Research and Development	• Number of research projects • Personnel hours on a project
Design of products, services and procedures	• Number of products in design • Number of parts per product • Number of engineering hours
Customer Service	• Number of service calls

	• Number of products serviced • Hours spent on servicing products
Marketing	• Number of advertisements • Number of sales personnel • Sales revenue
Distribution	• Number of units distributed • Number of customers



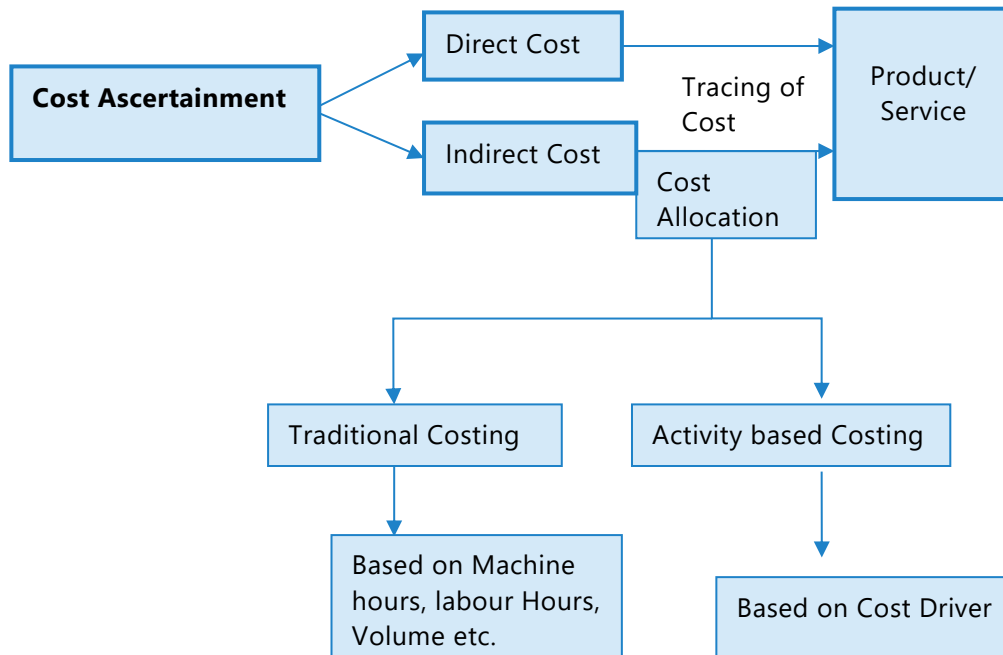
4. COST ALLOCATION UNDER ABC

Under activity based cost allocation overheads are attributed to products on the activity base. Traditionally, overhead costs are grouped together under cost centre and then absorbed into product costs on some basis such as direct labour hours. Activity based costing identifies the activities which cause cost to be incurred and searches for fundamental cost drivers of these activities. Once the activities and their cost drivers have been identified this information can be used to assign overheads to cost objects (e.g. products) which have actually caused cost to be incurred.



5. TRADITIONAL ABSORPTION COSTING VS ABC

Cost Allocation under Traditional and Activity Based Costing system



Cost Allocation under Traditional and Activity Based Costing System

In traditional absorption costing overheads are first related to cost centres (Production & Service Centres) and then to cost objects, i.e., products. *In ABC overheads* are related to activities or grouped into cost pools. Then they are related to the cost objects, e.g., products. The two processes are, therefore, very similar, but the first stage is different, as ABC uses activities instead of functional departments (cost centres). The problem with functional departments is that they tend to include a series of different activities, which incur a number of different costs that behave in different ways. Activities also tend to run across functions; for instance, procurement of materials often includes raising a requisition note in a manufacturing department or stores. It is not raised in the purchasing department where most procurement costs are incurred. Activity costs tend to behave in a similar way to each other i.e., they have the same cost driver. Therefore, ABC gives a more realistic picture of the way in which costs behave.

Difference between Activity Based Costing and Traditional Absorption Costing

Activity Based Costing	Traditional Absorption Costing
1. Overheads are <i>related to activities</i> and grouped into activity cost pools.	1. Overheads are <i>related to cost centers/departments</i> .
2. Costs are related to activities and hence are <i>more realistic</i> .	2. Costs are related to cost centers and hence not realistic of cost behaviour.
3. Activity-wise cost drivers are <i>determined</i> .	3. Time (Hours) are <i>assumed</i> to be the only cost driver governing costs in all departments.
4. Activity-wise recovery rates are determined and there is no concept of a single overhead recovery rate.	4. Either multiple overhead recovery rates (for each department) or a single overhead recovery rate may be determined for absorbing overheads.
5. Cost are assigned to cost objects , e.g. customers, products, services, departments, etc.	5. Costs are assigned to Cost Units i.e. to products, or jobs or hours.
6. <i>Essential activities can be simplified and unnecessary activities can be eliminated</i> . Thus, the corresponding costs are also reduced/ minimized. Hence ABC aids cost control.	6. <i>Cost Centers/ departments cannot be eliminated</i> . Hence, not suitable for cost control.



6. LEVEL OF ACTIVITIES UNDER ABC METHODOLOGY/COST HIERARCHY

These categories are generally accepted today, but were first identified by Cooper (1990). The categories of activities help to determine the type of activity cost driver required.

The categories of activities are:

Level of Activities	Meaning	Example
1. Unit level activities	These are those activities for which the consumption of resources can be identified with the number of units produced.	- The use of indirect materials/consumables tends to increase in proportion to the number of units produced. - The inspection or testing of every item produced, if this was deemed necessary or, perhaps more likely, every 100th item produced.
2. Batch level activities	The activities such as setting up of a machine or processing a purchase order are performed each time a batch of goods is produced. The cost of batch related activities varies with number of batches made, but is common (or fixed) for all units within the batch.	- Material ordering—where an order is placed for every batch of production - Machine set-up costs—where machines need resetting between each different batch of production. - Inspection of products where the first item in every batch is inspected rather than every 100th item quoted above.
3. Product level activities	These are the activities which are performed to support different products in product line	- Designing the product, - Producing parts specifications - Keeping technical drawings of products up to date.

4. Facilities level activities	These are the activities which cannot be directly attributed to individual products. These activities are necessary to sustain the manufacturing process and are common and joint to all products manufactured	• Maintenance of buildings • Plant security



7. STAGES IN ACTIVITY BASED COSTING (ABC)

The different stages in ABC calculations are listed below:

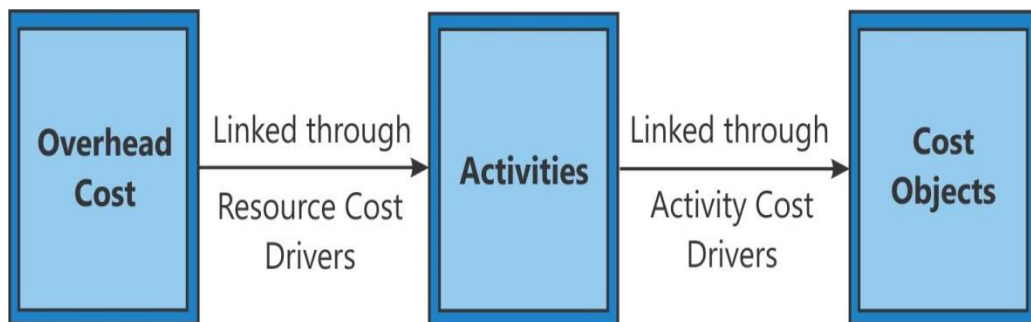
- (1) **Identify the different activities within the organisation:** Usually the number of cost centres that a traditional overhead system uses is quite small, say up to fifteen. In ABC, the number of activities will be much more, say 200; the exact number will depend on how the management subdivides the organisation's activities. *It is possible to break the organisation down into many very small activities.* But if ABC is to be acceptable as practical system it is necessary to use larger groupings, say, 40 activities may be used in practice. The additional number of activities over cost centres means that ABC should be more accurate than the traditional method regardless of anything else. Some activities may be listed as follows:-

- Production schedule changes
- Customer liaison
- Purchasing
- Production process set up
- Quality control
- Material handling
- Maintenance

- (2) **Relate the overheads to the activities**, both support and primary, that caused them. This creates '**cost pools**' or '**cost buckets**'. This will be done using resource cost drivers that reflect causality.
- (3) **Support activities are then spread across the primary activities** on some suitable base, which reflects the use of the support activity. The base is the cost driver that is the measure of how the support activities are used.
- (4) **Determine the activity cost drivers** that will be used to relate the overheads collected in the cost pools to the cost objects/products. This is based on the factor that drives the consumption of the activity. The question to ask is – what causes the activity to incur costs? In production scheduling, for example, the driver will probably be the number of batches ordered.
- (5) **Calculate activity cost driver rates for each activity**, just as an overhead absorption rate would be calculated in the traditional system.

$$\text{Activity cost driver rate} = \frac{\text{Total cost of activity}}{\text{Activity driver}}$$

The activity driver rate can be used not only to identify cost of products, as in traditional absorption costing, but it can also be used for costing other cost objects such as customers/customer segments and distribution channels. The possibility of costing objects other than products is part of the benefit of ABC. The activity cost driver rates will be multiplied by the different amounts of each activity that each product/other cost object consumes.



Cost allocation under ABC

Let us take a small example to understand the steps stated above:

Assume that a company makes widgets and the management decides to install an ABC system. The management decides that all overhead costs will have only three cost drivers viz. direct labour hours, machine hours and number of purchase orders. The general ledger of the company shows the following overhead costs –

General Ledger	(₹)
Perquisite taxes	1,000
Machine maintenance	500
Purchasing Dept. labour	4,000
Fringe benefits	2,000
Purchasing Dept. Supplies	250
Equipment depreciation	750
Electricity	1,250
Employees' group insurance	1,500
Total	11,250

So, which overheads do you think are driven by direct labour hours?

The answer is

Perquisite taxes	₹ 1,000
Fringe benefits	₹ 2,000
Employees' group insurance	₹ 1,500
Total	₹ 4,500

Similarly, overheads driven by machine hours include Machine maintenance, depreciation and electricity, totaling ₹ 2,500 and finally overheads driven by number of purchase orders include purchasing department labour and purchasing department supplies, totaling ₹ 4,250.

Now, overhead rate is calculated by the formula

Total cost in the activity pool ÷ Base,

base being the total number of labour hours, machine hours and total number of purchase orders in the given case.

Assume that the total number of labour hours be 1,000 hours, machine hours be 250 hours and total purchase orders be 100 orders.

So, Cost driver rate would be

Cost Driver Rate	(₹)
₹ 4,500/ 1,000	₹ 4.50 per labour hour
₹ 2,500/ 250	₹ 10 per machine hour
₹ 4,250/ 100	₹ 42.50 per purchase order

Now, let's allocate the overheads between two widgets A and B the details of which are given below:

Particulars	Widget A	Widget B
Labour hours	400	600
Machine Hours	100	150
Purchase Orders	50	50

So, total overhead costs applied to widget A = $(400 \times ₹ 4.50) + (100 \times ₹ 10) + (50 \times ₹ 42.50) = ₹ 4,925$

And total overheads applied to widget B = $(600 \times ₹ 4.50) + (150 \times ₹ 10) + (50 \times ₹ 42.50) = ₹ 6,325$

So total overheads = ₹ 4,925 + ₹ 6,325 = ₹ 11,250.

Generally, in the traditional costing method, overheads are applied on the basis of direct labour hours (total 1,000 labour hours in the given case). So, in that case the overhead absorption rate would be – $₹ 11,250/1000 = ₹ 11.25$ per hour and the total overheads applied to Widget A would have been = $400 \times ₹ 11.25 = ₹ 4,500$ and to Widget B = $600 \times ₹ 11.25 = ₹ 6,750$.

Hence Widget A would have been under-valued and Widget B over-valued by ₹ 425.

Examples of Cost Drivers

Some of the examples of cost drivers for different activity pools in a production department are stated below:

Activity Cost Pools	Related Cost Drivers
Ordering and Receiving Materials cost	Number of purchase orders
Setting up machines costs	Number of set-ups
Machining costs	Machine hours
Assembling costs	Number of parts
Inspecting and testing costs	Number of tests
Painting costs	Number of parts
Supervising Costs	Direct labour hours

The process of calculating cost driver rate is illustrated in diagrammatic presentation as below:

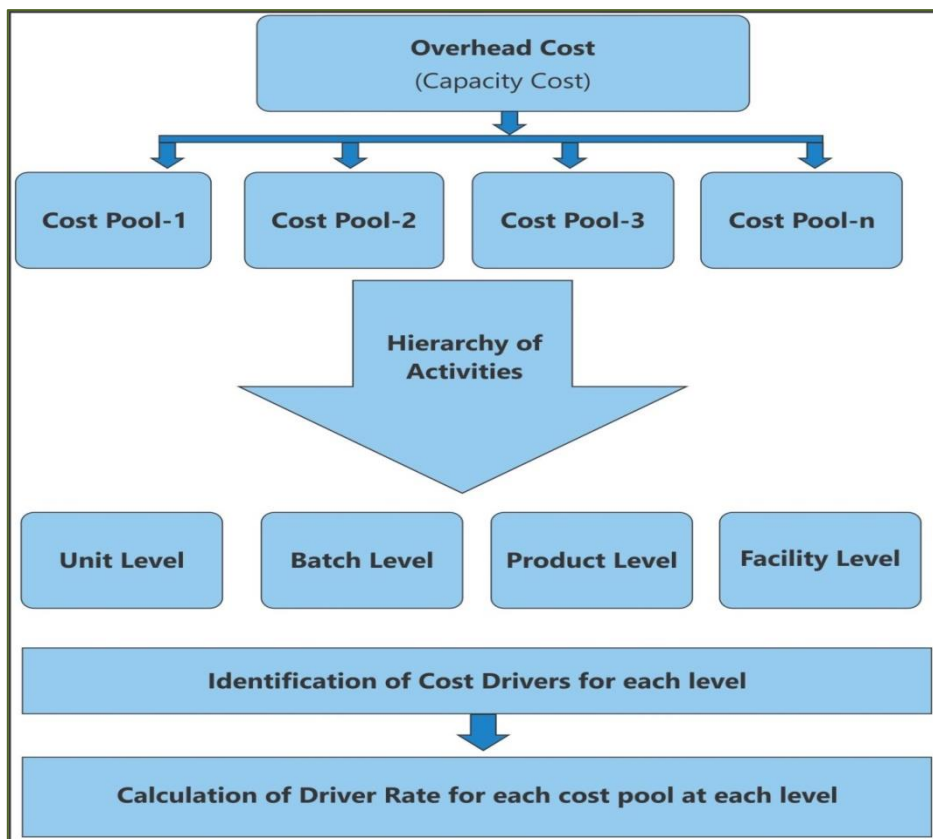


ILLUSTRATION 1

ABC Ltd. is a multiproduct company, manufacturing three products A, B and C. The budgeted costs and production for the year ending 31st March are as follows:

	A	B	C
Production quantity (Units)	4,000	3,000	1,600
Resources per Unit:			
- Direct Materials (Kg.)	4	6	3
- Direct Labour (Minutes)	30	45	60

The budgeted direct labour rate was ₹ 10 per hour, and the budgeted material cost was ₹ 2 per kg. Production overheads were budgeted at ₹ 99,450 and were absorbed to products using the direct labour hour rate. ABC Ltd. followed the Absorption Costing System.

ABC Ltd. is now considering to adopt an Activity Based Costing system. The following additional information is made available for this purpose.

1. **Budgeted overheads were analysed into the following:**

	(₹)
Material handling	29,100
Storage costs	31,200
Electricity	39,150

2. **The cost drivers identified were as follows:**

Material handling	Weight of material handled
Storage costs	Number of batches of material
Electricity	Number of Machine operations

3. **Data on Cost Drivers was as follows:**

	A	B	C
<i>For complete production:</i>			
<i>Batches of material</i>	10	5	15
<i>Per unit of production:</i>			
<i>Number of Machine operations</i>	6	3	2

You are requested to:

1. *PREPARE a statement for management showing the unit costs and total costs of each product using the absorption costing method.*
2. *PREPARE a statement for management showing the product costs of each product using the ABC approach.*
3. *STATE what are the reasons for the different product costs under the two approaches?*

SOLUTION**1. Traditional Absorption Costing**

	A	B	C	Total
(a) Quantity (units)	4,000	3,000	1,600	8,600
(b) Direct labour (minutes)	30	45	60	-
(c) Direct labour hours (a × b)/60 minutes	2,000	2,250	1,600	5,850

Overhead rate per direct labour hour:

= Budgeted overheads ÷ Budgeted labour hours

= ₹ 99,450 ÷ 5,850 hours

= ₹ 17 per direct labour hour

Unit Costs:

	A (₹)	B (₹)	C (₹)
Direct Costs:			
- Direct Labour	5.00	7.50	10.00
- Direct Material	8.00	12.00	6.00
Production Overhead:	8.50 $\left(\frac{₹ 17 \times 30}{60} \right)$	12.75 $\left(\frac{₹ 17 \times 45}{60} \right)$	17.00 $\left(\frac{₹ 17 \times 60}{60} \right)$
Total unit costs	21.50	32.25	33.00
Number of units	4,000	3,000	1,600
Total costs	86,000	96,750	52,800

2. Activity Based Costing

	A	B	C	Total
Quantity (units)	4,000	3,000	1,600	-
Material Weight per unit (Kg.)	4	6	3	-
Total material weight	16,000	18,000	4,800	38,800
Machine operations per unit	6	3	2	-
Total operations	24,000	9,000	3,200	36,200
Total batches of Material	10	5	15	30

Material handling rate per kg. = ₹ 29,100 ÷ 38,800 kg.

= ₹ 0.75 per kg.

Electricity rate per machine operations = ₹ 39,150 ÷ 36,200

= ₹ 1.081 per machine operations

Storage rate per batch

= ₹ 31,200 ÷ 30 batches

= ₹ 1,040 per batch

Unit Costs:

	A (₹)	B (₹)	C (₹)
Direct Costs:			
Direct Labour	5.00	7.50	10.00
Direct material	8.00	12.00	6.00
Production Overheads:			
Material Handling	3.00 (₹0.75 × 4)	4.50 (₹0.75 × 6)	2.25 (₹0.75 × 3)
Electricity	6.49 (₹1.081 × 6)	3.24 (₹1.081 × 3)	2.16 (₹1.081 × 2)
Storage	2.60 $\left(₹10 \times \frac{₹1,040}{4,000} \right)$	1.73 $\left(₹5 \times \frac{₹1,040}{3,000} \right)$	9.75 $\left(₹15 \times \frac{₹1,040}{1,600} \right)$
Total unit costs	25.09	28.97	30.16
Number of units	4,000	3,000	1,600
Total costs	₹ 1,00,360	₹ 86,910	₹ 48,256

3. **Comments:** The difference in the total costs under the two systems is due to the differences in the overheads borne by each of the products. The Activity Based Costs appear to be more precise.



8. ADVANTAGES OF ACTIVITY BASED COSTING

The main advantages of using Activity Based Costing are:

- More accurate costing of products/services.
- Overhead allocation is done on logical basis.
- It enables better pricing policies by supplying accurate cost information.
- Utilizes unit cost rather than just total cost

- (v) Help to identify non-value added activities which facilitates cost reduction.
- (vi) It is helpful to the organizations with multiple products.
- (vii) It highlights problem areas which require attention of the management.



9. LIMITATIONS OF ACTIVITY BASED COSTING

The main limitations using Activity Based Costing are:

- (i) It is more expensive, particularly in comparison with traditional costing system.
- (ii) It is not helpful to the small organizations.
- (iii) It may not be applied to organizations with limited products.
- (iv) Selection of the most suitable cost driver may not be easy/ may be difficult or complicated.



10. REQUIREMENTS IN ABC IMPLEMENTATION

A number of distinct practical stages are required in the ABC implementation which are given as below:

- (1) Staff Training:** The co-operation of the workforce is critical to the successful implementation of ABC. Staff training should be done to create an awareness on the purpose of ABC.
- (2) Process Specification:** Informal, but structured interviews with key members of personnel will identify the different stages of the production process, the commitment of resources to each, processing times and bottlenecks.
- (3) Activity Definition:** The activities must be defined clearly in the early stage in order to manage the problems, if any, effectively. There might be overloading of information from the new data, but the same is needed in codification.
- (4) Activity Driver Selection:** Cost driver for each activity shall be selected.
- (5) Assigning Cost:** A single representative activity driver can be used to assign costs from the activity pools to the cost objects.



11. PRACTICAL APPLICATIONS OF ACTIVITY BASED COSTING

11.1 As a Decision-Making Tool

ABC can act as a decision making tool in the following ways:

- (i) ABC along with some other cost management technique can be utilized to improve performance and profitability of an organization.
- (ii) Wholesale distributors can gain significant advantage in the decision-making process through implementation of ABC concepts by correlating costs to various activities. Introduction of new product or vendor can be better decided through ABC.
- (iii) ABC can assist in decisions related to facility and resource expansion. Often the basis for relocation or opening of a new distribution center is based on **cost associations**. Reduction in freight or other logistic costs can offset the expense of the new facility, staff or equipment. The **ABC model** can identify the specific cost elements being targeted, providing a much clearer picture which aids in management actions.
- (iv) ABC augments decision support for human resources. Since the activity (and therefore costs) can be associated to an individual, new levels of financial performance can be determined. This might be evident in the case of branch management or sales.
- (v) Companies who wish to determine price based on cost plus markup basis find ABC method of costing very relevant and are able to determine competitive prices for their products.

11.2 As Activity Based Management

Meaning of Activity Based Management

The term Activity Based Management (ABM) is used to describe the cost management application of ABC. **The use of ABC as a costing tool to manage costs at activity level is known as Activity Based Management (ABM).** ABM is a discipline that focuses on the efficient and effective management of activities as the route to continuously improving the value received by customers. ABM utilizes cost information gathered through ABC.

Various analysis in Activity Based Management

The various types of analysis involved in ABM are as follows:

- (1) **Cost Driver Analysis:** The factors that cause activities to be performed need to be identified in order to manage activity costs. Cost driver analysis identifies the causal factors.
- (2) **Activity Analysis.**
 - (a) **Value-Added Activities (VA):** The value-added activities are those activities which are indispensable in order to complete the process. The customers are usually willing to pay (in some way) for these services. For example, polishing furniture by a manufacturer dealing in furniture is a value added activity.
 - (b) **Non-Value-Added Activities (NVA):** The NVA activity **represents work that is not valued by the external or internal customer**. NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices. Moving materials and machine set up for a production run are examples of NVA activities.
- (3) **Performance Analysis:** Performance analysis involves the **identification of appropriate measures to report the performance of activity centres** or other organisational units, consistent with each unit's goals and objectives.

