INTERMEDIATE

Paper 8

COST ACCOUNTING

Study Notes

SYLLABUS 2022

The Institute of Cost Accountants of India

CMA Bhawan, 12, Sudder Street, Kolkata - 700 016

www.icmai.in

First Edition	:	August 2022
Revised Edition	:	February 2024
Revised Edition	:	October 2024
Reprint	:	January 2025

Price: ₹ 600.00

Published by :

Directorate of Studies
The Institute of Cost Accountants of India
CMA Bhawan, 12, Sudder Street, Kolkata - 700 016
studies@icmai.in

Printed at:

M/S. Infinity Advertising Services Pvt. Ltd.
Plot No. 171 & 172, Sector-58, Faridabad,
Haryana - 121004

Copyright of these Study Notes is reserved by the Institute of Cost Accountants of India and prior permission from the Institute is necessary for reproduction of the whole or any part thereof.

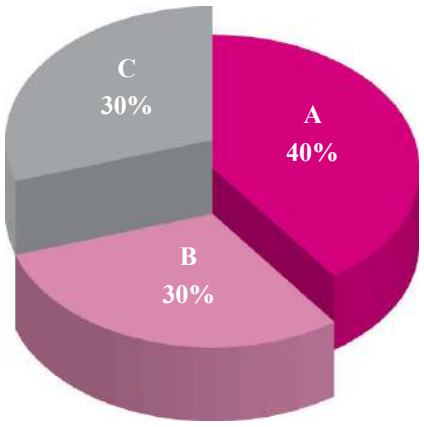
Copyright © 2025 by **The Institute of Cost Accountants of India**

PAPER 8 : COST ACCOUNTING

Syllabus Structure:

The syllabus comprises the following topics and study weightage:

Module No.	Module Description	Weight
Section A: Introduction to Cost Accounting		**40%**
1	Introduction to Cost Accounting	**5%**
2	Cost Ascertainment – Elements of Cost	**15%**
3	Cost Accounting Standards (CAS 1 to CAS 24)	**10%**
4	Cost Book Keeping	**10%**
Section B: Methods of Costing		**30%**
5	Methods of Costing	**30%**
Section C: Cost Accounting Techniques		**30%**
6	Cost Accounting Techniques	**30%**



Learning Environment – Paper 8

Subject Title	**COST ACCOUNTING**
Subject Code	**CA**
Paper No.	**8**
Course Description	The subject, Cost Accounting, introduces the fundamental concepts of cost, cost accounting and costing and carefully builds up a detail understanding of various elements of costs and the techniques for ascertainment, controlling and monitoring of costs. It also highlights different industry specific costing methods to accumulate total costs with due compliance of the Cost Accounting Standards that provide the framework for such tasks. The subject also focuses on the details of alternative cost bookkeeping processes, integration or reconciliation with financial accounting system used in organisations. It enumerates various techniques of costing to facilitate managerial decision making on cost optimisation, profit planning and control.
CMA Course Learning Objectives (CMLOs)	1. Interpret and appreciate emerging national and global concerns affecting organisations and be in a state of readiness for business management. a. Identify emerging national and global forces responsible for enhanced/varied business challenges. b. Assess how far these forces pose threats to the status-quo and creating new opportunities. c. Find out ways and means to convert challenges into opportunities. 2. Acquire skill sets for critical thinking, analyses and evaluations, comprehension, syntheses, and applications for optimization of sustainable goals. a. Be equipped with the appropriate tools for analyses of business risks and hurdles. b. Learn to apply tools and systems for evaluation of decision alternatives with a 360-degree approach. c. Develop solutions through critical thinking to optimize sustainable goals. 3. Develop an understanding of strategic, financial, cost and risk-enabled performance management in a dynamic business environment. a. Study the impacts of dynamic business environment on existing business strategies. b. Learn to adopt, adapt and innovate financial, cost and operating strategies to cope up with the dynamic business environment. c. Come up with strategies and tactics that create sustainable competitive advantages. 4. Learn to design the optimal approach for management of legal, institutional, regulatory and ESG frameworks, stakeholders' dynamics; monitoring, control, and reporting with application-oriented knowledge. a. Develop an understanding of the legal, institutional and regulatory and ESG frameworks within which a firm operates. b. Learn to articulate optimal responses to the changes in the above frameworks. c. Appreciate stakeholders' dynamics and expectations, and develop appropriate reporting mechanisms to address their concerns. 5. Prepare to adopt an integrated cross functional approach for decision management and execution with cost leadership, optimized value creations and deliveries. a. Acquire knowledge of cross functional tools for decision management.