Activity Based Management in Business

Activity Based Management can be used in the following ways

- (i) **Cost Reduction:** ABM helps the organisation to identify costs against activities and to find opportunities to streamline or reduce the costs or eliminate the entire activity, especially if there is no value added.
- (ii) **Business Process Re-engineering:** Business process re-engineering **involves examining business processes and making substantial changes to how organisation currently operates**. ABM is a powerful tool for measuring business performance, determining the cost of business output and is used as a means of identifying opportunities to improve process efficiency and effectiveness.

- (iii) **Benchmarking:** Benchmarking is a process of **comparing of ABC-derived activity costs of one segment of company with those of other segments**. It requires uniformity in the definition of activities and measurement of their costs.
- (iv) **Performance Measurement:** Many organisations are now focusing on activity performance as a means of facing competitors and managing costs by monitoring the efficiency and effectiveness of activities.

Area	Measure
Quality of purchased component	Zero defects
Quality of output	% yield
Customer awareness	Orders; number of complaints

11.3 Facilitate Activity Based Budgeting

Meaning of Activity Based Budgeting (ABB)

Activity based budgeting **analyse the resource input or cost for each activity**. It provides a framework for estimating the amount of resources required in accordance with the budgeted level of activity. Actual results can be compared with budgeted results to highlight both, in financial and non-financial terms, those activities with major discrepancies from budget for potential reduction in supply of resources. It is a planning and control system which seeks to support the objectives of continuous improvement. It means planning and controlling the expected activities of the organization to derive a cost-effective budget that meet forecast workload and agreed strategic goals. *ABB is the reversing of the ABC process to produce financial plans and budgets.*

Key Elements of ABB

The three key elements of activity based budgeting are as follows:-

- ◆ Type of work to be done
- ◆ Quantity of work to be done
- ◆ Cost of work to be done

Benefits of ABB

Few benefits of activity based budgeting are as follows:-

- (i) Activity Based Budgeting (ABB) can enhance accuracy of financial forecasts and increasing management understanding.
- (ii) When automated, ABB can rapidly and accurately produce financial plans and models based on varying levels of volume assumptions.
- (iii) ABB eliminates much of the needless rework created by traditional budgeting techniques.

ILLUSTRATION 2

MST Limited has collected the following data for its two activities. It calculates activity cost rates based on cost driver capacity.

Activity	Cost Driver	Capacity	Cost
Power	Kilowatt hours	50,000 kilowatt hours	₹ 2,00,000
Quality Inspections	Number of Inspections	10,000 Inspections	₹ 3,00,000

The company makes three products M, S and T. For the year ended March 31st, the following consumption of cost drivers was reported:

Product	Kilowatt hours	Quality Inspections
M	10,000	3,500
S	20,000	2,500
T	15,000	3,000

Required:

- (i) *COMPUTE the costs allocated to each product from each activity.*
- (ii) *CALCULATE the cost of unused capacity for each activity.*
- (iii) *DISCUSS the factors the management considers in choosing a capacity level to compute the budgeted fixed overhead cost rate.*

SOLUTION**(i) Statement of cost allocation to each product from each activity**

	Product			
	M (₹)	S (₹)	T (₹)	Total (₹)
Power (Refer to working note)	40,000 (10,000 kWh × ₹4)	80,000 (20,000 kWh × ₹4)	60,000 (15,000 kWh × ₹4)	1,80,000
Quality Inspections (Refer to working note)	1,05,000 (3,500 inspections × ₹30)	75,000 (2,500 inspections × ₹30)	90,000 (3,000 inspections × ₹30)	2,70,000

Working note**Rate per unit of cost driver:**

Power	(₹ 2,00,000 / 50,000 kWh)	₹ 4/kWh
Quality Inspection	(₹ 3,00,000 / 10,000 inspections)	₹ 30 per inspection

(ii) Computation of cost of unused capacity for each activity:

	(₹)
Power (₹ 2,00,000 – ₹ 1,80,000) or 5,000 × 4	20,000
Quality Inspections (₹ 3,00,000 – ₹ 2,70,000) or 1,000 × 30	30,000
Total cost of unused capacity	50,000

(iii) Factors management consider in choosing a capacity level to compute the budgeted fixed overhead cost rate:

- Effect on product costing & capacity management
- Effect on pricing decisions.
- Effect on performance evaluation
- Effect on financial statements
- Regulatory requirements.
- Difficulties in forecasting.

ILLUSTRATION 3

ABC Ltd. Manufactures two types of machinery equipment Y and Z and applies/absorbs overheads on the basis of direct-labour hours. The budgeted overheads and direct-labour hours for the month of December are ₹ 12,42,500 and 20,000 hours respectively. The information about Company's products is as follows:

	Equipment	Equipment
	Y	Z
Budgeted Production volume	2,500 units	3,125 units
Direct material cost	₹ 300 per unit	₹ 450 per unit
Direct labour cost		
Y : 3 hours @ ₹ 150 per hour		
Z : 4 hours @ ₹ 150 per hour	₹ 450	₹ 600

ABC Ltd.'s overheads of ₹ 12,42,500 can be identified with three major activities:

Order Processing (₹ 2,10,000), machine processing (₹ 8,75,000), and product inspection (₹ 1,57,500). These activities are driven by number of orders processed, machine hours worked, and inspection hours, respectively. The data relevant to these activities is as follows:

	Orders processed	Machine hours worked	Inspection hours
Y	350	23,000	4,000
Z	250	27,000	11,000
Total	600	50,000	15,000

Required:

- Assuming use of direct-labour hours to absorb/apply overheads to production, COMPUTE the unit manufacturing cost of the equipment Y and Z, if the budgeted manufacturing volume is attained.
- Assuming use of activity-based costing, COMPUTE the unit manufacturing costs of the equipment Y and Z, if the budgeted manufacturing volume is achieved.

- (iii) ABC Ltd.'s selling prices are based heavily on cost. By using direct-labour hours as an application base, CALCULATE the amount of cost distortion (under-costed or over-costed) for each equipment.

SOLUTION

(i) Overheads application base: Direct labour hours

	Equipment	Equipment
	Y (₹)	Z (₹)
Direct material cost	300	450
Direct labour cost	450	600
Overheads*	186.38	248.50
	936.38	1,298.50

$$\text{*Pre-determined rate} = \frac{\text{Budgeted overheads}}{\text{Budgeted direct labour hours}} = \frac{₹12,42,500}{20,000 \text{ hours}} = ₹62.125$$

(ii) Estimation of Cost-Driver rate

Activity	Overhead cost	Cost-driver level	Cost driver rate
	(₹)		(₹)
Order processing	2,10,000	600 Orders processed	350
Machine processing	8,75,000	50,000 Machine hours	17.50
Inspection	1,57,500	15,000 Inspection hours	10.50

	Equipment	Equipment
	Y (₹)	Z (₹)
Direct material cost	300	450
Direct labour cost	450	600
Prime Cost	750	1,050
Overhead Cost		
Order processing 350 : 250 or Rs 350 per order	1,22,500	87,500
Machine processing 23,000 : 27,000 or ₹ 17.5 per hour	4,02,500	4,72,500
Inspection 4,000 : 11,000	42,000	1,15,500
Total overhead cost	5,67,000	6,75,500
Per unit cost	Y (₹)	Z (₹)
5,67,000 / 2,500	226.80	₹ 216.16
6,75,500 / 3,125		
Unit manufacturing cost (Prime Cost + Overhead per unit)	₹ 976.80	₹ 1,266.16

(iii)

	Equipment	Equipment
	Y (₹)	Z (₹)
Unit manufacturing cost—using direct labour hours as an application base	936.38	1,298.50
Unit manufacturing cost—using activity based costing	976.80	1,266.16
Cost distortion	(-)40.42	+ 32.34

Low volume product Y is under-costed and high volume product Z is over costed using direct labour hours for overhead absorption.

ILLUSTRATION 4

'Humara - Apna' bank offers three products, viz., deposits, Loans and Credit Cards. The bank has selected 4 activities for a detailed budgeting exercise, following activity based costing methods.

The bank wants to know the product wise total cost per unit for the selected activities, so that prices may be fixed accordingly.

The following information is made available to formulate the budget:

Activity	Present Cost (₹)	Estimation for the budget period
ATM Services:		
(a) Machine Maintenance	4,00,000	All fixed, no change.
(b) Rents	2,00,000	Fully fixed, no change.
(c) Currency Replenishment Cost	1,00,000	Expected to double during budget period.
	7,00,000	(This activity is driven by no. of ATM transactions)
Computer Processing	5,00,000	Half this amount is fixed and no change is expected. The variable portion is expected to increase to three times the current level. (This activity is driven by the number of computer transactions)
Issuing Statements	18,00,000	Presently, 3 lakh statements are made. In the budget period, 5 lakh statements are expected. For every increase of one lakh statement, one lakh rupees is the budgeted increase. (This activity is driven by the number of statements)

Computer Inquiries	2,00,000	Estimated to increase by 80% during the budget period. (This activity is driven by telephone minutes)

The activity drivers and their budgeted quantifies are given below:

Activity Drivers	Deposits	Loans	Credit Cards
No. of ATM Transactions	1,50,000	---	50,000
No. of Computer Processing Transactions	15,00,000	2,00,000	3,00,000
No. of Statements to be issued	3,50,000	50,000	1,00,000
Telephone Minutes	3,60,000	1,80,000	1,80,000

The bank budgets a volume of 58,600 deposit accounts, 13,000 loan accounts, and 14,000 Credit Card Accounts.

Required:

- CALCULATE the budgeted rate for each activity.
- PREPARE the budgeted cost statement activity wise.
- COMPUTE the budgeted product cost per account for each product using (i) and (ii) above.

SOLUTION

Statement Showing "Budgeted Cost per unit of the Product"

Activity	Activity Cost (Budgeted) (₹)	Activity Driver	No. of Units of Activity Driver (Budget)	Activity Rate (₹)	Deposits (₹)	Loans (₹)	Credit Cards (₹)
ATM Services	8,00,000	No. of ATM Transaction	2,00,000	4.00	6,00,000	---	2,00,000

Computer Processing	10,00,000	No. of Computer processing Transaction	20,00,000	0.50	7,50,000	1,00,000	1,50,000
Issuing Statements	20,00,000	No. of Statements	5,00,000	4.00	14,00,000	2,00,000	4,00,000
Customer Inquiries	3,60,000	Telephone Minutes	7,20,000	0.50	1,80,000	90,000	90,000
Budgeted Cost	41,60,000				29,30,000	3,90,000	8,40,000
Units of Product (as estimated in the budget period)					58,600	13,000	14,000
Budgeted Cost <i>per unit</i> of the product					(₹) 50	(₹) 30	(₹) 60

Working Note

Activity	Budgeted Cost (₹)	Remark
ATM Services:		
(a) Machine Maintenance	4,00,000	- All fixed, no change.
(b) Rents	2,00,000	- Fully fixed, no change.
(c) Currency Replenishment Cost	2,00,000	- Doubled during budget period.
Total	8,00,000	
Computer Processing	2,50,000	- ₹ 2,50,000 (half of ₹ 5,00,000) is fixed and no change is expected.
	7,50,000	- ₹ 2,50,000 (variable portion) is expected to increase to three times the current level.
Total	10,00,000	

Issuing Statements	18,00,000	- Existing. - 2 lakh statements are expected to be increased in budgeted period. For every increase of one lakh statement, one lakh rupees is the budgeted increase.
	2,00,000	
Total	20,00,000	
Computer Inquiries	3,60,000	- Estimated to increase by 80% during the budget period. (₹ 2,00,000 x 180%)
	3,60,000	
Total	3,60,000	

SUMMARY

- ♦ Activity based costing is an accounting methodology that assigns costs to activities rather than products or services. This enables resources & overhead costs to be more accurately assigned to products & services that consume them.
- ♦ Unit level activities, batch level activities, product level activities and facility level activities are the categories of activities that help to determine the type of activity cost driver required.
- ♦ ABC is very much useful to the organization with multiple products.
- ♦ The limitations of ABC are that, it is very costly and cannot be applied to all companies.
- ♦ The use of ABC as a costing tool to manage costs at activity level is known as Activity Based Cost Management (ABM). ABM is a discipline that focuses on the efficient and effective management of activities as the route to continuously improving the value received by customers. ABM utilizes cost information gathered through ABC.
- ♦ The value-added activities are those activities which are indispensable in order to complete the process.

- ◆ NVA activity represents work that is not valued by the external or internal customer. NVA activities do not improve the quality or function of a product or service, but they can adversely affect costs and prices.
- ◆ Activity-based budgeting is a process of planning and controlling the expected activities for the organisation to derive a cost-effective budget that meets forecast workload and agreed strategic goals.
- ◆ Key elements of ABB are type of work/activity to be performed, quantity of work/activity to be performed and cost of work/activity to be performed.

TEST YOUR KNOWLEDGE

Multiple Choice Questions (MCQs)

1. A cost driver is:
 - (a) An item of production overheads
 - (b) A common cost which is shared over cost centres
 - (c) Any cost relating to transport
 - (d) An activity which generates costs
2. In activity based costing, costs are accumulated by activity using:
 - (a) Cost drivers
 - (b) Cost objects
 - (c) Cost pools
 - (d) Cost benefit analysis
3. A cost driver:
 - (a) Is a force behind the overhead cost
 - (b) Is an allocation base
 - (c) Is a transaction that is a significant determinant of cost
 - (d) All of the above

4. Which of the following is not a correct match:

Activity	Cost Driver
(a) Production Scheduling	Number of Production runs
(b) Despatching	Number of dispatch orders
(c) Goods receiving	Goods received orders
(d) Inspection	Machine hours

5. Transactions undertaken by support department personnel are the appropriate cost drivers. Find the one which is **not** appropriate:

- (a) The number of purchase, supplies and customers' orders drives the cost associated with new material inventory, work-in-progress and finished goods inventory
- (b) The number of production runs undertaken drives production scheduling, inspection and material handling
- (c) The quality of raw material issued drives the cost of receiving department costs
- (d) The number of packing orders drives the packing costs

6. Steps in ABC include:

- (a) Identification of activities and their respective costs
- (b) Identification of cost driver of each activity and computation of an allocation rate per activity
- (c) Allocation of overhead cost to products/ services based on the activities involved
- (d) All of the above

7. Which of the following is not a benefit of ABC?

- (a) Accurate cost allocation
- (b) Improved decision making
- (c) Better control on activity and costs
- (d) Reduction of prime cost

8. *The steps involved for installation of ABC in a manufacturing company include the following except:*
- (a) *Borrowing fund*
 - (b) *Feasibility study*
 - (c) *Building up necessary IT infrastructure and training of line employees*
 - (d) *Strategy and value chain analysis*
9. *Which of the following statements are true: (1) Activity based Management involves activity analysis and performance measurement. (2) Activity based costing serves as a major source of information in ABM.*
- (a) *(1) True; (2) False*
 - (b) *(1) True; (2) True*
 - (c) *(1) False; (2) True*
 - (d) *(1) False; (2) False*
10. *The key elements of activity based budgeting are:*
- (a) *Type of activity to be performed*
 - (b) *Quantity of activity to be performed*
 - (c) *Cost of activity to be performed*
 - (d) *All of the above*

Theoretical Questions

1. *DEFINE the following terms:*
 - (i) *Cost driver*
 - (ii) *Activity cost pool*
2. *EXPLAIN in brief the problems of traditional costing where overhead costs are allocated based on volume.*
3. *STATE what is Activity based costing. How are product costs determined in ABC?*

4. A manufacturing company in India wants to replace its traditional costing system by ABC. It produces a number of products, each having complex production process of different degree. SUGGEST various requirements for installing activity based costing.
5. DESCRIBE various levels of activities under ABC.
6. STATE what are the benefits of ABC.
7. STATE what are the limitations of ABC.
8. STATE what are the practical applications of ABC.
9. STATE what is Activity based Management. How does ABC help ABM?
10. DEFINE Activity based Budgeting. STATE what are its key elements.

Practical Problems

1. Woolmark Ltd. manufactures three types of products namely P, Q and R. The data relating to a period are as under:

Particulars	P	Q	R
Machine hours per unit	10	18	14
Direct Labour hours per unit	4	12	8
Direct Material per unit (₹)	90	80	120
Production (units)	3,000	5,000	20,000

Currently the company uses traditional costing method and absorbs all production overheads on the basis of machine hours. The machine hour rate of overheads is ₹6 per hour. Direct labour hour rate is ₹20 per hour.

The company proposes to use activity based costing system and the activity analysis is as under:

Particulars	P	Q	R
Batch size (units)	150	500	1,000
Number of purchase orders per batch	3	10	8
Number of inspections per batch	5	4	3

The total production overheads are analysed as under:

Machine set up costs.....	20%
Machine operation costs.....	30%
Inspection costs.....	40%
Material procurement related costs.....	10%

Required

- (i) CALCULATE the cost per unit of each product using traditional method of absorbing all production overheads on the basis of machine hours.
 - (ii) CALCULATE the cost per unit of each product using activity based costing principles.
2. RST Limited specializes in the distribution of pharmaceutical products. It buys from the pharmaceutical companies and resells to each of the three different markets.
- (i) General Supermarket Chains
 - (ii) Drugstore Chains
 - (iii) Chemist Shops

The following data for the month of April in respect of RST Limited has been reported:

	General Supermarket Chains (₹)	Drugstore Chains (₹)	Chemist Shops (₹)
Average revenue per delivery	84,975	28,875	5,445
Average cost of goods sold per delivery	82,500	27,500	4,950
Number of deliveries	330	825	2,750

In the past, RST Limited has used gross margin percentage to evaluate the relative profitability of its distribution channels.

The company plans to use activity-based costing for analysing the profitability of its distribution channels.

The Activity analysis of RST Limited is as under:

Activity Area	Cost Driver
Customer purchase order processing	Purchase orders by customers
Line-item ordering	Line-items per purchase order
Store delivery	Store deliveries
Cartons dispatched to stores	Cartons dispatched to a store per delivery
Shelf-stocking at customer store	Hours of shelf-stocking

The April month's operating costs (other than cost of goods sold) of RST Limited are ₹ 8,27,970. These operating costs are assigned to five activity areas. The cost in each area and the quantity of the cost allocation basis used in that area for the month of April are as follows:

Activity Area	Total costs (₹)	Total Units of Cost Allocation Base
Customer purchase order processing	2,20,000	5,500 orders
Line-item ordering	1,75,560	58,520 line items
Store delivery	1,95,250	3,905 store deliveries
Cartons dispatched to store	2,09,000	2,09,000 cartons
Shelf-stocking at customer store	28,160	1,760 hours

Other data for the month of April include the following:

	General Supermarket Chains	Drugstore Chains	Chemist Shops
Total number of orders	385	990	4,125
Average number of line items per order	14	12	10
Total number of store deliveries	330	825	2,750
Average number of cartons shipped per store delivery	300	80	16
Average number of hours of shelf-stocking per store delivery	3	0.6	0.1

Required:

- (i) COMPUTE gross-margin percentage for each of its three distribution channels and compute RST Limited's operating income.
 - (ii) COMPUTE the rate per unit of the cost-allocation base for each of the five activity areas.
 - (iii) COMPUTE the operating income of each distribution channel using the activity-based costing information. Comment on the results. What new insights are available with the activity-based cost information?
 - (iv) DESCRIBE four challenges one would face in assigning the total operating costs of ₹8,27,970 to five activity areas.
3. Family Store wants information about the profitability of individual product lines: Soft drinks, Fresh produce and Packaged food. Family store provides the following data for the current year for each product line:

	Soft drinks	Fresh produce	Packaged food
Revenues	₹ 39,67,500	₹ 1,05,03,000	₹ 60,49,500
Cost of goods sold	₹ 30,00,000	₹ 75,00,000	₹ 45,00,000
Cost of bottles returned	₹ 60,000	₹ 0	₹ 0

<i>Number of purchase orders placed</i>	360	840	360
<i>Number of deliveries received</i>	300	2,190	660
<i>Hours of shelf-stocking time</i>	540	5,400	2,700
<i>Items sold</i>	1,26,000	11,04,000	3,06,000

Family store also provides the following information for the current year:

Activity	Description of activity	Total Cost	Cost-allocation base
<i>Bottles returns</i>	<i>Returning of empty bottles</i>	₹ 60,000	<i>Direct tracing to soft drink line</i>
<i>Ordering</i>	<i>Placing of orders for purchases</i>	₹ 7,80,000	<i>1,560 purchase orders</i>
<i>Delivery</i>	<i>Physical delivery and receipt of goods</i>	₹ 12,60,000	<i>3,150 deliveries</i>
<i>Shelf stocking</i>	<i>Stocking of goods on store shelves and on-going restocking</i>	₹ 8,64,000	<i>8,640 hours of shelf-stocking time</i>
<i>Customer Support</i>	<i>Assistance provided to customers including check-out</i>	₹ 15,36,000	<i>15,36,000 items sold</i>

Required:

- (i) *Family store currently allocates support cost (all cost other than cost of goods sold) to product lines on the basis of cost of goods sold of each product line. CALCULATE the operating income and operating income as a % of revenues for each product line.*
- (ii) *If Family Store allocates support costs (all costs other than cost of goods sold) to product lines using an activity-based costing system, CALCULATE the operating income and operating income as a % of revenues for each product line.*

4. Alpha Limited has decided to analyse the profitability of its five new customers. It buys bottled water at ₹ 90 per case and sells to retail customers at a list price of ₹ 108 per case. The data pertaining to five customers are:

	Customers				
	A	B	C	D	E
<i>Cases sold</i>	4,680	19,688	1,36,800	71,550	8,775
<i>Listed Selling Price</i>	₹ 108	₹ 108	₹ 108	₹ 108	₹ 108
<i>Actual Selling Price</i>	₹ 108	₹ 106.20	₹ 99	₹ 104.40	₹ 97.20
<i>Number of Purchase orders</i>	15	25	30	25	30
<i>Number of Customer visits</i>	2	3	6	2	3
<i>Number of deliveries</i>	10	30	60	40	20
<i>Kilometers travelled per delivery</i>	20	6	5	10	30
<i>Number of expedited deliveries</i>	0	0	0	0	1

Its five activities and their cost drivers are:

Activity	Cost Driver Rate
<i>Order taking</i>	₹ 750 per purchase order
<i>Customer visits</i>	₹ 600 per customer visit
<i>Deliveries</i>	₹ 5.75 per delivery Km travelled
<i>Product handling</i>	₹ 3.75 per case sold
<i>Expedited deliveries</i>	₹ 2,250 per expedited delivery

Required:

- (i) COMPUTE the customer-level operating income of each of five retail customers now being examined (A, B, C, D and E). Comment on the results.
 - (ii) STATE what insights are gained by reporting both the list selling price and the actual selling price for each customer.
5. BABYSOFT is a global brand created by Bio-organic Ltd. The company manufactures three ranges of beauty soaps i.e. BABYSOFT- Gold, BABYSOFT- Pearl, and BABYSOFT- Diamond. The budgeted costs and production for the month of December are as follows:

	BABYSOFT- Gold		BABYSOFT- Pearl		BABYSOFT- Diamond	
Production of soaps (Units)	4,000		3,000		2,000	
Resources per Unit:	Qty	Rate	Qty	Rate	Qty	Rate
Essential Oils	60 ml	₹ 200 / 100 ml	55 ml	₹ 300 / 100 ml	65 ml	₹ 300 / 100 ml
Cocoa Butter	20 g	₹ 200 / 100 g	20 g	₹ 200 / 100 g	20 g	₹ 200 / 100 g
Filtered Water	30 ml	₹ 15 / 100 ml	30 ml	₹ 15 / 100 ml	30 ml	₹ 15 / 100 ml
Chemicals	10 g	₹ 30 / 100 g	12 g	₹ 50 / 100 g	15 g	₹ 60 / 100 g
Direct Labour	30 minutes	₹ 10 / hour	40 minutes	₹ 10 / hour	60 minutes	₹ 10 / hour

Bio-organic Ltd. followed an Absorption Costing System and absorbed its production overheads, to its products using direct labour hour rate, which were budgeted at ₹ 1,98,000.

Now, Bio-organic Ltd. is considering adopting an Activity Based Costing system. For this, additional information regarding budgeted overheads and their cost drivers is provided below:

Particulars	(₹)	Cost drivers
Forklifting cost	58,000	Weight of material lifted
Supervising cost	60,000	Direct labour hours
Utilities	80,000	Number of Machine operations

The number of machine operations per unit of production are 5, 5, and 6 for BABYSOFT- Gold, BABYSOFT- Pearl, and BABYSOFT- Diamond respectively.

(Consider (i) Mass of 1 litre of Essential Oils and Filtered Water equivalent to 0.8 kg and 1 kg respectively (ii) Mass of output produced is equivalent to the mass of input materials taken together.)

You are requested to:

- PREPARE a statement showing the unit costs and total costs of each product using the absorption costing method.
- PREPARE a statement showing the product costs of each product using the ABC approach.
- STATE what are the reasons for the different product costs under the two approaches.

Case Scenarios

- The sales department of A Limited is analysing the customer profitability for its Product Z. It has decided to analyse the profitability of its five new customers using activity-based costing method. It buys Product Z at ₹ 5,400 per unit and sells to retail customers at a listed price of ₹ 6,480 per unit. The data pertaining to five customers are:

	Customers				
	A	B	C	D	E
Units sold	4,500	6,000	9,500	7,500	12,750
Listed Selling Price	₹6,480	₹6,480	₹6,480	₹6,480	₹6,480
Actual Selling Price	₹6,480	₹6,372	₹5,940	₹6,264	₹5,832
Number of Purchase orders	15	25	30	25	30

<i>Number of Customer visits</i>	2	3	6	2	3
<i>Number of deliveries</i>	10	30	60	40	20
<i>Kilometers travelled per delivery</i>	20	6	5	10	30
<i>Number of expedited deliveries</i>	0	0	0	0	1

After a detailed analysis and computation, the following activities has been identified and respective cost has been calculated:

Activity	Cost Driver Rate
<i>Order taking</i>	<i>₹4,500 per purchase order</i>
<i>Customer visits</i>	<i>₹3,600 per customer visit</i>
<i>Deliveries</i>	<i>₹7.50 per delivery Km travelled</i>
<i>Product handling</i>	<i>₹22.50 per case sold</i>
<i>Expedited deliveries</i>	<i>₹13,500 per expedited delivery</i>

You have been assigned the following task of computing different cost information for managerial decision making:

- (i) *How much cost on customer visit is incurred on customer E?*
 - (a) ₹7,200
 - (b) ₹10,800
 - (c) ₹21,600
 - (d) ₹3,600
- (ii) *What is the cost of goods sold for customer D?*
 - (a) ₹2,43,00,000
 - (b) ₹3,24,00,000
 - (c) ₹5,13,00,000
 - (d) ₹4,05,00,000
- (iii) *How much is the cost of expediting delivery for customer A?*
 - (a) ₹13,500

- (b) ₹ 27,000
- (c) ₹ 40,500
- (d) ₹ 0
- (iv) Compute the customer-level operating income of each of customers A.
- (a) ₹ 55,72,350
- (b) ₹ 46,82,550
- (c) ₹ 47,57,400
- (d) ₹ 50,57,325
- (v) Compute the customer-level operating income of each of five retail customers D and E.
- (a) ₹ 46,82,550 & 50,65,720
- (b) ₹ 55,72,350 & 46,85,500
- (c) ₹ 47,57,400 & 55,72,350
- (d) ₹ 61,88,550 & 50,57,325

ANSWERS

Answers to the MCQs

1.	(d)	2.	(c)	3.	(d)	4.	(d)	5.	(c)	6.	(d)
7.	(d)	8.	(a)	9.	(b)	10.	(d)				

Answers to the Theoretical Questions

1. Please refer paragraph 3
2. Please refer paragraph 1
3. Please refer paragraph 2, 5 and 7
4. Please refer paragraph 10
5. Please refer paragraph 6
6. Please refer paragraph 8

7. Please refer paragraph 9
8. Please refer paragraph 11
9. Please refer paragraph 11.2
10. Please refer paragraph 11.3

Answers to the Practical Problems

1. (i) **Statement Showing "Cost per unit - Traditional Method"**

Particulars of Costs	P (₹)	Q (₹)	R (₹)
Direct Materials	90	80	120
Direct Labour [(4, 12, 8 hours) × ₹ 20]	80	240	160
Production Overheads [(10, 18, 14 hours) × ₹ 6]	60	108	84
Cost per unit	230	428	364

- (ii) **Statement Showing "Cost per unit - Activity Based Costing"**

Products	P	Q	R
Production (units)	3,000	5,000	20,000
	(₹)	(₹)	(₹)
Direct Materials (90, 80, 120)	2,70,000	4,00,000	24,00,000
Direct Labour (80, 240, 160)	2,40,000	12,00,000	32,00,000
Machine Related Costs @ ₹ 1.80 per hour (30,000, 90,000, 2,80,000)	54,000	1,62,000	5,04,000
Setup Costs @ ₹ 9,600 per setup (20, 10, 20)	1,92,000	96,000	1,92,000
Inspection Costs @ ₹ 4,800 per inspection (100, 40, 60)	4,80,000	1,92,000	2,88,000

Products	P	Q	R
Purchase Related Costs @ ₹ 750 <i>per purchase</i> (60, 100, 160)	45,000	75,000	1,20,000
Total Costs	12,81,000	21,25,000	67,04,000
Cost <i>per unit</i> (Total Cost ÷ Units)	427.00	425.00	335.20

Workings**Number of Batches, Purchase Orders, and Inspections-**

	Particulars	P	Q	R	Total
A.	Production (units)	3,000	5,000	20,000	
B.	Batch Size (units)	150	500	1,000	
C.	Number of Batches (A ÷ B)	20	10	20	50
D.	Number of Purchase Order <i>per batch</i>	3	10	8	
E.	Total Purchase Orders [C × D]	60	100	160	320
F.	Number of Inspections <i>per batch</i>	5	4	3	
G.	Total Inspections [C × F]	100	40	60	200

Total Machine Hours-

	Particulars	P	Q	R
A.	Machine Hours <i>per unit</i>	10	18	14
B.	Production (units)	3,000	5,000	20,000
C.	Total Machine Hours [A × B]	30,000	90,000	2,80,000

Total Machine Hours = 4,00,000

Total Production Overheads-

= 4,00,000 hrs. × ₹ 6 = ₹ 24,00,000

Cost Driver Rates-

Cost Pool	%	Overheads (₹)	Cost Driver Basis	Cost Driver (Units)	Cost Driver Rate (₹)
Setup	20%	4,80,000	Number of batches	50	9,600 per Setup
Inspection	40%	9,60,000	Number of inspections	200	4,800 per Inspection
Purchases	10%	2,40,000	Number of purchases	320	750 per Purchase
Machine Operation	30%	7,20,000	Machine Hours	4,00,000	1.80 per Machine Hour

2. (i) RST Limited's**Statement of operating income and gross margin percentage
for each of its three distribution channel**

Particulars	General Super Market Chains	Drugstore Chains	Chemist Shops	Total
Revenues: (₹)	2,80,41,750 (330 × ₹ 84,975)	2,38,21,875 (825 × ₹ 28,875)	1,49,73,750 (2,750 × ₹ 5,445)	6,68,37,375
Less: Cost of goods sold: (₹)	2,72,25,000 (330 × ₹ 82,500)	2,26,87,500 (825 × ₹ 27,500)	1,36,12,500 (2,750 × ₹ 4,950)	635,25,000
Gross Margin: (₹)	8,16,750	11,34,375	13,61,250	33,12,375
Less: Other operating costs: (₹)				8,27,970

Operating income: (₹)				24,84,405
Gross Margin	2.91%	4.76 %	9.09%	4.96%
Operating income %				3.72

(ii) Computation of rate per unit of the cost allocation base for each of the five activity areas for the month of April

	(₹)
Customer purchase order processing (₹ 2,20,000/ 5,500 orders)	40 per order
Line item ordering (₹ 1,75,560/ 58,520 line items)	3 per line item order
Store delivery (₹ 1,95,250/ 3,905 store deliveries)	50 per delivery
Cartons dispatched (₹ 2,09,000/ 2,09,000 dispatches)	1 per dispatch
Shelf-stocking at customer store (₹) (₹ 28,160/ 1,760 hours)	16 Per hour

(iii) Operating Income Statement of each distribution channel in April (Using the Activity based Costing information)

	General Super Market Chains	Drugstore Chains	Chemist Shops
Gross margin (₹) : (A) (Refer to (i) part of the answer)	8,16,750	11,34,375	13,61,250
Operating cost (₹): (B) (Refer to working note)	1,62,910	1,90,410	4,74,650

Operating income (₹): (A–B)	6,53,840	9,43,965	8,86,600
Operating income (in %) (Operating income/ Revenue) × 100	2.33	3.96	5.92

Comments and new insights: The activity-based cost information highlights, how the 'Chemist Shops' uses a larger amount of RST Ltd.'s resources per revenue than do the other two distribution channels. Ratio of operating costs to revenues, across these markets is:

General supermarket chains (₹ 1,62,910/ ₹ 2,80,41,750) × 100	0.58%
Drug store chains (₹ 1,90,410/ ₹ 2,38,21,875) × 100	0.80%
Chemist shops (₹ 4,74,650/ ₹ 1,49,73,750) × 100	3.17%

Working note:

Computation of operating cost of each distribution channel:

	General Super Market Chains (₹)	Drugstore Chains (₹)	Chemist Shops (₹)
Customer purchase order processing	15,400 (₹ 40 × 385 orders)	39,600 (₹ 40 × 990 orders)	1,65,000 (₹ 40 × 4125 orders)
Line item ordering	16,170 (₹ 3 × 14 × 385)	35,640 (₹ 3 × 12 × 990)	1,23,750 (₹ 3 × 10 × 4125)
Store delivery	16,500 (₹ 50 × 330 deliveries)	41,250 (₹ 50 × 825 deliveries)	1,37,500 (₹ 50 × 2750 deliveries)

Cartons dispatched	99,000 (₹ 1 × 300 cartons × 300 deliveries)	66,000 (₹ 1 × 80 cartons × 825 deliveries)	44,000 (₹ 1 × 16 cartons × 2,750 deliveries)
Shelf stocking	15,840 (₹ 16 × 330 deliveries × 3 Av. hrs.)	7,920 (₹ 16 × 825 deliveries × 0.6 Av. hrs)	4,400 (₹ 16 × 2,750 deliveries × 0.1 Av. hrs)
Operating cost	1,62,910	1,90,410	4,74,650

(iv) Challenges faced in assigning total operating cost of ₹ 8,27,970:

- Choosing an appropriate cost driver for activity area.
- Developing a reliable data base for the chosen cost driver.
- Deciding, how to handle costs that may be common across several activities.
- Choice of the time period to compute cost rates per cost driver.
- Behavioural factors

3. Working notes:

1. Total support cost:

	(₹)
Bottles returns	60,000
Ordering	7,80,000
Delivery	12,60,000
Shelf stocking	8,64,000
Customer support	15,36,000
Total support cost	45,00,000

2. Percentage of support cost to cost of goods sold (COGS):

$$= \frac{\text{Total support cost}}{\text{Total cost of goods sold}} \times 100$$

$$= \frac{\text{₹ 45,00,000}}{\text{₹ 1,50,00,000}} \times 100 = 30\%$$

3. Cost for each activity cost driver:

Activity (1)	Total cost (₹) (2)	Cost allocation base (3)	Cost driver rate (4)=[(2)÷(3)]
Ordering	7,80,000	1,560 purchase orders	₹ 500 per purchase order
Delivery	12,60,000	3,150 deliveries	₹ 400 per delivery
Shelf-stocking	8,64,000	8,640 hours	₹ 100 per stocking hour
Customer support	15,36,000	15,36,000 items sold	₹ 1 per item sold

- (i) **Statement of Operating income and Operating income as a percentage of revenues for each product line**

(When support costs are allocated to product lines on the basis of cost of goods sold of each product)

	Soft Drinks (₹)	Fresh Produce (₹)	Packaged Foods (₹)	Total (₹)
Revenues: (A)	39,67,500	1,05,03,000	60,49,500	2,05,20,000
Cost of Goods sold (COGS): (B)	30,00,000	75,00,000	45,00,000	1,50,00,000

Support cost (30% of COGS): (C) (Refer working notes)	9,00,000	22,50,000	13,50,000	45,00,000
Total cost: (D) = {(B) + (C)}	39,00,000	97,50,000	58,50,000	1,95,00,000
Operating income: E = {(A)-(D)}	67,500	7,53,000	1,99,500	10,20,000
Operating income as a percentage of revenues: (E/A) × 100)	1.70%	7.17%	3.30%	4.97%

(ii) Statement of Operating income and Operating income as a percentage of revenues for each product line

(When support costs are allocated to product lines using an activity-based costing system)

	Soft drinks (₹)	Fresh Produce (₹)	Packaged Food (₹)	Total (₹)
Revenues: (A)	39,67,500	1,05,03,000	60,49,500	2,05,20,000
Cost & Goods sold	30,00,000	75,00,000	45,00,000	1,50,00,000
Bottle return costs	60,000	0	0	60,000
Ordering cost* (360:840:360)	1,80,000	4,20,000	1,80,000	7,80,000
Delivery cost* (300:2190:660)	1,20,000	8,76,000	2,64,000	12,60,000
Shelf stocking cost* (540:5400:2700)	54,000	5,40,000	2,70,000	8,64,000

Customer Support cost* (1,26,000:11,04,000: 3,06,000)	1,26,000	11,04,000	3,06,000	15,36,000
Total cost: (B)	35,40,000	1,04,40,000	55,20,000	1,95,00,000
Operating income C: {(A) - (B)}	4,27,500	63,000	5,29,500	10,20,000
Operating income as a % of revenues	10.78%	0.60%	8.75%	4.97%

* Refer to working note 3

4. Working note:

Computation of revenues (at listed price), discount, cost of goods sold and customer level operating activities costs:

	Customers				
	A	B	C	D	E
Cases sold: (a)	4,680	19,688	1,36,800	71,550	8,775
Revenues (at listed price) (₹): (b) {(a) × ₹ 108}	5,05,440	21,26,304	1,47,74,400	77,27,400	9,47,700
Discount (₹): (c) {(a) × Discount per case}	-	35,438 (19,688 cases × ₹ 1.80)	12,31,200 (1,36,800 cases × ₹ 9)	2,57,580 (71,550 cases × ₹ 3.60)	94,770 (8,775 cases × ₹ 10.80)
Cost of goods sold (₹): (d) {(a) × ₹ 90}	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750

Customer level operating activities costs					
Order taking costs (₹): (No. of purchase × ₹750)	11,250	18,750	22,500	18,750	22,500
Customer visits costs (₹) (No. of customer visits × ₹ 600)	1,200	1,800	3,600	1,200	1,800
Delivery vehicles travel costs (₹) (₹ 5.75 per km) (Kms travelled by delivery vehicles × ₹ 5.75 per km.)	1,150 (5.75 × 10x20)	1,035 (5.75 × 30 × 6)	1,725 (5.75 × 60x 5)	2,300 (5.75 × 40 × 10)	3,450 (5.75 × 20 × 30)
Product handling costs (₹) {(a) × ₹ 3.75}	17,550	73,830	5,13,000	2,68,313	32,906

Cost of expediting deliveries (₹) {No. of expedited deliveries × ₹ 2,250}	-	-	-	-	2,250
Total cost of customer level operating activities (₹)	31,150	95,415	5,40,825	2,90,563	62,906

(i) **Computation of Customer level operating income**

	Customers				
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Revenues (At list price) (Refer to working note)	5,05,440	21,26,304	1,47,74,400	77,27,400	9,47,700
Less: Discount (Refer to working note)	-	35,438	12,31,200	2,57,580	94,770
Revenue (At actual price)	5,05,440	20,90,866	1,35,43,200	74,69,820	8,52,930
Less: Cost of goods sold (Refer to working note)	4,21,200	17,71,920	1,23,12,000	64,39,500	7,89,750
Gross margin	84,240	3,18,946	12,31,200	10,30,320	63,180

Less: Customer level operating activities costs (Refer to working note)	31,150	95,415	5,40,825	2,90,563	62,906
Customer level operating income	53,090	2,23,531	6,90,375	7,39,757	274

Comment on the results:

Customer D is the most profitable customer. D's profits are even higher than C (whose revenue is the highest) despite having only 52.30% of the unit volume of customer C. The main reason is that C receives a discount of ₹ 9 per case while customer D receives only a ₹ 3.60 discount per case.

Customer E is the least profitable. The profits of E is even less than A (whose revenue is least) Customer E received a discount of ₹ 10.80 per case, makes more frequent orders, requires more customer visits and requires more delivery kms. in comparison with customer A.

(ii) Insight gained by reporting both the list selling price and the actual selling price for each customer:

Separate reporting of both-the listed and actual selling prices enables Alpha Ltd. to examine which customer has received what discount per case, whether the discount received has any relationship with the sales volume. The data given below provides us with the following information;

Sales volume	Discount per case (₹)
C (1,36,800 cases)	9.00
D (71,550 cases)	3.60
B (19,688 cases)	1.80
E (8,775 cases)	10.80
A (4,680 cases)	0

The above data clearly shows that the discount given to customers per case has a direct relationship with sales volume, except in the case of customer E. The reasons for ₹ 10.80 discount per case for customer E should be explored.

5. (i) Traditional Absorption Costing

	BABYSOFT Gold	BABYSOFT- Pearl	BABYSOFT- Diamond	Total
(a) Production of soaps (Units)	4,000	3,000	2,000	9,000
(b) Direct labour (minutes)	30	40	60	-
(c) Direct labour hours (a × b)/60 minutes	2,000	2,000	2,000	6,000

Overhead rate per direct labour hour:

= Budgeted overheads ÷ Budgeted labour hours

= ₹ 1,98,000 ÷ 6,000 hours

= ₹ 33 per direct labour hour

Unit Costs:

	BABYSOFT- Gold (₹)	BABYSOFT- Pearl (₹)	BABYSOFT- Diamond (₹)
Direct Costs:			
- Direct Labour	5.00	6.67	10.00

	$\left(\frac{10 \times 30}{60}\right)$	$\left(\frac{10 \times 40}{60}\right)$	$\left(\frac{10 \times 60}{60}\right)$
- Direct Material (Refer working note1)	167.50	215.50	248.50
Production Overhead	16.50 $\left(\frac{33 \times 30}{60}\right)$	22.00 $\left(\frac{33 \times 40}{60}\right)$	33.00 $\left(\frac{33 \times 60}{60}\right)$
Total unit costs	189.00	244.17	291.50
Number of units	4,000	3,000	2,000
Total costs	7,56,000	7,32,510	5,83,000

Working note-1**Calculation of Direct material cost**

	BABYSOFT-Gold (₹)	BABYSOFT-Pearl (₹)	BABYSOFT-Diamond (₹)
Essential oils	120.00 $\left(\frac{200 \times 60}{100}\right)$	165.00 $\left(\frac{300 \times 55}{100}\right)$	195.00 $\left(\frac{300 \times 65}{100}\right)$
Cocoa Butter	40.00 $\left(\frac{200 \times 20}{100}\right)$	40.00 $\left(\frac{200 \times 20}{100}\right)$	40.00 $\left(\frac{200 \times 20}{100}\right)$
Filtered water	4.50 $\left(\frac{15 \times 30}{100}\right)$	4.50 $\left(\frac{15 \times 30}{100}\right)$	4.50 $\left(\frac{15 \times 30}{100}\right)$
Chemicals	3.00 $\left(\frac{30 \times 10}{100}\right)$	6.00 $\left(\frac{50 \times 12}{100}\right)$	9.00 $\left(\frac{60 \times 15}{100}\right)$
Total costs	167.50	215.50	248.50

(ii) Activity Based Costing

	BABYSOFT-Gold	BABYSOFT-Pearl	BABYSOFT-Diamond	Total
Quantity (units)	4,000	3,000	2,000	-
Weight per unit (grams)	108 $\{(60 \times 0.8) + 20 + 30 + 10\}$	106 $\{(55 \times 0.8) + 20 + 30 + 12\}$	117 $\{(65 \times 0.8) + 20 + 30 + 15\}$	-
Total weight (grams)	4,32,000	3,18,000	2,34,000	9,84,000
Direct labour (minutes)	30	40	60	-
Direct labour hours	2,000 $\left(\frac{4,000 \times 30}{60} \right)$	2,000 $\left(\frac{3,000 \times 40}{60} \right)$	2,000 $\left(\frac{2,000 \times 60}{60} \right)$	6,000
Machine operations per unit	5	5	6	-
Total operations	20,000	15,000	12,000	47,000

Forklifting rate per gram = ₹ 58,000 ÷ 9,84,000 grams

= ₹ 0.06 per gram

Supervising rate per direct = ₹ 60,000 ÷ 6,000 hours

labour hour = ₹ 10 per labour hour

Utilities rate per machine

operations = ₹ 80,000 ÷ 47,000 machine operations

= ₹ 1.70 per machine operations

Unit Costs under ABC:

	BABYSOFT- Gold (₹)	BABYSOFT- Pearl (₹)	BABYSOFT- Diamond (₹)
Direct Costs:			
- Direct Labour	5.00	6.67	10.00
- Direct material	167.50	215.50	248.50
Production Overheads:			
- Forklifting cost	6.48 (0.06 × 108)	6.36 (0.06 × 106)	7.02 (0.06 × 117)
- Supervising cost	5.00 $\left(\frac{10 \times 30}{60}\right)$	6.67 $\left(\frac{10 \times 40}{60}\right)$	10.00 $\left(\frac{10 \times 60}{60}\right)$
Utilities	8.50 (1.70 × 5)	8.50 (1.70 × 5)	10.20 (1.70 × 6)
Total unit costs	192.48	243.70	285.72
Number of units	4,000	3,000	2,000
Total costs	7,69,920	7,31,100	5,71,440

(iii) **Comments:** The difference in the total costs under the two systems is due to the differences in the overheads borne by each of the products. The Activity Based Costs appear to be more accurate.