	b. Take an industry specific approach towards cost optimization, and control to achieve sustainable cost leadership. c. Attain exclusive knowledge of data science and engineering to analyze and create value.
Subject Learning Objectives [SLOB(s)]	1. To develop a detail understanding of the fundamental concepts associated with cost and costing under the broader domain of Cost Accounting Standards. (CMLO 2a, 3a, 5a) 2. To attain in-depth knowledge about element-wise cost ascertainment with a detail coverage of inventory management and control and apportionment of overheads costs. (CMLO 2b 5b) 3. To obtain a detail understanding of the framework suggested by Cost Accounting Standards for cost ascertainment, cost accounting and reporting. (CMLO 4a, b, c) 4. To provide a conceptual framework of the cost record keeping and its integration with financial accounting (CMLO 4a) 5. To appreciate various cost accumulation processes designed with due consideration to the nature of output. (CMLO 3b) 6. To attain adequate knowledge to apply costing techniques in decision management and appreciate control techniques for cost optimization. (CMLO 3c, 5b)
Subject Learning Outcome [SLOC(s)] and Application Skill [APS]	**SLOC(s)** 1. Students would be able to ascertain costs elementwise and then perform accumulation of costs following the appropriate costing technique within a given organisational set-up. 2. Students would be able to attain abilities to maintain cost records and perform accounting as per the policies adopted by the organisation and in compliance with the framework suggested by Cost Accounting Standards. 3. They will accomplish abilities to appropriately advise and guide the leadership team for informed judgement, taking and executing decisions by providing necessary inputs through comparative analyses of alternative courses of action. 4. They will attain skills to apply tools such as standard costing and budgetary controls to pinpoint the areas of inefficiency and guide management to take appropriate corrective actions. **APS** 1. Students will be able to determine the total cost of a product or service by applying appropriate costing technique. 2. They will perform cost bookkeeping as per the policy adopted by the firm and in compliance with relevant standards. 3. They will prepare customised reports through evaluation of alternative courses of actions and present the same for final decision by management. 4. They will maintain necessary records and reports to ensure compliance with the provisions of relevant Cost Accounting Standards. 5. Students will be equipped to apply several tools for monitoring and controlling product and service costs and enable management to take corrective actions. .

Module wise Mapping of SLOB(s)			
Module No.	**Topics**	**Additional Resources (Research Paper, Books, Case Studies, Blogs etc.)**	**SLOB Mapped**
1	**Introduction to Cost Accounting**	Introduction to Management and Cost Accounting - Colin Drury (8th edition) Part One (Unit One) https://books.google.co.in/books	To develop a detail understanding of the fundamental concepts associated with cost and costing under the broader domain of Cost Accounting Standards.
2	**Cost Ascertainment – Elements of Cost**	Generally accepted cost accounting principles. https://icmai.in/upload/CASB/2015/GACAP-Final.pdf	To attain in-depth knowledge about element-wise cost ascertainment with a detail coverage of inventory management and control and apportionment of overheads costs.
3	**Cost Accounting Standards**	https://icmai.in/CASB/casb-about.php (ICAI resources available in the website). https://icmai.in/upload/CASB/2015/GACAP-Final.pdf (ICAI resources available in the website).	To obtain a detail understanding of the framework suggested by Cost Accounting Standards for cost ascertainment, cost accounting and reporting.
4	**Cost Book Keeping and Records**	https://icmai.in/CASB/casb-about.php (ICAI resources available in the website).	
5	**Methods of Costing**	Cost Accounting: Foundations and Evolutions (Eighth Edition) - Michael R. Kinney, Cecily A. Raiborn.	To appreciate various cost accumulation processes designed with due consideration to the nature of output.
6	**Cost Accounting Techniques**	Horngren's Cost Accounting: A Managerial Emphasis – Datar & Rajan Pearson Publication	To attain adequate knowledge to apply costing techniques in decision management and appreciate control techniques for cost optimization.

Contents as per Syllabus

SECTION A: INTRODUCTION TO COST ACCOUNTING 01 - 292

Module 1. Introduction to Cost Accounting 3-58

1.1. Introduction
1.2. Important Cost Accounting Terms
1.3. Elements of Cost
1.4. Classification of Cost
1.5. Preparation of Cost Sheet and Ascertainment of Profit

Module 2. Cost Ascertainment – Elements of Cost 59-222

2.1 Material Costs
- 2.1.1 Procurement of Materials
- 2.1.2 Inventory Management and Control
- 2.1.3 Inventory Accounting and Valuation
- 2.1.4 Physical Verification, Slow and Non-moving Stock and Treatment of Losses
- 2.1.5 Scrap, Spoilage, Defectives and Wastages

2.2 Employee Costs
- 2.2.1 Time Keeping, Time Booking and Payroll
- 2.2.2 Principles and Methods of Remuneration and Incentive Schemes
- 2.2.3 Overtime and Idle Time
- 2.2.4 Employee Cost Reporting
- 2.2.5 Labour Turnover

2.3 Direct Expenses
- 2.3.1 Definition and Examples
- 2.3.2 Nature of Direct Expense
- 2.3.3 Direct vs. Indirect Expense

2.4 Overheads
- 2.4.1 Collection, Classification, Apportionment and Allocation of Overheads
- 2.4.2 Absorption and Treatment of Over or Under Absorption of Overheads
- 2.4.3 Reporting of Overheads Costs