Answers to the Case Scenarios

1.

i.	(b)	ii.	(d)	iii.	(c)	iv.	(b)	v.	(d)

(i) (b) ₹10,800

(ii) (d) ₹ 4,05,00,000

(iii) (c) ₹ 0

(iv) (b) ₹ 46,82,550

(v) (d) ₹ 61,88,550 & 50,57,325

Working note:**1. Computation of revenues (at listed price), discount, cost of goods sold and customer level operating activities costs:**

	Customers				
	A	B	C	D	E
Units sold: (a)	4,500	6,000	9,500	7,500	12,750
Revenues (at listed price) (₹): (b) {(a) × ₹6,480}	2,91,60,000	3,88,80,000	6,15,60,000	4,86,00,000	8,26,20,000
Revenues (at listed price) (₹): (c) {(a) × Actual selling price}	2,91,60,000 (4,500 × 6,480)	3,82,32,000 (6,000 × 6,372)	5,64,30,000 (9,500 × 5,940)	4,69,80,000 (7,500 × 6,264)	7,43,58,000 (12,750 × 5,832)
Discount (₹) (d) {(b) – (c)}	0	6,48,000	51,30,000	16,20,000	82,62,000
Cost of goods sold (₹) : (e) {(a) × ₹5,400}	2,43,00,000	3,24,00,000	5,13,00,000	4,05,00,000	6,88,50,000
Customer level operating activities costs					
Order taking costs (₹): (No. of purchase orders × ₹ 4,500)	67,500	1,12,500	1,35,000	1,12,500	1,35,000
Customer visits costs (₹) (No. of customer visits × ₹ 3,600)	7,200	10,800	21,600	7,200	10,800
Delivery vehicles travel costs (₹) (Kms travelled by delivery vehicles ×	1,500	1,350	2,250	3,000	4,500

₹ 7.50 per km.)					
Product handling costs (₹) {(a) x ₹ 22.50}	1,01,250	1,35,000	2,13,750	1,68,750	2,86,875
Cost of expediting deliveries (₹) {No. of expedited deliveries x ₹ 13,500}	-	-	-	-	13,500
Total cost of customer level operating activities (₹)	1,77,450	2,59,650	3,72,600	2,91,450	4,50,675

Computation of Customer level operating income

	Customers				
	A	B	C	D	E
	(₹)	(₹)	(₹)	(₹)	(₹)
Revenues (At list price) (Refer to working note)	2,91,60,000	3,82,32,000	5,64,30,000	4,69,80,000	7,43,58,000
Less: Cost of goods sold (Refer to working note)	(2,43,00,000)	(3,24,00,000)	(5,13,00,000)	(4,05,00,000)	(6,88,50,000)
Gross margin	48,60,000	58,32,000	51,30,000	64,80,000	55,08,000
Less: Customer level operating activities costs (Refer to working note)	(1,77,450)	(2,59,650)	(3,72,600)	(2,91,450)	(4,50,675)
Customer level operating income	46,82,550	55,72,350	47,57,400	61,88,550	50,57,325

COST SHEET

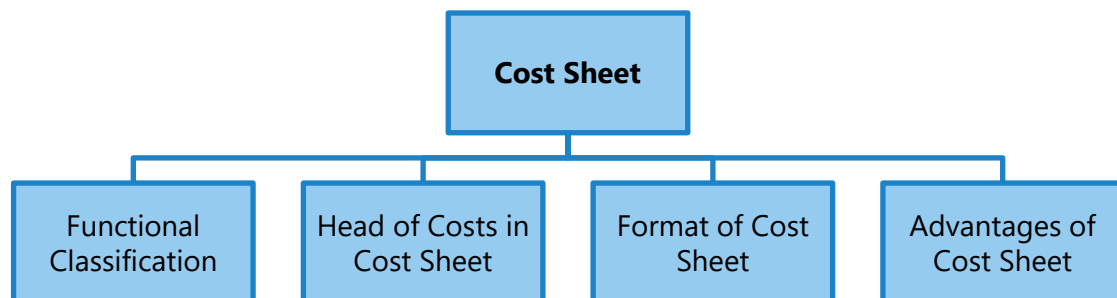


LEARNING OUTCOMES

After studying this chapter, you would be able to-

- ♦ Classify and ascertain Cost on the basis of function.
- ♦ Prepare Cost Sheet/statement for production of goods and providing of services.

CHAPTER OVERVIEW



1. INTRODUCTION

One of the objectives of cost accounting system is ascertainment of cost for a cost object. The cost objects may be a product, service or any cost centre. **Ascertainment of cost includes elementwise collection of costs, accumulation of the costs so collected for a certain volume or period and then arrange all these accumulated costs into a sheet to calculate total cost for the cost object.** In this chapter, a product or a service will be the cost object for cost calculation and cost ascertainment.

A Cost Sheet or Cost Statement is “a document which provides a detailed cost information. In a typical cost sheet, cost information are presented on the basis of functional classification. However, other classification may also be adopted as per the requirements of users of the information.

2. FUNCTIONAL CLASSIFICATION OF ELEMENTS OF COST

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

- (i) Production/ Manufacturing Cost
- (ii) Administration Cost
- (iii) Selling Cost
- (iv) Distribution Cost
- (v) Research and Development costs etc.

3. COST HEADS IN A COST SHEET

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

- (i) Prime Cost
- (ii) Cost of Production
- (iii) Cost of Goods Sold
- (iv) Cost of Sales

3.1 Prime Cost

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

Direct Material Cost	xxx
Direct Employees (labour) Cost	xxx
Direct Expenses	xxx
Prime Cost:	xxxx

- (i) **Direct Material Cost:** It is the cost of direct material consumed. The cost of direct material consumed is calculated as follows:

Opening Stock of Material	xxx
Add: Additions/ Purchases	xxx
Less: Closing stock of Material	(xxx)
Direct materials consumed	xxxx

The valuation of materials purchased and issued for production shall be done as per methods discussed in the 'Chapter- 2 Material Cost'.

Few examples of items to be added in the cost of raw material :

- (a) Freight inwards;
- (b) Insurance and other expenditure directly attributable to procurement;
- (c) Trade discounts or rebates (to be deducted);
- (d) Duties & Taxes (if input tax credit is not available/ availed) etc.

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

- (a) Wages and salary;
- (b) Allowances and incentives;

- (c) Payment for overtimes;
- (d) Bonus/ ex-gratia;
- (e) Employer's contribution to welfare funds such as Provident fund and other similar funds;
- (f) Other benefits (medical, leave with pay, free or subsidised food, leave travel concession and provisions for retirement benefits) etc.

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

- (a) Cost of utilities such as power & fuel, steam etc.;
- (b) Royalty paid/ payable for production or provision of service;
- (c) Hire charges paid for hiring specific equipment;
- (d) Fee for technical assistance and know-how;
- (e) Amortised cost of moulds, patterns, patents etc.;
- (f) Cost for product/ service specific design or drawing;
- (g) Cost of product/ service specific software;
- (h) Other expenses which are directly related with the production of goods or provision of service.

3.2 Cost of Production

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

Prime Cost	xxx
Add : Factory Overheads	xxx
Gross Works Costs	xxxx
Add: Opening stock of Work-in-process	xxx
Less: Closing stock of Work-in-process	(xxx)

Factory or Works Costs	XXXX
Add: Quality Control Cost	xxx
Add: Research & Development cost (Process related)	xxx
Add: Administrative Overheads related with production	xxx
Less: Credit for recoveries (miscellaneous income)	(xxx)
Add: Packing Cost (Primary packing)	xxx
Cost of Production	xxxx

- (i) **Factory Overheads:** It is also known as **works/production/ manufacturing** overheads. It includes the following indirect costs:
- (a) Consumable stores and spares;
 - (b) Depreciation of plant and machinery, factory building etc.
 - (c) Lease rent of production assets;
 - (d) Repair and maintenance of plant and machinery, factory building etc.
 - (e) Indirect employees cost related with production activities;
 - (f) Drawing and Designing department cost;
 - (g) Insurance of plant and machinery, factory building, stock of raw material & WIP etc.
 - (h) Amortized cost of jigs, fixtures, tooling etc.
 - (i) Service department cost such as Tool Room, Engineering & Maintenance, Pollution Control etc.
- (ii) **Stock of Work-in-process:** The cost of opening and closing stock of work-in-process (WIP) is adjusted to arrive at factory/ works cost. The WIP stock is valued on the basis of percentage of completion in respect of each element of cost. Students may refer the 'Chapter- Process & Operation Costing' to know the WIP valuation methods.
- (iii) **Quality Control Cost:** This is the cost of resources consumed towards quality control procedures.

- (iv) **Research & Development Cost:** It includes only those research and development related cost which is incurred for the improvement of process, system, product or services.
- (v) **Administrative Overheads:** It includes only those administration overheads which are related to production. The **general administration overhead is not included in production cost.**
- (vi) **Credit for Recoveries:** The realised or realisable value of scrap or waste is deducted as it reduces the cost of production.
- (vii) **Packing Cost (primary):** Packing material which is essential to hold and preserve the product for its use by the customer.
- (viii) **Joint Products and By-Products:** Joint costs are allocated between/among the products on a rational and consistent basis. In case of by-products, the net realisable value of by-products is deducted from the cost of production.

3.3 Cost of Goods Sold

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

Cost of Production	xxx
Add: Cost of Opening stock of finished goods	xxx
Less: Cost of Closing stock of finished goods	(xxx)
Cost of Goods Sold	xxxx

3.4 Cost of Sales

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

Cost of Goods Sold	xxx
Add: Administrative Overheads (General)	xxx
Add: Selling Overheads	xxx
Add: Packing Cost (secondary)	xxx
Add: Distribution Overheads	xxx
Cost of Sales	xxxx

(i) **Administrative Overheads:** It is the **cost related with general administration** of the entity. It includes the followings:

- (a) Depreciation and maintenance of, building, furniture etc. of corporate or general management.
- (b) Salary of administrative employees, accountants, directors, secretaries etc.
- (c) Rent, rates & taxes, insurance, lighting, office expenses etc.
- (d) Indirect materials- printing and stationery, office supplies etc.
- (e) Legal charges, audit fees, corporate office expenses like directors' sitting fees, remuneration and commission, meeting expenses etc.

(ii) **Selling Overheads:** It is the **cost related with sale of products or services**. It includes the following costs:

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

(iii) **Packing Cost (secondary):** Packing material that enables to store, transport, inform the customer, promote and otherwise make the product marketable.

(iv) **Distribution Overheads:** It includes the **cost related with making the goods available to the customers**. The costs are :

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



4. COST SHEET/STATEMENT

4.1 Presentation of Cost Information

The cost items in the cost statement shall be presented on 'basis of relevant classification'.

Specimen Format of Cost Sheet for a Manufacturing entity

	Particulars	Total Cost (₹)	Cost per unit (₹)
1.	Direct materials consumed:		
	Opening Stock of Raw Material	xxx	
	Add: Additions/ Purchases	xxx	
	Less: Closing stock of Raw Material	xxx	
		xxx	
2.	Direct employee (labour) cost	xxx	
3.	Direct expenses	xxx	
4.	Prime Cost (1+2+3)	xxx	
5.	Add: Works/ Factory Overheads	xxx	
6.	Gross Works Cost (4+5)	xxx	
7.	Add: Opening Work in Process	xxx	
8.	Less: Closing Work in Process	(xxx)	
9.	Works/ Factory Cost (6+7-8)	xxx	
10.	Add: Quality Control Cost	xxx	
11.	Add: Research and Development Cost	xxx	

12.	Add: Administrative Overheads (relating to production activity)	xxx	
13.	Less: Credit for Recoveries/Scrap/By-Products/misc. income	(xxx)	
14.	Add: Packing cost (primary)	xxx	
15.	Cost of Production (9+10+11+12-13+14)	xxx	
16.	Add: Opening stock of finished goods	xxx	
17.	Less: Closing stock of finished goods	(xxx)	
18.	Cost of Goods Sold (15+16-17)	xxx	
19.	Add: Administrative Overheads (General)	xxx	
20.	Add: Marketing Overheads :		
	Selling Overheads	xxx	
	Distribution Overheads	xxx	
21.	Cost of Sales (18+19+20)	xxx	

Cost sheet/statement for services is also prepared but the format and presentation may differ as per the information requirement. Format and presentation has been discussed in “Service Costing” chapter.

4.2 Treatment of various items of Cost in Cost Sheet/Statement

- (i) **Abnormal costs:** Any abnormal cost, where it is material and quantifiable, shall not form part of cost of production or acquisition or supply of goods or provision of service. Examples of abnormal costs are:
 - (a) Cost pertaining to or arising out of a pandemic e.g. COVID-19
 - (b) Cost associated with employees due to sudden lockdown.
- (ii) **Subsidy/Grant/Incentives:** Any such type of payment received/ receivable are reduced from the cost objects to which such amount pertains.
- (iii) **Penalty, fine, damages, and demurrage:** These types of expenses are not form part of cost.

- (iv) **Interest and other finance costs:** Interest, including any payment in the nature of interest for use of non-equity funds and incidental cost that an entity incurs in arranging those funds. Interest and finance charges are not included in cost of production. Interest and Financing Charges shall be presented in the cost statement as a separate item of cost of sales.

4.3 Advantages of Cost Sheet or Cost Statements

The main advantages of a Cost Sheet are as follows:

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

ILLUSTRATION 1

The following data relates to the manufacture of a standard product during the month of April:

Particulars	(₹)
Raw materials	₹ 1,80,000
Direct wages	₹ 90,000
Machine hours worked (hours)	10,000
Machine hour rate (per hour)	₹ 8
Administration overheads (general)	₹ 35,000
Selling overheads (per unit)	₹ 5
Units produced	4,000
Units sold	3,600
Selling price per unit	₹ 125

You are required to PREPARE a cost sheet in respect of the above showing:

- (i) Cost per unit
- (ii) Profit for the month

SOLUTION

(i) Cost Sheet

Output: 4,000 units

Particulars	Total Cost (₹)	Cost per (unit) (₹)
Raw materials	1,80,000	45.00
Direct wages	90,000	22.50
Prime cost	2,70,000	67.50
Add: Factory overheads (10,000 hrs × ₹ 8 per hour)	80,000	20.00
Cost of Production	3,50,000	87.50
Less: Closing Stock of finished goods (4,000 – 3,600 units)	(35,000)	--
Cost of Goods Sold	3,15,000	87.50
Add: Administration overheads (general)	35,000	9.72
Add: Selling Overheads (3,600 units × ₹ 5 unit)	18,000	5.00
Cost of sales (total Cost)	3,68,000	102.22

(ii) Statement of Profit

Particulars	Total Cost (₹)
Sales revenue (3,600 units @ ₹ 125)	4,50,000
Less: Cost of sales	3,68,000
Profit	82,000

ILLUSTRATION 2

The following information has been obtained from the records of ABC Corporation for the period from June 1 to June 30.

	On June 1 (₹)	On June 30 (₹)
Cost of raw materials	60,000	50,000
Cost of work-in-process	12,000	15,000
Cost of stock of finished goods	90,000	1,10,000
Purchase of raw materials during June 2020		4,80,000
Wages paid		2,40,000
Factory overheads		1,00,000
Administration overheads (related to production)		50,000
Selling & distribution overheads		25,000
Sales		10,00,000

PREPARE a statement giving the following information:

- Raw materials consumed;
- Prime cost;
- Factory cost;
- Cost of goods sold; and
- Net profit.

SOLUTION

Statement of Cost & Profit
(for the month of June)

	(₹)
Opening stock of raw materials	60,000
Add: Purchase of raw materials during the month of June	4,80,000
Less: Closing stock of raw materials	(50,000)
(a) Raw materials consumed	4,90,000
Add: Direct wages	2,40,000
(b) Prime cost	7,30,000
Add: Factory overheads	1,00,000
Works cost	8,30,000
Add: Opening work-in-process	12,000
Less: Closing work-in-process	(15,000)
(c) Factory cost	8,27,000
Add: Administration overheads	50,000
Cost of production	8,77,000
Add: Opening stock of finished goods	90,000
Less: Closing stock of finished goods	(1,10,000)
(d) Cost of goods sold	8,57,000
Add: Selling & distribution overheads	25,000
Cost of sales	8,82,000
(e) Net Profit	1,18,000
Sales	10,00,000

ILLUSTRATION 3

Arnav Inspat Udyog Ltd. has the following expenditures for the year ended 31st March 2023:

Sl. No.		(₹)	(₹)
(i)	<i>Raw materials purchased</i>		<i>10,00,00,000</i>
(ii)	<i>GST paid on the above purchases @18% (eligible for input tax credit)</i>		<i>1,80,00,000</i>
(iii)	<i>Freight inwards</i>		<i>11,20,600</i>
(iv)	<i>Wages paid to factory workers</i>		<i>29,20,000</i>
(v)	<i>Contribution made towards employees' PF & ESIS</i>		<i>3,60,000</i>
(vi)	<i>Production bonus paid to factory workers</i>		<i>2,90,000</i>
(vii)	<i>Royalty paid for production</i>		<i>1,72,600</i>
(viii)	<i>Amount paid for power & fuel</i>		<i>4,62,000</i>
(ix)	<i>Amount paid for purchase of moulds and patterns (life is equivalent to two years production)</i>		<i>8,96,000</i>
(x)	<i>Job charges paid to job workers</i>		<i>8,12,000</i>
(xi)	<i>Stores and spares consumed</i>		<i>1,12,000</i>
(xii)	<i>Depreciation on:</i>		
	<i>Factory building</i>	<i>84,000</i>	
	<i>Office building</i>	<i>56,000</i>	
	<i>Plant & Machinery</i>	<i>1,26,000</i>	
	<i>Delivery vehicles</i>	<i>86,000</i>	<i>3,52,000</i>

(xiii)	Salary paid to supervisors		1,26,000
(xiv)	Repairs & Maintenance paid for:		
	Plant & Machinery	48,000	
	Sales office building	18,000	
	Vehicles used by directors	19,600	85,600
(xv)	Insurance premium paid for:		
	Plant & Machinery	31,200	
	Factory building	18,100	
	Stock of raw materials & WIP	36,000	85,300
(xvi)	Expenses paid for quality control check activities		19,600
(xvii)	Salary paid to quality control staffs		96,200
(xviii)	Research & development cost paid for improvement in production process		18,200
(xix)	Expenses paid for pollution control and engineering & maintenance		26,600
(xx)	Expenses paid for administration of factory work		1,18,600
(xxi)	Salary paid to functional managers:		
	Production control	9,60,000	
	Finance & Accounts	9,18,000	
	Sales & Marketing	10,12,000	28,90,000
(xxii)	Salary paid to General Manager		12,56,000
(xxiii)	Packing cost paid for:		
	Primary packing necessary to maintain quality	96,000	
	For re-distribution of finished goods	1,12,000	2,08,000

(xxiv)	Interest and finance charges paid (for usage of non- equity fund)		7,20,000
(xxv)	Fee paid to auditors		1,80,000
(xxvi)	Fee paid to legal advisors		1,20,000
(xxvii)	Fee paid to independent directors		2,20,000
(xxviii)	Performance bonus paid to sales staffs		1,80,000
(xxix)	Value of stock as on 1st April, 2022:		
	Raw materials	18,00,000	
	Work-in-process	9,20,000	
	Finished goods	11,00,000	38,20,000
(xxx)	Value of stock as on 31st March, 2023:		
	Raw materials	9,60,000	
	Work-in-process	8,70,000	
	Finished goods	18,00,000	36,30,000

Amount realized by selling of scrap and waste generated during manufacturing process – ₹86,000/-

From the above data you are required to PREPARE Statement of cost for Arnav Ispat Udyog Ltd. for the year ended 31st March, 2023, showing (i) Prime cost, (ii) Factory cost, (iii) Cost of Production, (iv) Cost of goods sold and (v) Cost of sales.

SOLUTION

Statement of Cost of Arnav Ispat Udyog Ltd. for the year ended 31st March, 2023:

Sl. No.	Particulars	(₹)	(₹)
(i)	Material Consumed:		
	Raw materials purchased	10,00,00,000	
	Freight inwards	11,20,600	
	Add: Opening stock of raw materials	18,00,000	
	Less: Closing stock of raw materials	(9,60,000)	10,19,60,600

(ii)	Direct employee (labour) cost:		
	Wages paid to factory workers	29,20,000	
	Contribution made towards employees' PF & ESIS	3,60,000	
	Production bonus paid to factory workers	2,90,000	35,70,000
(iii)	Direct expenses:		
	Royalty paid for production	1,72,600	
	Amount paid for power & fuel	4,62,000	
	Amortised cost of moulds and patterns	4,48,000	
	Job charges paid to job workers	8,12,000	18,94,600
	Prime Cost		10,74,25,200
(iv)	Works/ Factory overheads:		
	Stores and spares consumed	1,12,000	
	Depreciation on factory building	84,000	
	Depreciation on plant & machinery	1,26,000	
	Repairs & Maintenance paid for plant & machinery	48,000	
	Insurance premium paid for plant & machinery	31,200	
	Insurance premium paid for factory building	18,100	
	Insurance premium paid for stock of raw materials & WIP	36,000	
	Salary paid to supervisors	1,26,000	
	Expenses paid for pollution control and engineering & maintenance	26,600	6,07,900
	Gross factory cost		10,80,33,100
	Add: Opening value of W-I-P		9,20,000
	Less: Closing value of W-I-P		(8,70,000)
	Factory Cost		10,80,83,100

(v)	Quality control cost:		
	Expenses paid for quality control check activities	19,600	
	Salary paid to quality control staffs	96,200	1,15,800
(vi)	Research & development cost paid for improvement in production process		18,200
(vii)	Administration cost related with production:		
	-Expenses paid for administration of factory work	1,18,600	
	-Salary paid to Production control manager	9,60,000	10,78,600
(viii)	Less: Realisable value on sale of scrap and waste		(86,000)
(ix)	Add: Primary packing cost		96,000
	Cost of Production		10,93,05,700
	Add: Opening stock of finished goods		11,00,000
	Less: Closing stock of finished goods		(18,00,000)
	Cost of Goods Sold		10,86,05,700
(x)	Administrative overheads:		
	Depreciation on office building	56,000	
	Repairs & Maintenance paid for vehicles used by directors	19,600	
	Salary paid to Manager- Finance & Accounts	9,18,000	
	Salary paid to General Manager	12,56,000	
	Fee paid to auditors	1,80,000	
	Fee paid to legal advisors	1,20,000	
	Fee paid to independent directors	2,20,000	27,69,600

(xi)	Selling overheads:		
	Repairs & Maintenance paid for sales office building	18,000	
	Salary paid to Manager- Sales & Marketing	10,12,000	
	Performance bonus paid to sales staffs	1,80,000	12,10,000
(xii)	Distribution overheads:		
	Depreciation on delivery vehicles	86,000	
(xiii)	Packing cost paid for re-distribution of finished goods	1,12,000	1,98,000
(xiv)	Interest and finance charges paid		7,20,000
	Cost of Sales		11,35,03,300

Note:

GST paid on purchase of raw materials would not be part of cost of materials as it is eligible for input tax credit.

SUMMARY

- ◆ **Cost Sheet:** A Cost Sheet or Cost Statement is "a document which provides a detailed cost information. In a typical cost sheet, cost information are presented on the basis of functional classification. However, other classification may also be adopted as per the requirements of users of the information.
- ◆ **Direct Expenses:** Expenses other than direct material cost and direct employee cost, which are incurred to manufacture a product or for provision of service and can be directly traced in an economically feasible manner to a cost object.
- ◆ **Prime Cost:** Prime cost represents the total of direct materials costs, direct employee (labour) costs and direct expenses.
- ◆ **Cost of Production:** Cost of production consists of cost of materials consumed, direct employee (labour) costs, direct expenses, production overheads, quality control costs, primary packing cost, R&D and administration cost relating to production.

- ◆ **Primary Packing Cost:** Cost incurred on packing materials which are essential to hold and preserve the product for further processing or its use by consumer.
- ◆ **Secondary Packing Cost:** Cost incurred on packing materials which is used to store, transport, and promote the product.
- ◆ **Cost of Goods Sold:** Cost of production adjusted with opening and closing inventories of finished goods.
- ◆ **Administrative overheads:** Cost incurred of all activities relating to general management and administration of an entity.
- ◆ **Marketing overheads:** Marketing overheads comprise of selling overheads and distribution overheads.
- ◆ **Selling Overheads:** Expenses related to sale of products or services.
- ◆ **Distribution overheads:** Costs incurred in handling a product or service from the time it is ready to dispatch or delivery until it reaches the ultimate consumer.
- ◆ **Cost of Sales:** It is the total cost of a product incurred to make the product available to the customer or consumer. It is the aggregate of cost of goods sold, administrative costs, marketing costs and other separate line items of cost which could not form part of cost of production.

TEST YOUR KNOWLEDGE

Multiple Choice Questions (MCQs)

1. *Generally, for the purpose of cost sheet preparation, costs are classified on the basis of:*
 - (a) *Functions*
 - (b) *Variability*
 - (c) *Relevance*
 - (d) *Nature*

2. Which of the following does not form part of prime cost:
 - (a) Cost of packing
 - (b) Cost of transportation paid to bring materials to factory
 - (c) GST paid on raw materials (input credit cannot be claimed)
 - (d) Overtime premium paid to workers.
3. A Ltd. received an order, for which it purchased a special frame for manufacturing, it is a part of:
 - (a) Direct Materials
 - (b) Direct expenses
 - (c) Factory Overheads
 - (d) Administration Overheads
4. Salary paid to plant supervisor is a part of
 - (a) Direct expenses
 - (b) Factory overheads
 - (c) Quality control cost
 - (d) Administration cost
5. Depreciation of director's laptop is treated as a part of:
 - (a) Administration Overheads
 - (b) Factory Overheads
 - (c) Direct Expenses
 - (d) Research & Development cost.
6. A manufacture has set-up a lab for testing of products for compliance with standards, salary of this lab staffs are part of:
 - (a) Works overheads
 - (b) Quality Control Cost
 - (c) Direct Expenses
 - (d) Research & Development Cost.

7. *Audit fees paid to auditors is part of:*
 - (a) *Administration Cost*
 - (b) *Production cost*
 - (c) *Selling & Distribution cost*
 - (d) *Not shown in cost sheet.*
8. *Salary paid to factory store staff is part of:*
 - (a) *Factory overheads*
 - (b) *Production Cost*
 - (c) *Direct Employee cost*
 - (d) *Direct Material Cost.*
9. *Canteen expenses for factory workers are part of:*
 - (a) *Factory overhead*
 - (b) *Administration Cost*
 - (c) *Marketing cost*
 - (d) *None of the above.*
10. *A company pays royalty to State Government on the basis of production, it is treated as:*
 - (a) *Direct Material Cost*
 - (b) *Factory Overheads*
 - (c) *Direct Expenses*
 - (d) *Administration cost.*

Theoretical Questions

1. *DESCRIBE how costs are classified on the basis of function.*
2. *EXPLAIN the treatment of administration overheads.*
3. *STATE the advantages of a cost sheet.*

Practical Problems

1. The books of Adarsh Manufacturing Company present the following data for the month of April:

Direct labour cost ₹ 17,500 being 175% of works overheads.

Cost of goods sold excluding administrative expenses ₹ 56,000.

Inventory accounts showed the following opening and closing balances:

	April 1 (₹)	April 30 (₹)
Raw materials	8,000	10,600
Work-in-progress	10,500	14,500
Finished goods	17,600	19,000

Other data are:

	(₹)
Selling expenses	3,500
General and administration expenses	2,500
Sales for the month	75,000

You are required to:

- (i) FIND out the value of materials purchased.
 - (ii) PREPARE a cost statement showing the various elements of cost and also the profit earned.
2. From the following particulars, you are required to PREPARE monthly cost sheet of Aditya Industries:

	(₹)
Opening Inventories:	
- Raw materials	12,00,000
- Work-in-process	18,00,000
- Finished goods (10,000 units)	9,60,000

<i>Closing Inventories:</i>	
- Raw materials	14,00,000
- Work-in-process	16,04,000
- Finished goods	?
Raw materials purchased	1,44,00,000
GST paid on raw materials purchased (ITC available)	7,20,000
Wages paid to production workers	36,64,000
Expenses paid for utilities	1,45,600
Office and administration expenses paid	26,52,000
Travelling allowance paid to office staffs	1,21,000
Selling expenses	6,46,000

Machine hours worked- 21,600 hours

Machine hour rate- ₹ 8.00 per hour

Units sold- 1,60,000

Units produced- 1,94,000

Desired profit- 15% on sales

3. A Ltd. Co. has capacity to produce 1,00,000 units of a product every month. Its works cost at varying levels of production is as under:

Level	Works cost per unit (₹)
10%	400
20%	390
30%	380
40%	370
50%	360
60%	350
70%	340
80%	330
90%	320
100%	310

Its fixed administration expenses amount to ₹1,50,000 and fixed marketing expenses amount to ₹2,50,000 per month respectively. The variable distribution cost amounts to ₹30 per unit.

It can sell 100% of its output at ₹500 per unit provided it incurs the following further expenditure:

- (a) it gives gift items costing ₹30 per unit of sale;*
- (b) it has lucky draws every month giving the first prize of ₹50,000; 2nd prize of ₹25,000, 3rd prize of ₹10,000 and three consolation prizes of ₹5,000 each to customers buying the product.*
- (c) it spends ₹1,00,000 on refreshments served every month to its customers;*
- (d) it sponsors a television programme every week at a cost of ₹20,00,000 per month.*

It can market 30% of its output at ₹550 per unit without incurring any of the expenses referred to in (a) to (d) above.

PREPARE a cost sheet for the month showing total cost and profit at 30% and 100% capacity level.

4. *The following figures are extracted from the Trial Balance of G.K Co. on 31st March:*

	Dr.	Cr.
	(₹)	(₹)
<i>Inventories:</i>		
<i>Finished Stock</i>	80,000	
<i>Raw Materials</i>	1,40,000	
<i>Work-in-Process</i>	2,00,000	
<i>Office Appliances</i>	17,400	
<i>Plant & Machinery</i>	4,60,500	
<i>Building</i>	2,00,000	

<i>Sales</i>		<i>7,68,000</i>
<i>Sales Return and Rebates</i>	<i>14,000</i>	
<i>Materials Purchased</i>	<i>3,20,000</i>	
<i>Freight incurred on Materials</i>	<i>16,000</i>	
<i>Purchase Returns</i>		<i>4,800</i>
<i>Direct employee cost</i>	<i>1,60,000</i>	
<i>Indirect employee cost</i>	<i>18,000</i>	
<i>Factory Supervision</i>	<i>10,000</i>	
<i>Repairs and factory up-keeping expenses</i>	<i>14,000</i>	
<i>Heat, Light and Power</i>	<i>65,000</i>	
<i>Rates and Taxes</i>	<i>6,300</i>	
<i>Miscellaneous Factory Expenses</i>	<i>18,700</i>	
<i>Sales Commission</i>	<i>33,600</i>	
<i>Sales Travelling</i>	<i>11,000</i>	
<i>Sales Promotion</i>	<i>22,500</i>	
<i>Distribution Deptt.—Salaries and Expenses</i>	<i>18,000</i>	
<i>Office Salaries and Expenses</i>	<i>8,600</i>	
<i>Interest on Borrowed Funds</i>	<i>2,000</i>	

Further details are available as follows:

<i>(i) Closing Inventories:</i>		
<i>Finished Goods</i>		<i>1,15,000</i>
<i>Raw Materials</i>		<i>1,80,000</i>
<i>Work-in-Process</i>		<i>1,92,000</i>
<i>(ii) Outstanding expenses on:</i>		
<i>Direct employee cost</i>		<i>8,000</i>
<i>Indirect employee cost</i>		<i>1,200</i>
<i>Interest on Borrowed Funds</i>		<i>2,000</i>

<i>(iii) Depreciation to be provided on:</i>	
<i>Office Appliances</i>	<i>5%</i>
<i>Plant and Machinery</i>	<i>10%</i>
<i>Buildings</i>	<i>4%</i>
<i>(iv) Distribution of the following costs:</i>	
<i>Heat, Light and Power to Factory, Office and Distribution in the ratio 8 : 1 : 1.</i>	
<i>Rates and Taxes two-thirds to Factory and one-third to Office.</i>	
<i>Depreciation on Buildings to Factory, Office and Selling in the ratio 8 : 1 : 1.</i>	

With the help of the above information, you are required to PREPARE a condensed Profit and Loss Statement of G.K Co. for the year ended 31st March along with supporting schedules of:

- (i) Cost of Sales.*
- (ii) Selling and Distribution Expenses.*
- (iii) Administration Expenses*

Case Scenarios

- M Ltd. is producing a single product and may expand into product diversification in next one to two years. M Ltd. is amongst a labour-intensive company where majority of processes are done manually. Employee cost is a major cost element in the total cost of the company. The company conventionally uses performance parameters Earnings per manshift (EMS) to measure cost paid to an employee for a shift of 8 hours, and Output per manshift (OMS) to measure an employee's output in a shift of 8 hours.*

The Chief Manager (Finance) of the company has emailed you few information related to the last month. The email contains the following data related to the last month:

During the last month, the company has produced 2,34,000 tonnes of output. Expenditures for the last months are:

- (i) *Raw materials consumed ₹50,00,000*
- (ii) *Power consumed 13,000 Kwh @ ₹8 per Kwh to run the machines for production.*
- (iii) *Diesels consumed 2,000 litres @ ₹93 per litre to run power generator used as alternative or backup for power cuts.*
- (iv) *Wages & salary paid – ₹6,40,00,000*
- (v) *Gratuity & leave encashment paid – ₹64,20,000*
- (vi) *Hiring charges paid for HEMM- ₹30,00,000. HEMM are directly used in production.*
- (vii) *Hiring charges paid for cars used for official purpose – ₹66,000*
- (viii) *Reimbursement of diesel cost for the cars – ₹22,000*
- (ix) *The hiring of cars attracts GST under RCM @5% without credit.*
- (x) *Maintenance cost paid for weighing bridge (used for weighing of final goods at the time of dispatch) – ₹12,000*
- (xi) *AMC cost of CCTV installed at weighing bridge (used for weighing of final goods at the time of dispatch) and factory premises is ₹8,000 and ₹18,000 per month respectively.*
- (xii) *TA/ DA and hotel bill paid for sales manager- ₹36,000*
- (xiii) *The company has 1,800 employees works for 26 days in a month.*

You are asked to calculate the followings:

- i. *What is the amount of prime cost incurred during the last month:*
 - (a) *₹7,54,20,000*
 - (b) *₹7,57,10,000*
 - (c) *₹7,56,06,000*
 - (d) *₹7,87,10,000*
- ii. *What is the total and per shift cost of production for last month:*
 - (a) *₹7,87,10,000 and ₹336.37 respectively*
 - (b) *₹7,87,10,000 and ₹1,681.84 respectively*

- (c) ₹7,87,28,000 and ₹1,682.22 respectively
- (d) ₹7,87,28,000 and ₹336.44 respectively
- iii. What is the value of administrative cost incurred during the last month:
- (a) ₹92,400
- (b) ₹88,000
- (c) ₹1,48,400
- (d) ₹1,44,000
- iv. What is the value of selling and distribution cost and total cost of sales:
- (a) ₹36,000 & ₹7,88,76,400 respectively
- (b) ₹56,000 & ₹7,88,76,400 respectively
- (c) ₹36,000 & ₹7,88,72,000 respectively
- (d) ₹56,000 & ₹7,88,72,000 respectively
- v. What is the value EMS and OMS for the last month:
- (a) ₹1,504.70 & 5 tonnes respectively
- (b) ₹1,367.52 & 5 tonnes respectively
- (c) ₹1,504.70 & 4.37 tonnes respectively
- (d) ₹1,367.52 & 4.37 tonnes respectively

ANSWERS

Answers to the MCQs

1.	(a)	2.	(a)	3.	(b)	4.	(b)	5.	(a)	6.	(b)
7.	(a)	8.	(a)	9.	(a)	10.	(c)				

Answers to the Theoretical Questions

- Please refer paragraph 2
- Please refer paragraph 3.4

3. Please refer paragraph 4.3

Answers to the Practical Problems

1. (i) Computation of the value of materials purchased

To find out the value of materials purchased, reverse calculations from the given data can be presented as below:

Particulars	(₹)
Cost of goods sold	56,000
Add: Closing stock of finished goods	19,000
Less: Opening stock of finished goods	(17,600)
Cost of production	57,400
Add: Closing stock of work-in-progress	14,500
Less: Opening stock of work-in-progress	(10,500)
Works cost	61,400
Less: Factory overheads: $\left(\frac{₹17,500 \times 100}{175} \right)$	(10,000)
Prime cost	51,400
Less: Direct labour	(17,500)
Raw material consumed	33,900
Add: Closing stock of raw materials	10,600
Raw materials available	44,500
Less: Opening stock of raw materials	(8,000)
Value of materials purchased	36,500

(ii) Cost statement

	(₹)
Raw material consumed [Refer to statement (i) above]	33,900
Add: Direct labour cost	17,500
Prime cost	51,400
Add: Factory overheads	10,000
Works cost	61,400
Add: Opening work-in-progress	10,500
Less: Closing work-in-progress	(14,500)
Cost of production	57,400
Add: Opening stock of finished goods	17,600
Less: Closing stock of finished goods	(19,000)
Cost of goods sold	56,000
Add: General and administration expenses	2,500
Add: Selling expenses	3,500
Cost of sales	62,000
Profit (Balance figure ₹ 75,000 – ₹ 62,000)	13,000
Sales	75,000

2. Cost sheet of Aditya Industries for month of.....

Units produced- 1,94,000

Units sold- 1,60,000

Particulars	(₹)	Cost per unit (₹)
Raw materials purchased	1,44,00,000	
Add: Opening value of raw materials	12,00,000	
Less: Closing value of raw materials	(14,00,000)	
Materials consumed	1,42,00,000	73.19

Wages paid to production workers	36,64,000	18.89
Expenses paid for utilities	1,45,600	0.75
Prime Cost	1,80,09,600	92.83
Factory overheads (₹ 8 × 21,600 hours)	1,72,800	
Add: Opening value of W-I-P	18,00,000	
Less: Closing value of W-I-P	(16,04,000)	
Cost of Production	1,83,78,400	94.73
Add: Value of opening finished stock	9,60,000	
Less: Value of closing finished stock (₹ 94.73 × 44,000)	(41,68,120)	
Cost of Goods Sold	1,51,70,280	94.81
Office and administration expenses paid	26,52,000	16.58
Travelling allowance paid to office staffs	1,21,000	0.75
Selling expenses	6,46,000	4.04
Cost of Sales	1,85,89,280	116.18
Add: Profit	32,80,461	20.50
	2,18,69,741	136.68

3. Cost Sheet (For the month)

Level of Capacity	30%		100%	
	30,000 units		1,00,000 units	
	Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)
Works Cost	380.00	1,14,00,000	310.00	3,10,00,000
Add: Fixed administration expenses	5.00	1,50,000	1.50	1,50,000

Add: Fixed marketing expenses	8.33	2,50,000	2.50	2,50,000
Add: Variable distribution cost	30.00	9,00,000	30.00	30,00,000
Add: Special Costs:				
- Gift items costs	—	—	30.00	30,00,000
- Customers' prizes*	—	—	1.00	1,00,000
- Refreshments	—	—	1.00	1,00,000
- Television programme sponsorship cost	—	—	20.00	20,00,000
Cost of sales	423.33	1,27,00,000	396.00	3,96,00,000
Profit (Balancing figure)	126.67	38,00,000	104.00	1,04,00,000
Sales revenue	550.00	1,65,00,000	500.00	5,00,00,000

***Customers' prize cost:**

	Amount (₹)
1 st Prize	50,000
2 nd Prize	25,000
3 rd Prize	10,000
Consolation Prizes (3 × ₹5,000)	15,000
Total	1,00,000

**4. Profit and Loss Statement of G.K Co.
for the year ended 31st March**

	(₹)	(₹)
Gross Sales	7,68,000	
Less: Returns and rebates	(14,000)	7,54,000
Less: Cost of Sales (excluding interest on borrowed funds) [Refer to Schedule (i)]		(7,14,020)
Net Operating Profit		39,980
Less: Interest on borrowed funds (2,000+2,000)		(4,000)
Net Profit		35,980

(i) Schedule of Cost of Sales

	(₹)	(₹)
Raw Material (Inventory opening balance)		1,40,000
Add: Material Purchased	3,20,000	
Add: Freight on Material	16,000	
Less: Purchase Returns	(4,800)	3,31,200
		4,71,200
Less: Closing Raw Material Inventory		(1,80,000)
Materials consumed in Production		2,91,200
Direct employee cost (₹1,60,000 + ₹8,000)		1,68,000
Prime Cost		4,59,200
Factory Overheads:		
Indirect employee cost (₹18,000 + ₹1,200)	19,200	
Factory Supervision	10,000	
Repairs and factory up-keeping expenses	14,000	
Heat, Light and Power (₹65,000 × 8/10)	52,000	
Rates and Taxes (₹6,300 × 2/3 rd)	4,200	
Miscellaneous Factory Expenses	18,700	
Depreciation of Plant (10% of ₹4,60,500)	46,050	
Depreciation of Buildings (4% of ₹2,00,000 × 8/10)	6,400	1,70,550
Gross Works Cost		6,29,750
Add: Opening Work-in-Process inventory		2,00,000
Less: Closing Work-in-Process inventory		(1,92,000)
Cost of production		6,37,750

Add: Opening Finished Goods inventory		80,000
Less: Closing Finished Goods inventory		(1,15,000)
Cost of Goods Sold		6,02,750
Add: Administration Expenses [See Schedule (iii)]		18,870
Add: Selling and Distribution Expenses [See Schedule (ii)]		92,400
Cost of Sales (excluding interest on borrowed funds)		7,14,020

Alternatively, Interest on borrowed funds of ₹ 4,000 (₹ 2,000 + ₹ 2,000) may be added to arrive at cost of sales.