Module 3. Cost Accounting Standards (CAS 1 to CAS 24) 223-246

Contents as per Syllabus

Module 4. Cost Book Keeping **247-292**

4.1 Cost Book - Keeping
4.2 Reconciliation of Costing and Financial Profit
4.3 Integrated Accounting System

SECTION B: METHODS OF COSTING **293-430**

Module 5. Methods of Costing **295-430**

5.1 Job Costing
5.2 Batch Costing
5.3 Contract Costing
5.4 Process Costing – Normal and Abnormal Losses, Equivalent Production, Inter-process Profit, Joint and By Products
5.5 Operating Costing – Transport, Hotel and Healthcare

SECTION C: COST ACCOUNTING TECHNIQUES **431-588**

Module 6. Cost Accounting Techniques **433-588**

6.1 Marginal Costing
- 6.1.1 Concept of Marginal Cost and Marginal Costing
- 6.1.2 Absorption Costing vs. Marginal Costing
- 6.1.3 Cost - Volume - Profit (CVP) Analysis
- 6.1.4 Margin of Safety
- 6.1.5 Application of Marginal Costing for Decision Making

6.2 Standard Costing and Variance Analysis
- 6.2.1 Concept of Standard Cost and Standard Costing
- 6.2.2 Advantages and Limitations
- 6.2.3 Computation and Analysis of Variances (Material and Labour Costs only)

6.3 Budget and Budgetary Control
- 6.3.1 Concepts, Types of Budget
- 6.3.2 Budgetary Control vs. Standard Costing
- 6.3.3 Advantages and Limitations
- 6.3.4 Preparation of Budgets

SECTION-A

Introduction to Cost Accounting

Introduction to Cost Accounting 1

This Module Includes

1.1 Introduction

1.2 Important Cost Accounting Terms

1.3 Elements of Cost

1.4 Classification of Cost

1.5 Preparation of Cost Sheet and Ascertainment of Profit

Introduction to Cost Accounting

SLOB Mapped against the Module:

To develop a detail understanding of the fundamental concepts associated with cost and costing. (CMLO 2a, 3a, 5a)

Module Learning Objectives:

After studying this module, the students will be able to –

- Conceptualize the nature and scope of Cost Accounting
- Distinguish the characteristic features of Financial Accounting, Cost Accounting and Management Accounting.
- Understand fundamental role of the three in the operation of an organisation
- Understand the important Cost Accounting terminology
- Contextualize classification cost
- Understand the basic issue of segregation of semi-variable cost into its fixed and variable elements

Introduction

1.1

One important definition of accounting put forward by American Accounting Association reads as follows:

'Accounting is the process of identifying, measuring and communicating economic information to permit informed judgements and decisions by users of the information'.

From the above definition it is obvious that accounting is a process which as its end product, has information that is economically worthwhile for decision making. Further, accounting is concerned with providing both financial and non-financial information that will help decision-makers to make appropriate decisions based on informed judgements. This is pictorially represented as follows:

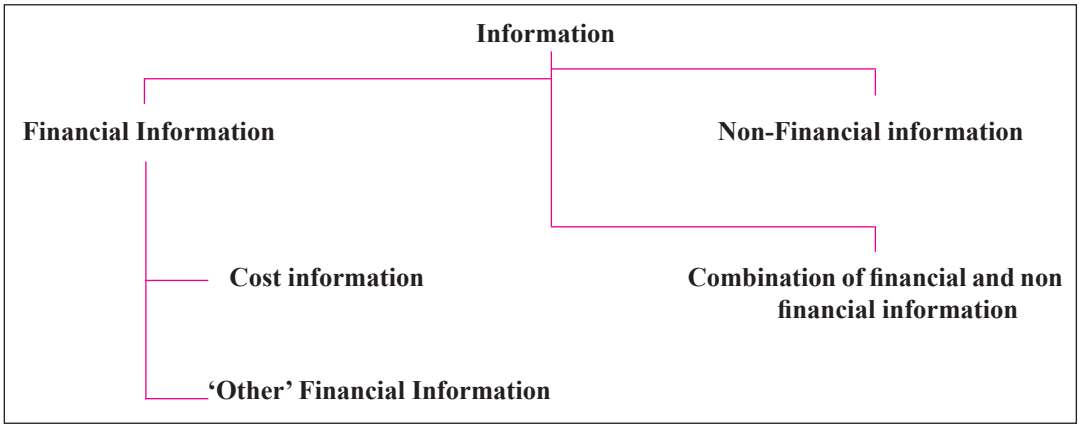


Figure 1.1: Types of Information

Cost information is a type of financial information that is related to the cost of the product or service. Cost Accounting, which is a branch of accounting, deals with the whole gamut of preparation and presentation of cost information. It is important to note that information provided by the cost accounting system[1] is referred as cost information which particularly includes the following:

a. The unit cost of a product, work or service
b. Various elements of cost of a department or a factory or any other cost object.
c. The volume of waste and the technological loses
d. The costs related to the number of activities
e. cost analysis (for decision making)

1. Cost accounting system is the discussed subsequently under 'scope of cost accounting' and also in module 6 of this study note.

it is important to note that;

- **Users of financial information** – Accounting is often referred as a language of the Business which helps the business to communicate with the stakeholders who have an interest in an organization. Thus, the stakeholders of the business are the users of accounting information. These people are categorised as managers, shareholders and potential investors, employees, creditors and the government and each of these groups has its own requirements for information[2]. It is important to note that the stakeholders are either internal (managers, shareholders, employees, creditors) or external (potential investors and government).