(ii) Schedule of Selling and Distribution Expenses

	(₹)
Sales Commission	33,600
Sales Travelling	11,000
Sales Promotion	22,500
Distribution Deptt.—Salaries and Expenses	18,000
Heat, Light and Power	6,500
Depreciation of Buildings	800
	92,400

(iii) Schedule of Administration Expenses

	(₹)
Office Salaries and Expenses	8,600
Depreciation of Office Appliances	870
Depreciation of Buildings	800
Heat, Light and Power	6,500
Rates and Taxes	2,100
	18,870

Answers to the Case Scenarios

1.

i.	(d)	ii.	(c)	iii.	(a)	iv.	(b)	v.	(a)

i. d Please refer cost sheet below for prime cost

ii. c Please refer cost sheet below for cost of production

Cost of production per manshift =

Cost of production ÷ Total manshift

₹ 7,87,28,000 ÷ 46,800 = ₹1,682.22

iii. a Car hire charges including GST @5%, please refer the cost sheet

iv. b Selling and distribution cost includes the following:

Maintenance cost for weighing bridge	12,000
AMC cost of CCTV installed at weigh bridge	8,000
TA/ DA & hotel bill of sales manager	36,000
	56,000

For Cost of Sale please refer the cost sheet

v. a Manshift = 1,800 employees × 26 days = 46,800 manshifts

Computation of earnings per manshift (EMS):

EMS = $\frac{\text{Total employee benefits paid}}{\text{Manshift}}$

= $\frac{\text{₹ 7,04,20,000}}{46,800}$ = ₹ 1504.70

Computation of Output per manshift (OMS):

OMS = $\frac{\text{Total Output / Production}}{\text{Manshift}}$

$\frac{2,34,000 \text{ Tonne}}{46,800}$ = 5 tonnes

Workings**Cost Sheet of M Ltd. for the last month**

Particulars	Amount (₹)	Amount (₹)
Materials consumed		50,00,000
Wages & Salary	6,40,00,000	
Gratuity & leave encashment	64,20,000	7,04,20,000
Power cost (13,000 kwh × ₹ 8)	1,04,000	
Diesel cost (2,000 ltr × ₹ 93)	1,86,000	2,90,000
HEMM hiring charges		30,00,000
Prime Cost		7,87,10,000
AMC cost of CCTV installed at factory premises		18,000
Cost of Production/ Cost of Goods Sold		7,87,28,000
Hiring charges of cars	66,000	
Reimbursement of diesel cost	22,000	
	88,000	
Add: GST @5% on RCM basis	4,400	92,400
Maintenance cost for weighing bridge	12,000	
AMC cost of CCTV installed at weigh bridge	8,000	20,000
TA/ DA & hotel bill of sales manager		36,000
Cost of Sales		7,88,76,400

COST ACCOUNTING SYSTEMS

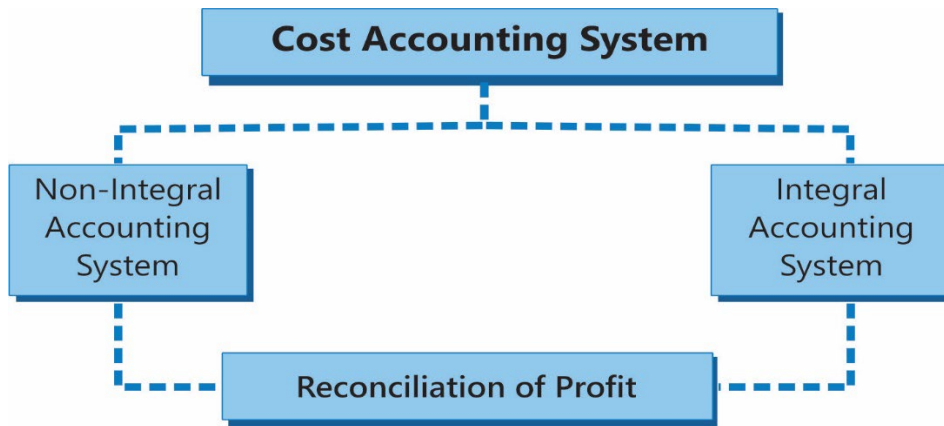


LEARNING OUTCOMES

After studying this chapter, you would be able to-

- ◆ Discuss the Cost Accounting System.
- ◆ Differentiate between Integral and Non-Integral System of Accounting.
- ◆ Identify the ledgers maintained under Integral and Non-Integral Accounting System.
- ◆ Analyse the reasons for differences in profit under Financial and Cost Accounting Systems.
- ◆ Prepare reconciliation statement for profit under Financial and Cost Accounting Systems.
- ◆ Discuss the Accounting for Management Information and Cost Control.

CHAPTER OVERVIEW



1. INTRODUCTION

To operate business operations efficiently and successfully, it is necessary to make use of an appropriate accounting system. Such a system should state in clear terms whether cost and financial transactions should be integrated or kept separately (Non-integrated). **Where cost and financial accounting records are integrated, the system so evolved is known as integrated or integral accounting system. In case cost and financial transactions are kept separately, the system is called Non-Integrated Accounting system or Cost Control System.** While non-integrated system of accounting necessitates reconciliation between financial and cost accounts but no reconciliation is required under integrated accounting system.



2. NON-INTEGRATED ACCOUNTING SYSTEM

It is a system of accounting under which separate ledgers are maintained for both cost and financial accounts. This system is also known as **cost ledger accounting system**. Under this system the cost accounts restrict itself to recording only those transactions which relate to the product or service being supplied. Items of expenses which are related to sales, production or other matters of factory management are the ones dealt with in such accounts. This leads to the exclusion of certain expenses like interest, bad debts and revenue/income from 'other than

the sale of product or service'.

Non-Integrated accounting systems contain fewer accounts as compared to financial accounting system due to the exclusion of purchases, expenses and also Balance Sheet items like fixed assets, debtors and creditors. **Items of accounts which are excluded are represented by an account known as *Cost ledger control account*.**

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

- (a) **Cost Ledger** - This is the **principle ledger** of the cost department in which impersonal accounts are recorded. This ledger is made self-balancing by maintaining therein a Control Account for each subsidiary ledger.
- (b) **Stores Ledger** - It contains an account for each item of stores. The entries in each account maintained in this ledger are made from the invoice, goods received note, material requisitions, material received note etc. Accounts in respect of each item of stores show receipt, issue and balance in physical as well as in monetary terms.
- (c) **Work-in-Process Ledger** - This ledger is also known as **job ledger**, it contains accounts of unfinished jobs and processes. All material costs, wages and overheads for each job in process are posted to the respective job accounts in this ledger. The balance in a job account represents total balance of job/work-in-process, as shown by the job account.
- (d) **Finished Goods Ledger** - It contains an account for each item of finished product manufactured or the completed job. If the finished product is transferred to stock, a credit entry is made in the work-in-process ledger and a corresponding debit entry is made in this ledger.

2.1 Principal Accounts

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

- (1) **Cost Ledger Control Account** - This account is also known as **General Ledger Adjustment Account**. **This account is made to complete double entry.** All items of expenditure are credited to this account. Sales are debited to this account and net profit/loss from Costing Profit & Loss

Account is transferred to this account. The balance in this account at the end of the particular period represents the net total of all the balances of the impersonal accounts.

- (2) **Stores Ledger Control Account** – This account is **debited for the purchase of material and credited for issue of materials from the stores**. The balance in this account indicates the total balance of all the individual stores accounts. Abnormal losses or gains if any in this account are transferred to Costing Profit & Loss Account. Entries are made on the basis of goods received notes and stores requisitions etc.
- (3) **Wages Control Account** - This account is **debited with total wages paid (direct and indirect)**. Direct wages are further transferred to Work-in-Process Control Account and indirect wages to Production Overhead; Administration Overhead or Selling & Distribution Overhead Control Accounts, as the case may be. Wages paid for abnormal idle time are transferred to Costing Profit & Loss Account either directly or through Abnormal Loss Account.
- (4) **Manufacturing/Production/Works/ Factory Overhead Control Account** - This account is **debited with indirect costs of production** such as indirect material, indirect employee, indirect expenses (carriage inward etc.). **Overhead recovered (absorbed) is credited to this Account**. The difference between overhead incurred and overhead recovered (i.e. Under Absorption or Over Absorption of Overheads) is transferred to Overheads Adjustment Account.
- (5) **Work-in-Process Control Account** - This account is **debited with the total cost of production**, which includes—direct materials, direct employee, direct expenses, production overhead recovered, and is credited with the amount of finished goods completed and transferred. The balance in this account represents total balances of jobs/works-in-process, as shown by several job accounts.
- (6) **Administrative Overhead Control Account** - This account is **debited with overheads incurred and credited with overhead recovered**. The overhead recovered are debited to Finished Goods Control Account, if administrative overhead is related with production activities otherwise to Cost of Sales A/c.

The difference between administrative overheads incurred and recovered is transferred to Overhead Adjustment Account.

- (7) **Finished Goods Control Accounts** - This account is **debited with the value of goods transferred from Work-in-process Control Account and administration costs recovered (if relates to production activities)**. This account is credited with Cost of Sales Account. The balance of this account represents the value of goods unsold at the end of the period.
- (8) **Selling and Distribution Overhead Control Account** - This account is debited with selling and distribution overheads incurred and credited with the selling and distribution overheads recovered. The difference between overheads incurred and recovered is transferred usually to Overhead Adjustment Account.
- (9) **Cost of Sales Account** - This account is **debited with the cost of finished goods transferred from Finished Goods Control Account for sale, General Administrative overhead recovered, Selling and distribution overhead recovered**. The balance of this account is ultimately transferred to Sales Account or Costing Profit & Loss Account.
- (10) **Costing Profit & Loss Account** – This account is debited with cost of sales, under-absorbed overheads and abnormal losses and is credited with sales value, over-absorbed overhead and abnormal gains. The net profit or loss in this account is transferred to Cost Ledger Control Account.
- (11) **Overhead Adjustment Account** - This account is to be **debited for under-recovery of overhead and credited with over-recovery of overhead amount**. The net balance in this account is transferred to Costing Profit & Loss Account.

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

2.2 Scheme of Accounting Entries

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

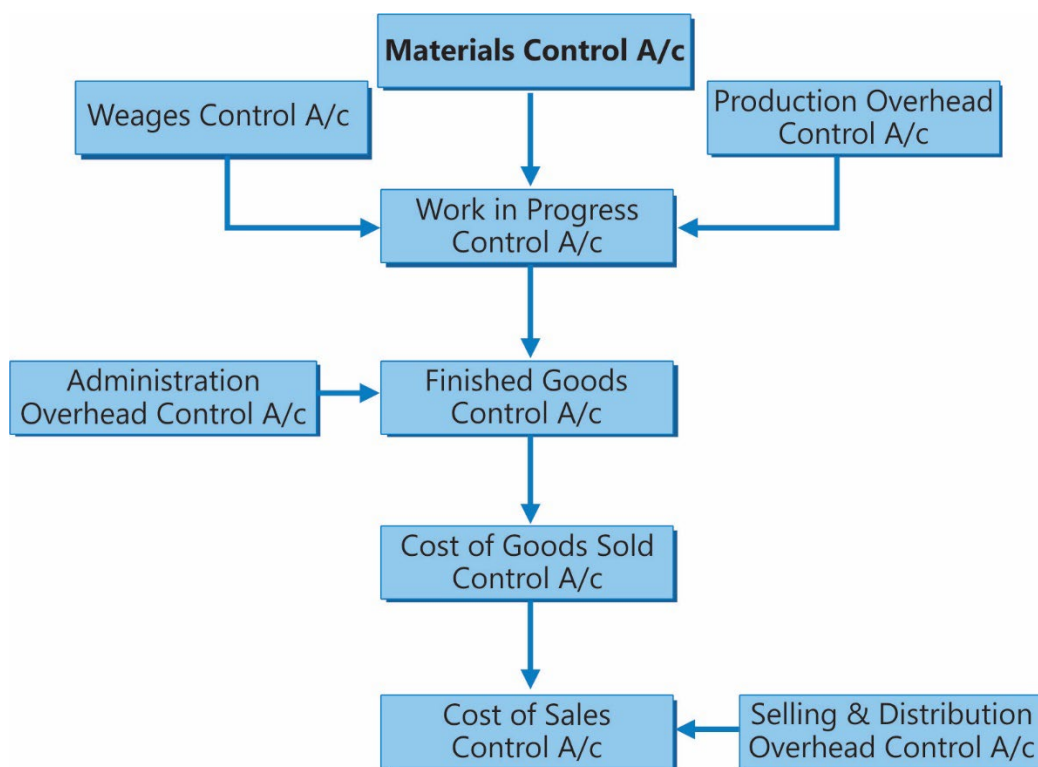
Material:			(₹)	(₹)
(a)	Purchase—₹ 5,000 (credit or cash)			
	(i) Material Control A/c	Dr.	5,000	
	To Cost Ledger Control A/c			5,000
	(ii) Stores Ledger Control A/c	Dr.	5,000	
	To Material Control A/c			5,000
Note: Sometimes Material Control Account is dispensed with and entries are directly made into Stores Ledger Control A/c, giving a credit to Cost Ledger Control A/c.				
(b)	Purchases worth ₹ 500 for special job			
	Work-in-Process Ledger Control A/c.....	Dr.	500	
	To Cost Ledger Control A/c			500
(c)	Material returned to vendor—₹ 500			
	Cost Ledger Control A/c	Dr.	500	
	To Store Ledger Control A/c			500
(d)	(i) Material (Direct) issued to production—₹ 1,000			
	Work-in-Process Control A/c.....	Dr.	1,000	
	To Store Ledger Control A/c			1,000
	(ii) Material (Indirect) issued to production—₹ 200			
	Production Overhead Control A/c.....	Dr.	200	
	To Store Ledger Control A/c			200
(e)	(i) Material worth ₹ 200 returned from shop to stores			
	Stores Ledger Control A/c.....	Dr.	200	
	To Work-in-Process Control A/c			200
	(ii) Material worth ₹ 100 is transferred from Job-1 to Job- 2			
	Job- 2 A/c.....	Dr.	100	
	To Job- 1 A/c			100

(f)	Material worth ₹ 100 is issued from stores for re-pairs			
	Production Overhead Control A/c.....	Dr.	100	
	To Stores Ledger Control A/c			100
Labour:				
(g)	Direct wages paid to workers— ₹ 1,000			
	Wages Control A/c.....	Dr.	1,000	
	To Cost Ledger Control A/c			1,000
(h)	Indirect wages paid to workers in the production— ₹ 700			
(i)	Wages Control A/c.....	Dr.	700	
	To Cost Ledger Control A/c			700
(ii)	Production Overhead Control A/c.....	Dr.	700	
	To Wages Control A/c			700
(i)	Indirect wages paid to workers in administration— ₹ 500			
(i)	Wages Control A/c.....	Dr.	500	
	To Cost Ledger Control A/c			500
(ii)	Administration Overhead A/c.....	Dr.	500	
	To Wages Control A/c			500
(j)	Indirect wages paid to workers in Selling & Dist. department— ₹ 300			
(i)	Wages Control A/c.....	Dr.	300	
	To Cost Ledger Control A/c			300
(ii)	Selling & Dist. Overhead A/c.....	Dr.	300	
	To Wages Control A/c			300
Direct Expenses:				
(k)	Direct expenses incurred ₹ 500 for Job No. 12			
	Job No. 12 A/c (WIP Control A/c).....	Dr.	500	
	To Cost Ledger Control A/c			500

Overheads:				
(l)	Overhead expenses incurred ₹ 500 (Production ₹150; Administrative ₹150; Selling and Distribution ₹200)			
	Production Overhead Control A/c.....	Dr.	150	
	Administrative Overhead Control A/c.....	Dr.	150	
	Selling & Dist. Overhead Control A/c.....	Dr.	200	
	To Cost Ledger Control A/c			500
(m)	Carriage Inward (Direct to Factory) —₹ 100			
	Production Overhead Control A/c.....	Dr.	100	
	To Cost Ledger Control A/c			100
(n)	Production overhead recovered—₹ 1,000			
	Work-in-Process Ledger Control A/c.....	Dr.	1,000	
	To Production Overhead Control A/c			1,000
(o)	Administrative Overhead recovered ₹ 500 from finished goods			
	Cost of Sales A/c.....	Dr.	500	
	To Administrative Overhead Control A/c			500
(p)	Selling and Distribution Overhead ₹ 100 recovered from sales			
	Cost of Sales A/c.....	Dr.	100	
	To Selling & Dist. Overhead Control A/c			100
(q)	Under recovery of overheads			
	Costing Profit & Loss A/c.....	Dr.	xxx	
	To Administrative Overhead Control A/c			xxx
(r)	Over recovery of overheads			
	Production Overheads Control A/c.....	Dr.	xxx	
	To Costing Profit & Loss A/c			xxx

Sales:				
(s)	Cost Ledger Control A/c.....	Dr.	xxx	
	To Costing Profit & Loss A/c			xxx
Profit/ Loss:				
(t)	In case of Profit			
(i)	Costing Profit & Loss A/c.....	Dr.	xxx	
	To Cost Ledger Control A/c			xxx
(u)	In case of Loss			
(ii)	Cost Ledger Control A/c.....	Dr.	xxx	
	To Costing Profit & Loss A/c			xxx

Non-Integrated Accounting System-flowchart



**In the diagram administrative overhead is assumed to be related with production activity. In case of general administration expenses, it is treated as a part of Cost of Sales.*

ILLUSTRATION 1

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

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

During the next three months the following items arose:

	(₹)
<i>Finished product (at cost)</i>	2,10,835
<i>Manufacturing Overhead incurred</i>	91,510
<i>Raw Materials purchased</i>	1,23,000
<i>Factory Wages</i>	50,530
<i>Indirect Labour</i>	21,665
<i>Cost of Sales</i>	1,85,890
<i>Material issued to production</i>	1,27,315
<i>Sales returned at Cost</i>	5,380
<i>Material returned to suppliers</i>	2,900
<i>Manufacturing Overhead charged to production</i>	77,200

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

SOLUTION**Journal entries are as follows:**

			Dr. (₹)	Cr. (₹)
1.	Finished stock ledger Control A/c	Dr.	2,10,835	
	To Work-in-Process Control A/c			2,10,835
2.	Manufacturing Overhead Control A/c	Dr.	91,510	
	To Cost Ledger Control A/c			91,510
3.	Stores Ledger Control A/c	Dr.	1,23,000	
	To Cost Ledger Control A/c			1,23,000
4.	(i) Wage Control A/c	Dr.	72,195	
	To Cost Ledger Control A/c			72,195
	(ii) Work-in-Process Control A/c	Dr.	50,530	
	To Wages Control A/c			50,530
	(iii) Manufacturing Overhead Control A/c	Dr.	21,665	
	To Wages Control A/c			21,665
5.	Cost of Sales A/c	Dr.	1,85,890	
	To Finished Stock Ledger A/c			1,85,890
6.	Work-in-Process Control A/c	Dr.	1,27,315	
	To Stores Ledger Control A/c			1,27,315
7.	Finished Stock Ledger Control A/c	Dr.	5,380	
	To Cost of Sales A/c			5,380
8.	Cost Ledger Control A/c	Dr.	2,900	
	To Stores Ledger Control A/c			2,900
9.	Work-in-Process Control A/c	Dr.	77,200	
	To Manufacturing Overhead Control A/c			77,200

COST LEDGERS**Cost Ledger Control Account**

Particulars	(₹)	Particulars	(₹)
To Stores Ledger Control A/c (return)	2,900	By Balance b/d	6,65,220
" Balance c/d	9,49,025	" Manufacturing OH Control A/c	91,510
		" Stores Ledger Control A/c	1,23,000
		" Wages Control A/c	72,195
	9,51,925		9,51,925

Stores Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	3,01,435	By Work in Process Control A/c	1,27,315
" Cost Ledger Control A/c	1,23,000	" Cost Ledger Control A/c	2,900
		" Balance c/d	2,94,220
	4,24,435		4,24,435

Wages Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	72,195	By Work in Process Control A/c	50,530
		" Manufacturing OH Control A/c	21,665
	72,195		72,195

Manufacturing Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	91,510	By Balance b/d	10,525
" Wages Control A/c	21,665	" Work in Process Control A/c	77,200
		" Balance c/d	25,450
	1,13,175		1,13,175

Work-in-Process Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,22,365	By Finished Stock Ledger Control A/c	2,10,835
" Wages Control A/c	50,530	" Balance c/d	1,66,575
" Stores Ledger Control A/c	1,27,315		
" Manufacturing OH Control A/c	77,200		
	3,77,410		3,77,410

Finished Stock Ledger Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	2,51,945	By Cost of Sales Control A/c	1,85,890
" Work in Process Control A/c	2,10,835	" Balance c/d	2,82,270
" Cost of Sales Control A/c (Return at cost)	5,380		
	4,68,160		4,68,160

Cost of Sales Account

Particulars	(₹)	Particulars	(₹)
To Finished Stock Ledger Control	1,85,890	By Finished Stock Ledger Control (Return)	5,380
		" Balance c/d	1,80,510
	1,85,890		1,85,890

Trial Balance

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	2,94,220	
Work-in-Process Control A/c	1,66,575	
Finished Stock Ledger Control A/c	2,82,270	
Manufacturing Overhead Control A/c	25,450	
Cost of Sales A/c	1,80,510	
Cost Ledger Control A/c		9,49,025
	9,49,025	9,49,025

ILLUSTRATION 2

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

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

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

	(₹)
<i>Materials purchased</i>	4,80,100
<i>Materials issued to jobs</i>	4,77,400
<i>Materials to works maintenance</i>	41,200
<i>Materials to administrative office</i>	3,400
<i>Materials to sales department</i>	7,200
<i>Wages Direct</i>	1,49,300
<i>Wages Indirect</i>	65,000
<i>Transportation for Indirect Materials</i>	8,400
<i>Production Overheads incurred</i>	2,42,250
<i>Absorbed Production Overheads</i>	3,59,100
<i>Administrative Overheads incurred</i>	74,000
<i>Administrative Overheads allocated to production</i>	52,900
<i>Administrative Overheads allocated to sales department</i>	14,800
<i>Selling & Distribution overheads incurred</i>	64,200
<i>Selling & Distribution overheads absorbed</i>	82,000
<i>Finished goods produced</i>	9,58,400
<i>Finished goods sold</i>	9,77,300
<i>Sales</i>	14,43,000

Make up the various accounts as you envisage in the Cost Ledger and PREPARE a Trial Balance as at 30th September.