  It is important to note that the management accounting is concerned with the provision of information to people within the organization (internal users) to help them make better decisions and improve the efficiency and effectiveness of existing operations, whereas financial accounting is concerned with the provision of information to external users. Thus, management accounting is often related to internal reporting while financial accounting is related to external reporting.

- **Quality of financial information** – the success or failure of an organisation depends to a great extent on the effectiveness and efficiency of the decisions made. For example, during the early period of lockdown brought about by the COVID 19, Mr Keshubhai, a vegetable vendor adjusted to the new normal within few days and started online transactions and home delivery during 7 pm to 8 pm and 7 am to 8 am when lockdown was eased. While Mr Bikram, who sells vegetables in the same Bazar was undecided and waited for the lockdown to end. The decision made by the two vegetable vendors is being made on the basis of the information they possess at the time of making the decision[3].

  Thus, one of the basic aspects of accounting is to generate quality financial information for the users such that they can make efficacious decision making which lead to successful business.

From the above discussion it is apparent that the main purpose of accounting is to create financial information which is used by users (internal and external). There is specific information need of each individual user. While the internal users would require financial information, which would provide information to people within the organization to help them make better decisions and improve the efficiency and effectiveness of existing operations, ultimately leading to a successful business. This is the arena of management accounting and the financial information is referred as cost information for the purpose of this study note. While financial accounting is concerned with the provision of information to users external to the organization.

It is of prime importance to point out that cost accounting and management accounting are often used interchangeably though there is significant difference between the two in respect of the purpose they serve and the scope of the two. Cost accounting discusses the nuances of the process of cost accumulation for fixation of sale price, valuation of inventory and taking other operating decisions. This is required for profit calculation and external reporting, as and when necessary. Whereas management accounting relates to the provision of appropriate information for decision-making, planning, control and performance evaluation. However, a study of the literature reveals that the distinction between cost accounting and management accounting is not clear cut and the two terms are often used synonymously[4].

---

2. Students may note that in Para 9 of Framework for the Preparation and Presentation of Financial Statements in accordance with Indian Accounting Standards issued by ICAI, the users of financial statements and their information needs are mentioned with specificity and in Para 10, the financial information need of Investors are set as the most important information need as it is stated that their information need would suffice the information need of the other users.
3. This is, off course, a non-financial information, and is being used here for the sake of understanding the link between a decision and a success/ failure of a business.
4. For detailed discussion, readers may refer to chapter 1, Management and Cost Accounting, eighth edition by Colin Drury.

1.1.1 Evolution of Cost Accounting

The double entry system of accounting was initiated in 1494 . Since then, till the after period of Industrial Revolution cost accounting remained as a small branch of financial accounting. The need for information on internal operation and the competitive business environment ushered by the Industrial revolution acted as catalyst in the development cost accounting. Firms, such as textile mills and railroads, were compelled to devise internal administrative procedures to coordinate the various operations involved in the performance of the basic activity of conversion of raw materials into finished goods by textile mills and the transportation of passengers and freight by the railroads. During 1880s, the newly formed mass distribution and mass production enterprises adapted the internal accounting reporting systems of the railroads to their own organizations. But all these along with the adaptations were exclusively focussed on direct labour and direct material (prime costs).

The scientific management movement provided a major impetus to the development of cost accounting practices. The period 1880 - 1925 saw the development of complex product designs and the emergence of multi activity diversified corporations like Du Pont, General Motors etc. It was during this period that scientific management was developed which led the accountants to convert physical standards into Cost Standards, the latter being used for variance analysis and control. During the World War I and II the social importance of Cost Accounting grew with the growth of each country's defence expenditure. In the absence of competitive markets for most of the material required for war, the governments in several countries placed cost-plus contracts under which the price to be paid was cost of production plus an agreed rate of profit. The reliance on cost estimation by parties to defence contracts continued after World War II.

In India, prior to independence, there were a few Cost Accountants, and they were qualified mainly from I.C.M.A. (now CIMA) London. During the World War II, the need for developing the profession in the country was felt, and the leadership of forming an Indian Institute was taken by some members of Defence Services employed at Kolkata. However, with the enactment of the Cost and Works Accountants of India Act, 1959, the Institute of Cost Accountants of India (erstwhile The Institute of Cost and Works Accountants of India) was established at Kolkata. The profession assumed further importance in 1968 when the Government of India introduced Cost Audit under section 233(B) of the Companies Act, 1956. At present it is under Section 148 of the Companies Act, 2013. Many times, we use Cost Accounting, Costing and Cost Accountancy interchangeably. But there are subtle differences among these terms. Though the terms are used interchangeably, it is important to know the precise meaning of the terms.

1.1.2. Three Basic Definitions

From discussions in the previous section, it is obvious that cost accounting is a specific branch of the Accounting which caters to the financial (cost) information needs of the users. Cost and management accountancy primarily accommodates the financial information needs of the internal users[8]. But financial accountancy records and reports which culminates in the preparation of financial statements of an organisation is solely targeted towards the financial

---

5. Summa de arithmetica, geometria. Proportioni et proportionalita, a textbook for use in the schools of Northern Italy, was published in Venice in 1494. Though the book is basically on the synthesis of the mathematical knowledge of his time it is also notable for including one of the first published descriptions of the bookkeeping method that Venetian merchants used during the Italian Renaissance, known as the double-entry accounting system.
6. https://archive.org/details/scientificmanage00tayl
7. For a comprehensive understanding of the evolution of cost and management accounting, students are advised to refer The Evolution of Management Accounting by Robert S. Kaplan Source: The Accounting Review, Jul., 1984, Vol. 59, No. 3 (Jul., 1984), pp. 390-418, Published by: American Accounting Association.
8. Though in some specific cases, cost accounting records and reports are used by external users, management accounting is solely cater to the financial information needs of the internal users.

information need of the external users. Thus, it would not be an exaggeration to highlight that cost and management accountancy is specifically aligned to the accomplishment of the strategic goal of an organisation as decision making is the epicentre of strategic success/failure.

Before entering into the nuances of the academic discipline of cost accountancy it is essential to read into the three basic conceptual issues which are discussed in the following lines.

1. **Cost Accountancy:** - Cost Accountancy is the academic discipline of cost accounting and is defined as 'the application of costing and cost accounting principles, methods and techniques to the science and art and practice of cost control and the ascertainment of profitability as well as presentation of information for the purpose of managerial decision making.'

   Four particular points summarizes the above-mentioned definition.

   a. The application of the costing and cost accounting principles is encompassed in cost accountancy.

   b. This application is with specific purpose and that is for the purpose of cost control, ascertainment of profitability.

   c. Cost accountancy is a combination of art and science; it is a science as it has well defined rules and regulations, it is an art as application of any science requires art and it is a practice as it has to be applied on continuous basis and is not a onetime exercise.

   d. Cost accountancy merely caters to the need of the cost information need of the management which facilitate decision making.

2. **Cost accounting** - CIMA Official Terminology defines cost accounting as the process of gathering of cost information and its attachment to cost objects, the establishment of budgets, standard costs and actual costs of operations, processes, activities or products; and the analysis of variances, profitability or the social use of funds. Thus, cost accounting encompasses the following;

   a. One of the main purposes of cost accounting is gathering of cost information related to cost objects. This cost information is then suitably presented to the management which aides them in their decision-making process.

   b. Nuances of cost accounting includes the process of cost accumulation through which the cost of operations, processes or activities or products is calculated. Establishment of standard cost and variance analysis are important aspects[9].

   c. Computation profitability[10] which pivots around fixation of selling price is an important aspect of cost accounting.

3. **Costing** - CIMA Official Terminology specifically states that the use of the term costing is not recommended except with a qualifying adjective, for example standard costing. The term is used in the following connotations; batch costing, continuous operation costing, contract costing, job costing, service costing, specific order costing, absorption costing and marginal costing.

Thus, it is important to note that the term 'costing' is only to be used as a qualifying adjective

1.1.3. Objectives of Cost Accounting:

It is reiterated that the very basic objective of Cost Accounting is preparation and presentation of cost information. The details of the basic objective are summarized in the following lines.

---

9. It is important to note that these are really aspects of management accounting as has been discussed previously. It has also been discussed that the arena of cost accounting and management are often blurred and is not specifically demarcated though the two covers comprehensively different aspects of dealing with cost information.

10. It is important to note that 'social use of funds and 'profitability' have been synonymously used by The Document.

1. To ascertain the cost of production on per unit basis, for example, cost per kg, cost per meter, cost per litre, cost per ton etc.
2. Cost accounting helps in the fixation of selling price. Cost accounting enables to determine the cost of production which helps to fix the selling price.
3. Cost accounting helps in cost control and cost reduction.
4. Ascertainment of division wise, activity wise and unit wise profitability is analysed through cost accounting.
5. Cost accounting also helps in locating wastages, inefficiencies and other gaps in the production processes and services offered.
6. Cost accounting helps in presentation of relevant data to the management which helps in decision making. Decision making is the most important functions of Management which has specific linkages to the strategic success/failure of an organisation.