SOLUTION

Cost Ledgers
Material Control A/c*

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,24,000	By Work-in-process Control A/c	4,77,400
" Cost Ledger Control A/c (purchase)	4,80,100	" Production OH Control A/c	41,200
		" Admn. OH Control A/c	3,400
		" S&D OH Control A/c	7,200
		" Balance c/d	74,900
	6,04,100		6,04,100

*Material Control A/c may also be written as Stores Ledger Control A/c

Wages Control A/c

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	2,14,300	By Work-in-process Control A/c	1,49,300
		" Production OH Control A/c	65,000
	2,14,300		2,14,300

Production Overhead Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	8,400	By Work-in-process Control A/c	3,59,100
" Cost Ledger Control A/c:			
- Transportation	8,400		
- Production OH	2,42,250		
" Wages Control A/c	65,000		
" Material Control A/c	41,200	" Balance c/d	6,150
	3,65,250		3,65,250

Administrative Overhead Control A/c

Particulars	(₹)	Particulars	(₹)
To Cost Ledger Control A/c	74,000	By Balance b/d	12,000
" Material Control A/c:	3,400	" Finished Goods Control A/c	52,900
" Balance c/d	2,300	" Cost of sales A/c	14,800
	79,700		79,700

Work-in-Process Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	62,500	By Finished goods Control A/c	9,58,400
" Material Control A/c	4,77,400		
" Wages Control A/c	1,49,300		
" Production OH Control A/c	3,59,100		
		" Balance c/d	89,900
	10,48,300		10,48,300

Finished Goods Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	1,24,000	By Cost of Sales A/c	9,77,300
" Administrative Overhead Control A/c	52,900		
" Work-in-process Control A/c	9,58,400	" Balance c/d	1,58,000
	11,35,300		11,35,300

Selling and Distribution Overhead Control A/c

Particulars	(₹)	Particulars	(₹)
To Balance b/d	6,250	By Cost of Sales A/c	82,000
" Cost Ledger Control A/c:	64,200		
" Material Control A/c	7,200		
" Balance c/d	4,350		
	82,000		82,000

Cost of Sales A/c

Particulars	(₹)	Particulars	(₹)
To Finished Goods Control A/c	9,77,300	By Costing P&L A/c	10,74,100
" Admn. OH Control A/c	14,800		
" S&D OH Control A/c	82,000		
	10,74,100		10,74,100

Cost Ledger Control A/c

Particulars	(₹)	Particulars	(₹)
To Costing P&L A/c (Sales)	14,43,000	By Balance b/d	3,13,150
		" Material Control A/c	4,80,100
		" Wages Control A/c (₹1,49,300+₹65,000)	2,14,300
		" Production OH Control A/c (₹8,400+₹2,42,250)	2,50,650
		" Administrative OH A/c	74,000
		" S&D OH Control A/c	64,200
" Balance c/d	3,22,300	" Costing P&L A/c	3,68,900
	17,65,300		17,65,300

Costing Profit & Loss A/c

Particulars	(₹)	Particulars	(₹)
To Cost of sales A/c	10,74,100	By Cost Ledger Control A/c (sales)	14,43,000
" Cost Ledger Control A/c (profit) (balancing figure)	3,68,900		
	14,43,000		14,43,000

Trial Balance as at 30th September

	Dr. (₹)	Cr. (₹)
Material Control A/c	74,900	
Production OH Control A/c	6,150	
Administrative OH Control A/c		2,300
Selling & Distribution OH Control A/c		4,350
Work-in-process Control A/c	89,900	
Finished Goods Control A/c	1,58,000	
Cost Ledger Control A/c		3,22,300
	3,28,950	3,28,950



3. INTEGRATED (OR INTEGRAL) ACCOUNTING SYSTEM

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

3.1 Advantages

The main advantages of Integrated Accounts are as follows:

- (a) **No need for Reconciliation**- The question of reconciling costing profit and financial profit does not arise, as there is only one figure of profit.
- (b) **Less efforts**- Due to use of one set of books, there is a significant saving in efforts made.
- (c) **Less time consuming**- No delay is caused in obtaining information as it is provided from books of original entry.
- (d) **Economical process**- It is economical also as it is based on the concept of "Centralisation of Accounting function".

3.2 Essential pre-requisites for Integrated Accounts

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

1. The management's decision about the extent of integration of the two sets of books. Some concerns find it useful to integrate up to the stage of prime cost or factory cost while other prefers full integration of the entire accounting records.
2. A suitable coding system must be made available so as to serve the accounting purposes of financial and cost accounts.
3. An agreed routine, with regard to the treatment of provision for accruals, prepaid expenses, other adjustment necessary for preparation of interim accounts.
4. Perfect coordination should exist between the staff responsible for the financial and cost aspects of the accounts and an efficient processing of accounting documents should be ensured.

Under this system there is no need for a separate cost ledger. Of course, there will be a number of subsidiary ledgers; in addition to the useful Customers' Ledger and the Purchase Ledger, there will be: (a) Stores Ledger; (b) Stock Ledger and (c) Job Ledger.

3.3 Features of Integrated Accounting System

Following are the main points of integrated accounting:

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

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

- (a) Bank account
- (b) Receivables (Debtors) account
- (c) Payables (Creditors) account
- (d) Provision for depreciation account etc.

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

- (a) Bank account
- (b) Receivables (Debtors) account
- (c) Payables (Creditors) account
- (d) Provision for depreciation account
- (e) Fixed assets account
- (f) Share capital account

If the illustration given below is to be worked out on integrated account basis, the journal entries would be as follows:

ILLUSTRATION 3

JOURNALISE the following transactions assuming that cost and financial transactions are integrated:

	(₹)
<i>Raw materials purchased</i>	<i>2,00,000</i>
<i>Direct materials issued to production</i>	<i>1,50,000</i>
<i>Wages paid (30% indirect)</i>	<i>1,20,000</i>
<i>Wages charged to production</i>	<i>84,000</i>
<i>Manufacturing expenses incurred</i>	<i>84,000</i>
<i>Manufacturing overhead charged to production</i>	<i>92,000</i>
<i>Selling and Distribution costs</i>	<i>20,000</i>
<i>Finished products (at cost)</i>	<i>2,00,000</i>
<i>Sales</i>	<i>2,90,000</i>
<i>Closing stock</i>	<i>Nil</i>
<i>Receipts from debtors</i>	<i>69,000</i>
<i>Payments to creditors</i>	<i>1,10,000</i>

SOLUTION

Journal entries are as follows:

		DR. (₹)	CR. (₹)
Stores Ledger Control A/c.....	Dr.	2,00,000	
To Payables (Creditors)/ Bank A/c			2,00,000
(Materials purchased)			
Work-in-Process Control A/c.....	Dr.	1,50,000	
To Stores Ledger Control A/c			1,50,000
(Materials issued to production)			
Wages Control A/c.....	Dr.	1,20,000	
To Bank A/c			1,20,000
(Wages paid)			

Factory Overhead Control A/c..... To Wages Control A/c (30% of wages paid being indirect charged to overhead)	Dr.	36,000	36,000
Work-in-Process Control A/c..... To Wages Control A/c (Direct wages charged to production)	Dr.	84,000	84,000
Factory Overhead Control A/c..... To Bank A/c (Manufacturing overhead incurred)	Dr.	84,000	84,000
Work-in-Process Control A/c..... To Factory Overhead Control A/c (Manufacturing overhead charged to production)	Dr.	92,000	92,000
Selling & Distribution Overhead Control A/c..... To Bank A/c (Selling and Distribution costs incurred)	Dr.	20,000	20,000
Finished Goods Control A/c..... To Work-in-Process Control A/c (Cost of finished goods)	Dr.	2,00,000	2,00,000
Cost of Sales A/c..... To Finished Goods Control A/c To Selling and Distribution Control A/c (Costs of sales)	Dr.	2,20,000	2,00,000 20,000
Receivables (Debtors)/ Bank A/c..... To Sales A/c (Finished goods sold)	Dr.	2,90,000	2,90,000
Bank A/c..... To Receivables (Debtors) A/c (Receipts from receivables)	Dr.	69,000	69,000
Payables (Creditors) A/c..... To Bank A/c (Payment made to payables)	Dr.	1,10,000	1,10,000

ILLUSTRATION 4

In the absence of the Chief Accountant, you have been asked to prepare a month's cost accounts for a company which operates a batch costing system fully integrated with the financial accounts. The following relevant information is provided to you:

	(₹)	(₹)
Balances at the beginning of the month:		
Stores Ledger Control Account		25,000
Work-in-Process Control Account		20,000
Finished Goods Control Account		35,000
Prepaid Production Overheads brought forward from previous month		3,000
Transactions during the month:		
Materials Purchased		75,000
Materials Issued:		
To production	30,000	
To factory maintenance	4,000	34,000
Materials transferred between batches		5,000
Total wages paid:		
To direct workers	25,000	
To indirect workers	5,000	30,000
Direct wages charged to batches		20,000
Recorded non-productive time of direct workers		5,000
Selling and Distribution Overheads Incurred		6,000
Other Production Overheads Incurred		12,000
Sales		1,00,000
Cost of Finished Goods Sold		80,000
Cost of Goods completed and transferred into finished goods during the month		65,000
Physical value of work-in-Process at the end of the month		40,000

The production overhead absorption rate is 150% of direct wages charged to work-in-Process.

Required:

PREPARE the following accounts for the month:

- (a) Stores Ledger Control Account.
- (b) Work-in-Process Control Account.
- (c) Finished Goods Control Account.
- (d) Production Overhead Control Account.
- (e) Costing Profit and Loss Account.

SOLUTION

(a) Stores Ledger Control Account

	(₹)		(₹)
To Balance b/d	25,000	By Work in Process Control A/c	30,000
" Creditors/ Bank A/c	75,000	" Production OH Control A/c	4,000
		" Balance c/d	66,000
	1,00,000		1,00,000

(b) Wages Control Account

	(₹)		(₹)
To Bank A/c (Paid to direct workers)	25,000	By Work in Process Control A/c (Charged to batches)	20,000
" Bank A/c (Paid to indirect workers)	5,000	" Production OH Control A/c	5,000
		" Production OH Control A/c (Non-productive wages)	5,000
	30,000		30,000

(c) Production Overhead Control Account

	(₹)		(₹)
To Balance b/d (Prepaid amount)	3,000	By Work-in-Process Control A/c (150% of direct wages)	30,000
" Stores Ledger Control A/c	4,000		
" Wages Control A/c (₹5,000 + ₹5,000)	10,000		
" Bank A/c	12,000		
" Costing P&L A/c (Over-absorption, balancing figure)	1,000		
	30,000		30,000

(d) Work-in-Process Control Account

	(₹)		(₹)
To Balance b/d	20,000	By Finished Goods Control A/c	65,000
" Store Ledger Control A/c	30,000	" Balance c/d (Physical value)	40,000
" Wages Control A/c	20,000		
" Production OH Control A/c (150% of direct wages)	30,000		
" Costing P&L A/c (Stock Gains)	5,000		
	1,05,000		1,05,000

(e) Finished Goods Control Account

	(₹)		(₹)
To Balance b/d	35,000	By Cost of Goods Sold* A/c	80,000
" Work-in-Process Control A/c	65,000	" Balance c/d	20,000
	1,00,000		1,00,000

* Alternatively, Costing Profit & Loss Account

(f) Costing Profit & Loss Account

	(₹)		(₹)
To Finished Goods Control A/c or Cost of Goods Sold A/c	80,000	By Sales A/c	1,00,000
" Selling & Distribution OH A/c	6,000	" Production OH Control A/c	1,000
" Balance c/d	20,000	" Work-in-Process Control A/c (Stock gain)	5,000
	1,06,000		1,06,000

Notes:

- (1) Materials transferred between batches will not affect the Control Accounts.
- (2) Non-production time of direct workers is a production overhead and therefore will not be charged to work-in-Process Control A/c.
- (3) Production overheads absorbed in work-in-Process Control A/c equals to ₹ 30,000 (150% of ₹ 20,000).
- (4) In the work-in-Process Control A/c the excess physical value of stock is taken resulting in stock gain. Stock gain is transferred to Profit & Loss A/c.

ILLUSTRATION 5

A fire destroyed some accounting records of a company. You have been able to collect the following from the spoilt papers/records and as a result of consultation with accounting staff for the month of January:

(i) Incomplete Ledger Entries:

Materials Control A/c

	(₹)		(₹)
To Balance b/d	32,000		

Work-in-Process Control A/c

	(₹)		(₹)
To Balance b/d	9,200	By Finished Goods Control A/c	1,51,000

Payables (Creditors) A/c

	(₹)		(₹)
To Balance c/d	19,200	By Balance b/d	16,400

Manufacturing Overheads Control A/c

	(₹)		(₹)
To Bank A/c (Amount spent)	29,600		

Finished Goods Control A/c

	(₹)		(₹)
To Balance b/d	24,000	By Balance c/d	30,000

(ii) *Additional Information:*

- (1) *The bank-book showed that ₹ 89,200 have been paid to creditors for raw-material.*
- (2) *Ending inventory of work-in-process included materials of ₹ 5,000 on which 300 direct labour hours have been booked against wages and overheads.*
- (3) *The job card showed that workers have worked for 7,000 hours. The wage rate is ₹ 10 per labour hour.*
- (4) *Overhead recovery rate was ₹ 4 per direct labour hour.*

You are required to COMPLETE the above accounts in the cost ledger of the company.

SOLUTION

Materials Control A/c

	(₹)		(₹)
To Balance b/d		By Work-in-process control A/c	53,000
Cost Ledger Control A/c	32,000		
" Payables (Creditors) A/c (Purchases)	92,000	" Balance c/d	71,000
	1,24,000		1,24,000

Manufacturing Overheads A/c

	(₹)		(₹)
To Bank A/c (amount spent)	29,600	By Work-in-process control A/c (₹4 × 7,000 hours)	28,000
		" Costing P/L A/c (Under-absorbed OH)	1,600
	29,600		29,600

Work-in-Process Control A/c

	(₹)		(₹)
To Balance b/d	9,200	By Finished Goods Control A/c	1,51,000
" Wages Control A/c (₹10 × 7,000 hours)	70,000	" Balance c/d:	
" Overheads Control A/c (₹4 × 7,000 hours)	28,000	-Material	5,000
		-Wages (₹10 × 300 hours)	3,000
" Materials Control A/c (Balancing figure)	53,000	- Overheads (₹4 × 300 hours)	<u>1,200</u>
	1,60,200		9,200
			1,60,200

Finished Goods Control A/c

	(₹)		(₹)
To Balance b/d	24,000	By Cost of sales A/c (Bal. fig.)	1,45,000
" Work-in-process Control A/c (as above)	1,51,000	" Balance c/d	30,000
	1,75,000		1,75,000

Payables (Creditors) A/c

	(₹)		(₹)
To Bank A/c	89,200	By Balance b/d	16,400
" Balance c/d	19,200	" Material Control A/c (Purchases) (Balancing fig.)	92,000
	1,08,400		1,08,400



4. RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

When the cost and financial accounts are kept separately, it is imperative that these should be reconciled to make the cost accounts reliable. It is necessary for reconciliation of the two sets of accounts that sufficient details are available to locate the differences and the reasons for the same. It is, therefore, important that in the financial accounts, the expenses should be analysed in the same way as in the cost accounts.

The General Ledger Adjustment Account in the Cost Ledger may be studied to know the items which are included here and how differently these are presented in the financial accounts. **The reconciliation of the balances of two sets of accounts is possible by preparing a Memorandum Reconciliation Account.** In this account, the items charged in one set of accounts but not in the other or those charged in excess as compared to the other are identified and collected. These items of differences are either added or subtracted from the profit as shown by one of the accounts. Finally the profits from two sets of accounts are reconciled. The procedure is similar to those which are followed for reconciling bank balance as per bank ledger with the balance as shown in bank statement.

It is important, however, to know the causes which, generally, give rise to differences in the Cost and Financial Accounts. These are briefly summarised below:

4.1 Causes of differences in Financial and Cost Accounts

1. Items included in Financial Accounts only-

(a) *Purely Financial Expenses:*

- (i) Interest on loans or bank mortgages.
- (ii) Expenses and discounts on issue of shares, debentures etc.
- (iii) Other capital losses i.e., loss by fire not covered by insurance etc.
- (iv) Losses on the sales of fixed assets and investments
- (v) Income tax, donations, subscriptions
- (vi) Expenses of the company's share transfer office, if any.

(b) *Purely Financial Income*

- (i) Interest received on bank deposits, loans and investments
- (ii) Dividends received
- (iii) Profits on the sale of fixed assets and investments
- (iv) Transfer fee received.
- (v) Rent receivables

2. Item included in Cost Accounts only (notional expenses):

- (i) Charges in lieu of rent where premises are owned
- (ii) Interest on capital at notional figure though not incurred
- (iii) Salary for the proprietor at notional figure though not incurred
- (iv) Notional Depreciation on the assets fully depreciated for which book value is nil.

3. Items whose treatment is different in the two sets of accounts: The objective of cost accounting is to provide information to management for decision making and control purposes while financial accounting conforms to external reporting requirements. Hence there are chances that certain items are treated differently in the two sets of accounts. For example, LIFO method for inventory valuation is not recommended by Accounting Standards for Financial Reporting purpose but this method may be adopted for cost accounting purpose if management feels it suitable for making any decision. Similarly cost accounting may use a different method of depreciation than what is allowed under financial accounting.

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

4.2 Procedure for Reconciliation

There are 3 steps involved in the procedure for reconciliation.

1. Ascertainment of profit as per Financial Accounts



2. Ascertainment of profit as per Cost Accounts



3. Reconciliation of both the profits

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

ILLUSTRATION 6

The following figures are available from the financial records of ABC Manufacturing Co. Ltd. for the year ended 31st March.

	(₹)
Sales (20,000 units)	25,00,000
Materials	10,00,000
Wages	5,00,000
Factory Overheads	4,50,000
Administrative Overhead (production related)	2,60,000
Selling and Distribution Overheads	1,80,000
Finished goods (1,230 units)	1,50,000

	(₹)	(₹)
<i>Work-in-Process:</i>		
<i>Materials</i>	30,000	
<i>Labour</i>	20,000	
<i>Factory overheads</i>	20,000	70,000
<i>Goodwill written off</i>		2,00,000
<i>Interest on loan taken</i>		20,000

In the Costing records, factory overhead is charged at 100% of wages, administrative overhead 10% of factory cost and selling and distribution overhead at the rate of ₹ 10 per unit sold.

PREPARE a statement reconciling the profit as per cost records with the profit as per financial records.

SOLUTION

Profit & Loss Account of ABC Manufacturing Co. Ltd. (for the year ended 31st March)

	(₹)		(₹)
To Opening Stock	-	By Sales (20,000 units)	25,00,000
" Materials	10,00,000	" Closing Stock:	
" Wages	5,00,000	Finished goods (1,230 units)	1,50,000
" Factory Overheads	4,50,000	Work-in-Process	70,000
" Admn. Overheads	2,60,000		
" S&D Overheads	1,80,000		
" Goodwill written off	2,00,000		
" Interest on loan	20,000		
" Net Profit	1,10,000		
	27,20,000		27,20,000

Cost Sheet

	(₹)
Materials	10,00,000
Wages	5,00,000
Direct Expenses	Nil
Prime Cost	15,00,000
Add: Factory Overhead @ 100% of wages	5,00,000
Gross Factory Cost	20,00,000
Less: Closing WIP	(70,000)
Factory Cost of (20,000 + 1,230) units	19,30,000
Add: Admn. Overhead @ 10% of Factory cost	1,93,000
	21,23,000
Less: Closing Stock of finished goods (1,230 units)	(1,23,000)*
Cost of Goods sold (20,000 units)	20,00,000
Add: Selling & Dist. Overhead @ ₹ 10 per unit	2,00,000
Cost of sales (20,000 units)	22,00,000
Sales of 20,000 units	25,00,000
Profit	3,00,000

* (₹21,23,000 × 1,230 units/ 21,230 units)

Reconciliation Statement

	(₹)	(₹)
Profit as per Cost Accounts		3,00,000
Add: Factory overheads over-absorbed (₹ 5,00,000 – ₹ 4,50,000)	50,000	
Selling & Dist. Overhead over-absorbed (₹ 2,00,000 – ₹ 1,80,000)	20,000	
Difference in the valuation of closing stock of finished goods (₹ 1,50,000 – ₹ 1,23,000)	27,000	97,000
		3,97,000

Less: Admn. overhead under-absorbed (₹ 2,60,000 – ₹ 1,93,000)	67,000	
Goodwill written off	2,00,000	
Interest on loan	20,000	2,87,000
Profit as per financial accounts		1,10,000

ILLUSTRATION 7

Following are the figures extracted from the Cost Ledger of a manufacturing unit.

	(₹)
Stores:	
Opening balance	15,000
Purchases	80,000
Transfer from WIP	40,000
Issue to WIP	80,000
Issue to repairs and maintenance	10,000
Sold as a special case at cost	5,000
Shortage in the year	3,000
Work-in-Process:	
Opening inventory	30,000
Direct labour cost charged	30,000
Overhead cost charged	1,20,000
Closing Balance	20,000
Finished Products:	
Entire output is sold at 10% profit on actual cost from Work-in-Process.	
Others:	
Wages for the period	35,000
Overhead Expenses	1,25,000

ASCERTAIN the profit or loss as per financial account and cost accounts and reconcile them.

SOLUTION**Stores Ledger Control A/c**

	(₹)		(₹)
To Balance b/d	15,000	By Work-in-Process Control A/c (Issued to WIP)	80,000
" Cost Ledger Control A/c (Purchases)	80,000	" Overhead Control A/c (Issued for repairs)	10,000
" Work-in-Process Control A/c (Return from WIP)	40,000	" Cost Ledger Control A/c (Sold at cost)	5,000
		" Overheads Control A/c* (Shortages)	3,000
		" Balance c/d	37,000
	1,35,000		1,35,000

* Assumed normal

Wages Control A/c

	(₹)		(₹)
To Cost Ledger Control A/c	35,000	By Work-in-process Control A/c	30,000
		" Overhead Control A/c	5,000
	35,000		35,000

Overhead Control A/c

	(₹)		(₹)
To Stores Ledger Control A/c	10,000	By Work-in-Process Control A/c	1,20,000
" Stores Ledger Control A/c	3,000		
" Cost Ledger Control A/c	1,25,000		
" Wages Control A/c	5,000	" Balance c/d	23,000
	1,43,000		1,43,000

WIP Control A/c

	(₹)		(₹)
To Balance b/d	30,000	By Stores Ledger Control A/c	40,000
" Stores Ledger Control A/c	80,000	" Finished Goods Control A/c	2,00,000*
" Wages Control A/c	30,000		
" Overheads Control A/c	1,20,000	" Balance c/d	20,000
	2,60,000		2,60,000

* Finished output at cost 2,00,000

Profit at 10% on actual cost from WIP Sales 20,000

2,20,000

Statement of Profit as per Costing Records

	(₹)
Direct Material Cost (₹80,000 – ₹40,000)	40,000
Direct wages	30,000
Prime Cost	70,000
Production Overheads	1,20,000
Works Cost	1,90,000
Add: Opening WIP	30,000
	2,20,000
Less: Closing WIP	(20,000)
Cost of finished goods	2,00,000
Profit (10% of cost)	20,000
Sales	2,20,000

Profit & Loss A/c

	(₹)		(₹)
To Material (Op. bal. + Purchases - Sale)	90,000	By Sales A/c	2,20,000
" Opening WIP	30,000	" Closing WIP	20,000
" Wages for the period	35,000	" Closing stock of Raw Material	37,000
" Overheads expenses	1,25,000	" Net loss	3,000
	2,80,000		2,80,000

Reconciliation Statement

	(₹)
Profit (loss) as per Financial Accounts	(3,000)
Add: Overheads over absorbed (refer Overhead control A/c)	23,000
Net Profit as per Cost Accounts	20,000

ILLUSTRATION 8

The following figures have been extracted from the Financial Accounts of a manufacturing firm for the first year of its operation:

	(₹)
<i>Direct Material Consumption</i>	50,00,000
<i>Direct Wages</i>	30,00,000
<i>Factory Overheads</i>	16,00,000
<i>General Administrative Overheads</i>	7,00,000
<i>Selling and Distribution Overheads</i>	9,60,000
<i>Bad Debts</i>	80,000
<i>Preliminary expenses written off</i>	40,000
<i>Legal Charges</i>	10,000

Dividends Received	1,00,000
Interest received on Deposits	20,000
Sales (1,20,000 units)	1,20,00,000
Closing Stock:	
Finished Goods (4,000 units)	3,20,000
Work-in-Process	2,40,000

The cost accounts for the same period reveal that the direct material consumption was ₹ 56,00,000. Factory overhead is recovered at 20% on prime cost. Administration overhead is recovered at ₹ 6 per unit of goods sold. Selling and Distribution overheads are recovered at ₹ 8 per unit sold.