1.1.4. Scope of Cost Accounting

The scope of cost accounting is broad and is directed into the operations of the organisation. Thus a proper functioning cost accounting system ensures the strategic success/ failure of the organisation.

- **Cost book-keeping**[11] - It involves maintenance of records of all costs incurred from their incurrence to their charge to departments, products and services. Such recording is done on the basis of double entry system.
- **Cost ascertainment -** Ascertaining cost of products, processes, jobs, services, etc., is the important function of cost accounting. Cost ascertainment becomes the basis of managerial decision making such as pricing, planning and control.
- **Cost Analysis** - It involves the process of finding out the causal factors of actual costs varying from the budgeted costs and fixation of responsibility for cost increases.
- **Cost Comparisons -** Cost accounting also encompasses comparisons between cost from alternative courses of action such as use of technology for production, cost of making different products and activities, and cost of same product/ service over a period of time.
- **Cost Control -** Cost accounting also includes the utilization of cost information for exercising control. It involves a detailed examination of each cost in the light of benefit derived from the incurrence of the cost. Thus, cost is analyzed to recognize whether the current level of costs is satisfactory in the light of standards set in advance.
- **Cost Reports** - Presentation of cost is the ultimate function of cost accounting. These reports are primarily for use by the management at different levels. Cost Reports forms the basis for planning and control, performance appraisal and managerial decision making.
- **Cost Audit -** Cost Audit is the verification of correctness of Cost Accounts and check on the adherence to the Cost Accounting plan. Its purpose is not only to ensure the arithmetic accuracy of cost records but also to see the principles and rules have been applied correctly.

1.1.5. Cost Accounting Systems

Systems and procedures are devised for proper accounting for costs. Such a system is referred as a cost accounting system. The design of such a system varies significantly and depends on the type of the product/service of the organisation. As such six types of cost accounting system may be identified. These are listed as under.

---

[11] This is covered in module 4 of this study note.

1. Historical Costing

In this type of costing system, the costs are ascertained only after they have been incurred. The main objective of it is to ascertain costs that have been incurred in past. It is the process of accumulation of costs after they are incurred in a systematic manner. The historical costs are used only for post-mortem examination of actual costs incurred and it would be too late to control. The actual figures can be compared only when the standards of performance exist.

2. Absorption Costing[12]

Under the 'absorption costing system' all fixed and variable costs are allotted to cost units and total overheads are absorbed according to activity level. In absorption costing system, fixed manufacturing overheads are allocated to products, and these are included in stock valuation. Therefore, valuation of inventories of finished goods and work in progress includes manufacturing fixed cost and transferred to next period. Unlike manufacturing fixed overheads, the administrative overheads, selling and distribution overheads are treated as fixed cost and recorded only when they are incurred. It is a traditional form of cost ascertainment. It is based on the principle that costs should be charged or absorbed to whatever is being costed – be it cost unit, cost centre – on the basis of the benefit received from these costs.

3. Direct Costing

It is a method of costing in which the product is charged with only those costs which vary with volume. Variable or direct costs such as direct material, direct labour and variable manufacturing expenses are examples of costs charged to the product. All indirect costs are charged to profit and loss account of the period in which they arise. Indirect costs are disregarded in inventory valuation. This is similar to marginal cost accounting system where costs are classified into fixed and variable costs. Variable costs are charged to unit cost and the fixed costs attributable to the relevant period are written-off in full against the contribution for that period. Contribution margin indicates the recovery of fixed cost before contributing towards the operational profit. This technique is widely used for internal management purpose for decision making rather than for external reporting[13].

4. Standard Costing[14]

Under standard costing system, the ascertainment and use of standard costs and the measurement and analysis of variances is done for control purpose. Standard cost is a predetermined cost which is computed in advance of production on the basis of a specification of all the factors affecting costs and used in Standard Costing. Its main purpose is to provide a base for control through Variance Analysis, for valuation of stock and work-in-progress and, in some cases, for fixing selling prices.

5. Uniform Costing

It is not a distinct method of costing. It is the adoption of identical costing principles and procedures by several units of the same industry or several undertakings by mutual agreement. It facilitates valid comparisons between organizations and helps in elimination of inefficiencies.

Essentials of a Cost Accounting System

A company deploys the cost accounting system to track the raw materials even before the production process begins. Eventually, these raw materials convert into finished goods in real-time. Once the raw materials enter the production, the system tracks and record the use of the materials by crediting the raw material account and debiting

12. This is one of the frequently used cost accounting systems and is used for external reporting purpose, as well.
13. This is discussed in module 6.1 of this study note.
14. This is discussed in module 6.2 of this study note.

the goods in the process account. Thus a suitable cost accounting system will vary according the to the operation of converting raw material into finished goods. But overall, a good cost accounting system should possess the following seven qualities.