PREPARE the Profit and Loss Accounts both as per financial records and as per cost records. RECONCILE the profits as per the two records.

SOLUTION

Profit and Loss Account

(As per financial records)

	(₹)		(₹)
To Direct Material	50,00,000	By Sales (1,20,000 units)	1,20,00,000
" Direct Wages	30,00,000	" Closing Stock	
" Factory Overheads	16,00,000	Work-in-process	2,40,000
" Gross Profit c/d	29,60,000	Finished Goods (4,000 units)	3,20,000
	1,25,60,000		1,25,60,000
" General Administrative Overheads	7,00,000	" Gross Profit b/d	29,60,000
" Selling and Dist. OH	9,60,000	" Dividend received	1,00,000

"	Bad debts	80,000	"	Interest received	20,000
"	Preliminary Expenses written off	40,000			
"	Legal Charges	10,000			
"	Net Profit	12,90,000			
		30,80,000			30,80,000

Statement of Cost and Profit*(As per Cost Records)*

	(₹)
Direct Material	56,00,000
Direct Wages	30,00,000
Prime Cost	86,00,000
Factory Overhead (20% of ₹86,00,000)	17,20,000
	1,03,20,000
Less: Closing Stock (WIP)	(2,40,000)
Works Cost or Cost of production (1,24,000 units)	1,00,80,000
Less: Finished Goods (4,000 units @ ₹81.29)	(3,25,160)
Cost of goods sold (1,20,000 units)	97,54,840
Administrative Overhead (1,20,000 units @ ₹ 6 p.u.)	7,20,000
Selling and Distribution Overhead (1,20,000 @ ₹ 8 p.u.)	9,60,000
Cost of Sales	1,14,34,840
Net profit (Balancing figure)	5,65,160
Sales Revenue	1,20,00,000

Statement of Reconciliation of profit as obtained under Cost and Financial Accounts

	(₹)	(₹)
Profit as per Cost Records		5,65,160
<i>Add:</i> Excess of Material Consumption	6,00,000	
Factory Overhead	1,20,000	
Administrative Overhead	20,000	
Dividend Received	1,00,000	
Interest Received	20,000	8,60,000
		14,25,160
<i>Less:</i> Bad debts	80,000	
Preliminary expenses written off	40,000	
Legal Charges	10,000	
Over-valuation of stock in cost book (₹ 3,25,160 – ₹ 3,20,000)	5,160	(1,35,160)
Profit as per Financial Records		12,90,000

SUMMARY

- ♦ **Cost Control Accounts:** These are accounts maintained for the purpose of exercising control over the costing ledgers and also to complete the double entry in cost accounts.
- ♦ **Integral System of Accounting:** A system of accounting where both costing and financial transactions are recorded in the same set of books.
- ♦ **Non-Integral System of Accounting:** A system of accounting where two sets of books are maintained-(i) for Costing transactions; and (ii) for Financial transactions
- ♦ **Reconciliation:** In the Non-Integral System of Accounting, since the cost and financial accounts are kept separately, it is imperative that those should be reconciled; otherwise the cost accounts would not be reliable. The reason for differences in the cost & financial accounts can be of purely financial nature (Income and expenses) and notional nature.

TEST YOUR KNOWLEDGE

Multiple Choice Questions (MCQs)

1. *Under the Non-integrated accounting system*
 - (a) *Same ledger is maintained for cost and financial accounts by accountants*
 - (b) *Separate ledgers are maintained for cost and financial accounts*
 - (c) *(a) and (b) both*
 - (d) *None of the above*
2. *Notional costs*
 - (a) *May be included in Integrated accounts*
 - (b) *May be included in Non- integrated accounts*
 - (c) *Cannot be included in Non-integrated accounts*
 - (d) *None of the above*

3. *Under Non-integrated accounting system, the account made to complete double entry is*
 - (a) *Stores ledger control account*
 - (b) *Work in progress control account*
 - (c) *Finished goods control account*
 - (d) *General ledger adjustment account*
4. *Integrated systems of accounts are maintained*
 - (a) *In separate books of accounts for costing and financial accounting purposes*
 - (b) *In same books of accounts*
 - (c) *Both (a) & (b)*
 - (d) *None of the above*
5. *Under Non-integrated system of accounting, purchase of raw material is debited to which account*
 - (a) *Material control account / Stores ledger control account*
 - (b) *General ledger adjustment account*
 - (c) *Purchase account*
 - (d) *None of the above*
6. *Under Non-integrated accounts, if materials worth ₹ 1,500 are purchased for a special job, then which account will be debited:*
 - (a) *Special job account / Work in Process account*
 - (b) *Material Control account*
 - (c) *Cost Control account*
 - (d) *None of the above*

7. Which account is to be debited if materials worth ₹ 500 are returned to vendor under Non-integrated accounts:
- (a) Cost ledger control account
 - (b) Finished goods control account
 - (c) WIP control account
 - (d) None of the above
8. Which of the following items is included in cost accounts?
- (a) Notional rent
 - (b) Donations
 - (c) Transfer to general reserve
 - (d) Rent receivable
9. When costing loss is ₹ 5,600, administrative overhead under-absorbed being ₹ 600, the loss as per financial accounts should be
- (a) ₹ 5,600
 - (b) ₹ 6,200
 - (c) ₹ 5,000
 - (d) None of the above
10. Which of the following items should be added to costing profit to arrive at financial profit?
- (a) Over-absorption of works overhead
 - (b) Interest paid on debentures
 - (c) Income tax paid
 - (d) All of the above

Theoretical Questions

1. EXPLAIN what are the essential pre-requisites of Integrated Accounting System.
2. STATE what are the advantages of Integrated Accounting.

3. *EXPLAIN* why is it necessary to reconcile the Profits between the Cost Accounts and Financial Accounts.
4. *STATE* what are the reasons for disagreement of profits as per Cost Accounts and Financial Accounts. Discuss.
5. *LIST* the Financial expenses which are not included in Cost.
6. *STATE* when is the Reconciliation statement of Cost and Financial accounts not required.

Practical Problems

1. The following incomplete accounts are furnished to you for the month ended 31st October, 2022.

Stores Ledger Control Account		
1.10.2022	To Balance	₹ 54,000
Work in Process Control Account		
1.10. 2022	To Balance	₹ 6,000
Finished Goods Control Account		
1.10. 2022	To Balance	₹ 75,000
Factory Overheads Control Account		
Total debits for October, 2022		₹ 45,000
Factory Overheads Applied Account		
Cost of Goods Sold Account		
Creditors for Purchases Account		
1.10. 2022	By Balance	₹ 30,000

Additional information:

- (i) The factory overheads are applied by using a budgeted rate based on direct labour hours. The budget for overheads for 2022 is ₹ 6,75,000 and the budget of direct labour hours is 4,50,000.

- (ii) The balance in the account of creditors for purchases on 31.10.2022 is ₹ 15,000 and the payments made to creditors in October, 2022 amount to ₹ 1,05,000.
- (iii) The finished goods inventory as on 31st October, 2022 is ₹ 66,000.
- (iv) The cost of goods sold during the month was ₹ 1,95,000.
- (v) On 31st October, 2022 there was only one unfinished job in the factory. The cost records show that ₹ 3,000 (1,200 direct labour hours) of direct labour cost and ₹ 6,000 of direct material cost had been charged.
- (vi) A total of 28,200 direct labour hours were worked in October, 2022. All factory workers earn same rate of pay.
- (vii) All actual factory overheads incurred in October, 2022 have been posted.

You are required to FIND:

- (a) Materials purchased during October, 2022.
 - (b) Cost of goods completed in October, 2022.
 - (c) Overheads applied to production in October, 2022.
 - (d) Balance of Work-in-Process Control A/c on 31st October, 2022.
 - (e) Direct Materials consumed during October, 2022.
 - (f) Balance of Stores Ledger Control Account on 31st October, 2022.
 - (g) Over absorbed or under absorbed overheads for October, 2022.
2. A company operates on historic job cost accounting system, which is not integrated with the financial accounts. At the beginning of a month, the opening balances in cost ledger were:

	(₹ in lakhs)
Stores Ledger Control Account	80
Work-in-Process Control Account	20
Finished Goods Control Account	430
Building Construction Account	10
Cost Ledger Control Account	540

During the month, the following transactions took place:

		(₹ in lakh)
Materials	Purchased	40
	Issued to production	50
	Issued to factory maintenance	6
	Issued to building construction	4
Wages	Gross wages paid	150
	Indirect wages	40
	For building construction	10
Works Overheads	Actual amount incurred	160
	(excluding items shown above)	
	Absorbed in building construction	20
	Under absorbed	8
Royalty paid	(related to production)	5
Selling, Distribution and Administration overheads		25
Sales		450

At the end of the month, the stock of raw material and work-in-Process was ₹ 55 lakhs and ₹ 25 lakhs respectively. The loss arising in the raw material accounts is treated as factory overheads. The building under construction was completed during the month. Company's gross profit margin is 20% on sales.

PREPARE the relevant control accounts to record the above transactions in the cost ledger of the company.

3. Dutta Enterprises operates an Integral system of accounting. You are required to PASS the Journal Entries for the following transactions that took place for the year ended 31st March.

(Narrations are not required.)

	(₹)
Raw Materials purchased (50% on Credit)	6,00,000
Materials issued to production	4,00,000
Wages paid (50% Direct)	2,00,000
Wages charged to production	1,00,000
Factory Overheads incurred	80,000
Factory Overheads charged to production	1,00,000
Selling and Distribution Overheads incurred	40,000
Finished Goods at cost	5,00,000
Sales (50% Credit)	7,50,000
Closing stock	Nil
Receipts from debtors	2,00,000
Payments to creditors	2,00,000

4. The following information is available from the financial books of a company having a normal production capacity of 60,000 units for the year ended 31st March:

- (i) Sales ₹ 10,00,000 (50,000 units).
- (ii) There was no opening and closing stock of finished units.
- (iii) Direct Material and Direct Wages cost were ₹ 5,00,000 and ₹ 2,50,000 respectively.
- (iv) Actual factory expenses were ₹ 1,50,000 of which 60% are fixed.
- (v) Actual Administrative expenses were ₹ 45,000 which are completely fixed.
- (vi) Actual Selling and Distribution expenses were ₹ 30,000 of which 40% are fixed.
- (vii) Interest and dividends received ₹ 15,000.

You are required to:

- (a) FIND OUT profit as per financial books for the year ended 31st March;
- (b) PREPARE the cost sheet and ascertain the profit as per cost accounts for the year ended 31st March assuming that the indirect expenses are absorbed on the basis of normal production capacity; and
- (c) PREPARE a statement reconciling profits shown by financial and cost books.

5. M/s. H.K. Piano Company showed a net loss of ₹ 4,16,000 as per their financial accounts for the year ended 31st March. The cost accounts, however, disclosed a net loss of ₹ 3,28,000 for the same period. The following information were revealed as a result of scrutiny of the figures of both the sets of books:

		(₹)
(i)	Factory Overheads under-recovered	6,000
(ii)	Administration Overheads over-recovered	4,000
(iii)	Depreciation charged in financial accounts	1,20,000
(iv)	Depreciation recovered in costs	1,30,000
(v)	Interest on investment not included in costs	20,000
(vi)	Income-tax provided	1,20,000
(vii)	Transfer fees (credit in financial books)	2,000
(viii)	Stores adjustment (credit in financial books)	2,000

PREPARE a Memorandum reconciliation account.

ANSWERS

Answers to the MCQs

1.	(b)	2.	(b)	3.	(d)	4.	(b)	5.	(a)	6.	(a)
7.	(a)	8.	(a)	9.	(b)	10.	(a)				

Answers to the Theoretical Questions

1. Please refer paragraph 3.2
2. Please refer paragraph 3.1
3. Please refer paragraph 4
4. Please refer paragraph 4.1
5. Please refer paragraph 4.1
6. Please refer paragraph 4.2

Answers to the Practical Problems

1. Working Notes:

- (i) Overhead recovery rate per direct labour hour:

Budgeted Factory Overheads = ₹ 6,75,000

Budgeted Direct Labour hours = 4,50,000

$$\begin{aligned}\text{Overhead recovery rate} &= \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Labour hours}} \\ &= \frac{\text{₹ 6,75,000}}{4,50,000 \text{ hours}} \\ &= \text{₹ 1.50 per direct labour}\end{aligned}$$

- (ii) Direct Wage rate per hour:

Direct Labour cost of WIP = ₹ 3,000

(on 31st October 2022)

Direct labour hours of WIP = 1,200 hours

$$\begin{aligned}\text{Direct wage rate per hour} &= \frac{\text{Direct labour cost on WIP}}{\text{Direct labour hours on WIP}} \\ &= \frac{\text{₹ 3,000}}{1,200 \text{ hours}} = \text{₹ 2.50}\end{aligned}$$

- (iii) Total Direct Wages charged to production:

Total direct labour hours spent on production × Direct wage rate per hour

$$= 28,200 \text{ hours} \times \text{₹ 2.50} = \text{₹ 70,500}$$

(a) Material purchased during October, 2022

	(₹)
Payment made to creditors	1,05,000
Add: Closing balance in the account of creditors for purchase	15,000
Less: Opening balance	(30,000)
Material Purchased	90,000

(b) Cost of Finished Goods in October, 2022

	(₹)
Cost of goods sold during the month	1,95,000
Add: Closing finished goods inventory	66,000
Less: Opening finished goods inventory	(75,000)
Cost of goods completed during the month	1,86,000

(c) Overhead applied to production in October, 2022

$$= 28,200 \text{ hours} \times ₹ 1.50 = ₹ 42,300$$

(d) Balance of Work-in-Process on 31st October, 2022

	(₹)
Direct material cost	6,000
Direct labour cost	3,000
Overheads (₹ 1.50 × 1,200 hours)	1,800
	10,800

(e) Direct material consumed during October, 2022 = ₹ 78,000

(Refer to following Accounts)

Work in Process Control A/c

	(₹)		(₹)
To Balance b/d	6,000	By Finished goods control A/c [Refer (b) above]	1,86,000
" Wages Control A/c [Refer working note (iii)]	70,500	" Balance c/d [Refer (d) above]	10,800

"	Factory OH Control A/c [Refer (c) above]	42,300		
"	Material consumed (Balancing fig.)	78,000		
		1,96,800		1,96,800

(f) **Balance of Stores Control Account on 31st October, 2022 = ₹ 66,000**

(Refer to following Account)

Stores Ledger Control Account

	(₹)		(₹)
" Balance b/d	54,000	By Work-in-process Control A/c [Refer (e) above]	78,000
" Payables (Creditors) A/c [Refer (a) above]	90,000	" Balance c/d (Balancing fig.)	66,000
	1,44,000		1,44,000

(g) **Over-absorbed or under-absorbed overheads for October, 2022:**
Balance in Factory Overhead Account below showing that ₹ 2,700 is under-absorbed.

Factory Overhead Account

	(₹)		(₹)
To Bank A/c	45,000	By Work-in-process Control A/c (Factory OH applied)	42,300
		" Costing P/L A/c (Under-absorbed)	2,700
	45,000		45,000

2.

Cost Ledger Control A/c*Amount (₹ in lakhs)*

	(₹)		(₹)
To Costing P&L A/c	450	By Balance b/d	540
" Building Construction A/c	44	" Stores Ledger Control A/c	40
" Balance c/d	483	" Wages Control A/c	150
		" Works OH Control A/c	160
		" Royalty A/c	5
		" Admn. OH and S&D OH A/c	25
		" Costing P&L A/c	57
	977		977

Stores Ledger Control A/c

	(₹)		(₹)
To Balance b/d	80	By Work-in-Process A/c	50
" Cost Ledger Control A/c	40	" Works OH Control A/c	6
		" Building Const. A/c	4
		" Works OH Control A/c (Bal. fig.) (loss)	5
		" Balance c/d	55
	120		120

Wages Control A/c

	(₹)		(₹)
To Cost Ledger Control A/c	150	By Works OH Control A/c	40
		" Building Const. A/c	10
		" Work-in-process Control A/c (Balancing figure)	100
	150		150

Works Overhead Control A/c

	(₹)		(₹)
To Stores Ledger Control A/c	6	By Building Const. A/c	20
" Wages Control A/c	40	" Work-in-process Control A/c (Balancing figure)	183
" Cost Ledger Control A/c	160	" Costing P&L A/c (under-absorption)	8
" Store Ledger Control A/c (loss)	5		
	211		211

Royalty A/c

	(₹)		(₹)
To Cost Ledger Control A/c	5	By Work-in-process Control A/c	5
	5		5

Work-in-Process Control A/c

	(₹)		(₹)
To Balance b/d	20	By Finished Goods Control A/c (Balancing figure)	333
" Stores Ledger Control A/c	50		
" Wages Control A/c	100		
" Works OH Control A/c	183		
" Royalty A/c	5	" Balance c/d	25
	358		358

Finished Goods Control A/c

	(₹)		(₹)
To Balance b/d	430	By Cost of Goods Sold A/c (80% of ₹ 450)	360
" Work-in-process Control A/c	333	" Balance c/d	403
	763		763

Cost of Goods Sold A/c

	(₹)		(₹)
To Finished Goods Control A/c	360	By Cost of sales A/c	360
	360		360

Selling, Distribution and Administration Overhead A/c

	(₹)		(₹)
To Cost Ledger Control A/c	25	By Cost of sales A/c	25
	25		25

Cost of Sales A/c

	(₹)		(₹)
To Cost of Goods Sold	360	By Costing P&L A/c	385
" Admn. OH and S&D OH A/c	25		
	385		385

Costing P & L A/c

	(₹)		(₹)
To Cost of Sales A/c	385	By Cost Ledger Control A/c (Sales)	450
" Works Overhead Control A/c	8		
" Cost Ledger Control A/c (Profit) (Balancing figure)	57		
	450		450

Building Construction A/c

	(₹)		(₹)
To Balance b/d	10	By Cost Ledger Control A/c	44
" Stores Ledger Control A/c	4		
" Wages Control A/c	10		
" Works OH Control A/c	20		
	44		44

Trial Balance*(₹ in lakhs)*

	Dr. (₹)	Cr. (₹)
Stores control A/c	55	
Work-in-Process A/c	25	
Finished Goods A/c	403	
Cost Ledger Adjustment A/c		483
	483	483

3. Journal entries are as follows:

		Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c.....	Dr.	6,00,000	
To Payables (Creditors) A/c			3,00,000
To Cash or Bank			3,00,000
Work-in-Process Control A/c.....	Dr.	4,00,000	
To Stores Ledger Control A/c			4,00,000
Wages Control A/c.....	Dr.	2,00,000	
To Bank A/c			2,00,000
Factory Overhead Control A/c.....	Dr.	1,00,000	
To Wages Control A/c			1,00,000
Work-in-Process Control A/c.....	Dr.	1,00,000	
To Wages Control A/c			1,00,000
Factory Overhead Control A/c.....	Dr.	80,000	
To Bank A/c			80,000
Work-in-Process Control A/c.....	Dr.	1,00,000	
To Factory Overhead Control A/c			1,00,000
Selling and Dist. Overhead Control A/c	Dr.	40,000	
To Bank A/c			40,000
Finished Goods Control A/c.....	Dr.	5,00,000	
To Work-in-Process Control A/c			5,00,000
Cost of Sales A/c.....	Dr.	5,40,000	
To Finished Goods Control A/c			5,00,000
To Selling and Distribution Control A/c			40,000
Receivables (Debtors) A/c.....	Dr.	3,75,000	
Bank or Cash A/c.....	Dr.	3,75,000	
To Sales A/c			7,50,000
Bank A/c.....	Dr.	2,00,000	
To Receivables (Debtors) A/c			2,00,000
Payables (Creditors) A/c.....	Dr.	2,00,000	
To Bank A/c			2,00,000

4. (a)

Profit & Loss Account
(for the year ended 31st March)

	(₹)		(₹)
To Direct Material	5,00,000	By Sales (50,000 units)	10,00,000
" Direct Wages	2,50,000	" Interest and dividends	15,000
" Factory expenses	1,50,000		
" Administrative expenses	45,000		
" Selling & Dist. Expenses	30,000		
" Net Profit	40,000		
	10,15,000		10,15,000

(b)

Cost Sheet
(for the year ended 31st March)

	(₹)	(₹)
Direct Material		5,00,000
Direct Wages		2,50,000
Prime cost		7,50,000
<i>Factory expenses:</i>		
Variable (40% of ₹ 1,50,000)	60,000	
Fixed (₹ 90,000 × 50,000/60,000)	75,000	1,35,000
Works cost/ Cost of production		8,85,000

Administrative expenses: (₹ 45,000 × 50,000/60,000)		37,500
<i>Selling & Distribution expenses:</i>		
Variable (60% of ₹ 30,000)	18,000	
Fixed* (₹ 12,000 × 50,000/60,000)	10,000	28,000
Cost of Sales		9,50,500
Profit (Balancing figure)		49,500
Sales revenue		10,00,000

*It is assumed that the company sells what it generally produces i.e. normal production.

(c) **Statement of Reconciliation**
(Reconciling profit shown by Financial and Cost Accounts)

	(₹)	(₹)
Profit as per Cost Account		49,500
<i>Add : Income from interest and dividends</i>		15,000
		64,500
<i>Less: Factory expenses under-charged in Cost Accounts (₹ 1,50,000 – ₹ 1,35,000)</i>	15,000	
<i>Administrative expenses under-charged in Cost Accounts (₹ 45,000 – ₹ 37,500)</i>	7,500	
<i>Selling & distribution expenses under-charged in Cost Accounts (₹ 30,000 – ₹ 28,000)</i>	2,000	(24,500)
Profit as per Financial Accounts		40,000

5. Memorandum Reconciliation Account

	(₹)		(₹)
To Net loss as per costing books	3,28,000	By Administration Overhead- over-recovered in costs	4,000
" Factory Overheads under-recovered in costs	6,000	" Depreciation overcharged in costs	10,000
" Income-tax not provided in costs	1,20,000	" Interest on investments not included in costs	20,000
		" Transfer fees in financial books	2,000
		" Stores adjustment	2,000
		" Net loss as per financial books	4,16,000
	4,54,000		4,54,000