1. Cost accounting system should be tailor made, practical, simple and capable of meeting the requirement of a business concern.
2. The data to be used by the cost accounting system should be accurate, otherwise it may distort the output of the system.
3. Necessary cooperation and participation of executives from various departments of the concern is essential for developing a good system of cost accounting.
4. The cost of installing and operating the system should not be too high and ultimately pass the cost-benefit analysis test.
5. The system of costing should not sacrifice the utility by introducing meticulous and unnecessary details.
6. A carefully phased programme should be prepared by using network analysis for the introduction of the system.
7. Management should have a faith in the costing system and should also provide a helping hand for its development and success.

Installation of a Costing Accounting System

Cost accounting system is a system that accumulates costs, assigns them to cost objects and reports cost information. In addition to this, a proper cost accounting system assists management in the planning and control of the business operations as well as in analyzing product profitability. There are several other advantages of a well-defined costing system in an organization like generating information for decision making, supplying information to the management for internal control, detailed analysis of costs. However, it is necessary that the cost accounting system is properly installed in an organization. The essential elements of such a system is discussed in the previous section. The following factors should be taken into consideration while designing a costing system.

1. **Size of the firm** - Size of the firm is an extremely important factor in designing a cost accounting system. As the size of the firm and its business grows, the volume and complexity of the cost data also grows. In such situation, the cost accounting system should be capable of supplying such information.
2. **Manufacturing Process** - Process of manufacturer changes from industry to industry. In some industries, there may be a continuous process of production while in some batch or job type of production may be in operation. A cost accounting system should be such that the manufacturing process is taken into consideration and cost data is collected accordingly.
3. **Nature and Number of Products** - If a single product is produced, all costs like material, labour and indirect expenses can be directly allocated to that product. But if more than one product is manufactured, the question of allocation and apportionment as well as absorption of indirect expenses (Overheads) arises and hence the cost accounting system should be designed accordingly as more complex data will be required.
4. **Management Control Needs** - The designing of a cost accounting system in a business organization is guided by the management control requirements. The costing system should supply data to persons at different levels in the organization to take suitable action in their respective areas.
5. **Raw Materials -** The designing of a cost accounting system in a business is also guided by the raw materials required for the production. The nature of raw materials and the degree of waste therein influence the designing of costing system. There are some materials which have a high degree of spoilage. The costing system should be such that identification of spoilage, keeping records of materials, pricing of the issues etc are taken into consideration.

6. **Organization Structure** - The structure of the organization also plays a vital role in designing a costing system. The system should correspond to the hierarchy of the organization.

7. **External Factors** - External factors are also important in designing of a costing system. For example, Cost Accounting Record Rules have been mandatory for certain types of industries. For the sake of compliance of the same, costing system should be designed.

Limitations of Cost Accounting System

Cost Accountancy is not an exact science but an art which has been developed through theories and accounting practices based on reasoning and common sense. The theories put to use in a particular organisation are often debatable. Conventions and accepted principles of Cost Accounting set the norm on which the cost accounting system are based. Some of the limitations of a cost accounting system are discussed in the following lines.

1. Installing a cost accounting system is expensive. It is argued that installation of a cost accounting system enhances cost of production. This is debatable as various cost reduction and cost control along with cost engineering (analysing alternative methods of production) helps in reducing cost.

2. The results shown by the financial accounts almost always differ from those shown by the cost accounts. Thus, there is a need for preparing reconciliation statements.

3. Differing views are put forward by cost accountants about the items to be included in cost accounting.

4. There is lack of exactness in the calculated costs as conventions, estimations and flexible factors are considered before they are calculated. Some of the aspects due to which the calculated costs cannot be said to be exact are as follows[15]:

   (a) Classification of costs into its elements.

   (b) Materials issue pricing based on average or standard costs.

   (c) Apportionment of overheads expenses and their allocation to cost units / centers.

   (d) Allocation of joint costs.

   (e) Segregation of semi variable overheads into fixed and variable.

   Cost Accounting lacks the uniform procedures and formats in preparing the cost information of a product / service. Keeping in view this limitation, all Cost Accounting results can be taken as mere estimates.

1.1.6. Financial Accounting, Cost Accounting and Management Accounting – a comparative study

Accounting is the systematic recordation of the financial transactions of a business. The process includes systematic record keeping, tracking transactions, and aggregating the resulting information into a set of financial reports. Thus, the three aspects of accounting are

- **Documentation (Record Keeping)**

  The system of record keeping for accounting requires the use of a standard set of accounting policies and procedures, as well as standardized forms. The procedures should incorporate controls designed to ensure that assets are used as intended.

- **Tracking of a transaction**

  A separate procedure is needed to collect information about each type of business transaction. Transaction tracking occupies the bulk of the time of the accountant.

[15] These are discussed vividly in different sections of the study note. Students are advised to note them whenever and wherever they come across these issues while proceeding with learning of this module.

- **Financial Reporting**[16]

Accounting frameworks are specified by generally accepted accounting principles (GAAP) and accounting standards of the respective countries. These mandates specific manner in which business transactions must be treated in the accounting records and aggregated into the financial statements. The result is an income statement, balance sheet, statement of cash flows, and supporting disclosures that describe the results of a reporting period and the financial position of the reporting entity at the end of that period.

Accounting is classified as financial accounting, cost accounting and managements accounting. The classification is based on the specific function each of them performs and the nature of the accounting information they generate. This is pictorially represented below:

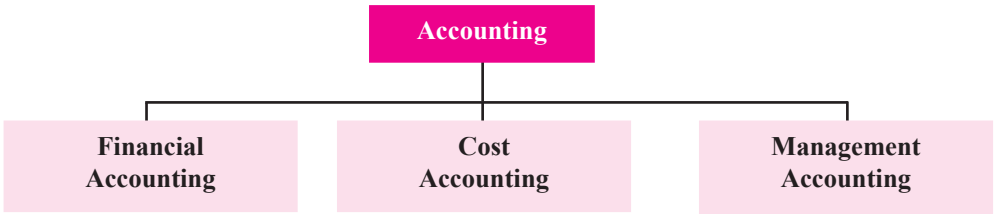


Figure 1.2: Classification of Accounting

Financial Accounting and Cost Accounting – A Comparison

Financial accounting and cost accounting are complementary to each other. Financial accounting, as such, is the systematic procedure of recording, classifying, summarizing, analyzing, and reporting business transactions. The primary objective is to reveal the profits and losses of a business. Financial accounting provides a true and fair evaluation of a business. It, therefore, safeguards the interests of stakeholders. Cost Accounting, as such, is a subset of financial accounting, and is focussed on the process of conversion of raw material into finished goods. As such the cost accumulation process is the basic issue of cost accounting. The differences between cost accounting and financial accounting are presented in a tabular format.

Basis of Comparison	Financial Accounting	Cost Accounting
Purpose	It is prepared for providing information about the results of the business activities as a whole for a particular period to the users.	The main purpose of Cost Accounting is to provide information to the management for the proper planning, control and decision making.
Need	Financial Accounts are maintained as per the requirements of Companies Act and Income Tax Act.	Cost accounts are maintained to meet the requirement of the Management.
Recording	Transactions are classified, recorded and analysed subjectively.	In cost accounting, transactions are classified, recorded and analysed objectively according to the purpose for which costs are incurred.

16. This is specific to financial accounting as the users are external to the business in such case. Thus, reporting is crucial and needs standardization in case of financial accounting. Thus, financial reporting.

Basis of Comparison	Financial Accounting	Cost Accounting
Analysis of profit	Financial accounting reveals the profit of a business as a whole.	Cost Accounting shows the profit made on each product, job or process.
Accounting period	Financial accounts are prepared for a definite period.	Cost reports are prepared frequently and submitted to the management according to their requirement which may be daily, weekly, etc.
Stock valuation	In financial accounts, stocks are valued as per the relevant Accounting Standard (for example, AS 2 specifies that closing inventory should be valued at cost [carrying amount] or net realisable value whichever is lower.	Cost accounting stocks are valued at cost
Relative Efficiency	Financial accounts do not reveal the relative efficiency of each department or section.	Cost account provides information on the relative efficiencies of various plant and Machinery

Cost Accounting and Management Accounting - A Comparison

Cost accounting is that branch of accounting which aims at generating information to control operations with the aim of maximizing profits and efficiency of the company. Conversely, management accounting is the type of accounting which assist management in planning and decision-making and thus is also referred as decision accounting. While cost accounting has a quantitative approach, management accounting gives emphasis on both quantitative and qualitative data.

The two-accounting system plays a significant role, as the users are the internal management of the organization. Following is a tabular representation of the two accounting systems.

Basis of Comparison	Cost Accounting	Management Accounting
Meaning	The recording, classifying and summarising of cost data of an organisation is known as cost accounting.	The accounting in which the both financial and non-financial information are provided to managers is known as Management Accounting.
Information Type	Quantitative.	Quantitative and Qualitative.
Objective	Ascertainment of cost of production.	Providing information to managers to make decisions, and forecast strategies.
Scope	Concerned with ascertainment, allocation, distribution and accounting aspects of cost.	Managerial decision making.

Basis of Comparison	Cost Accounting	Management Accounting
Specific Procedure	Yes	No. Thus the scope of management accounting is much broad.
Target	Recording of cost data (past and present).	It gives more stress on the analysis of future projections.
Interdependency	Can be installed without management accounting.	Cannot be installed without cost accounting.

Financial Accounting and Management Accounting – A Comparison

The key difference between financial accounting and management accounting is that financial accounting is the preparation of financial reports for the analysis by the external users interested in knowing the company's financial position. In contrast, management accounting is the preparation of financial and non-financial information, which helps managers (internal user) make policies and strategies for the company. The distinguishing features of the two are presented in a tabular format in the next few lines.

Basis for Comparison	Financial Accounting	Management Accounting
Purpose	Financial Accounting classifies, analyses, records, and summarizes the financial transactions of a particular period of the company.	Management accounting helps management make effective decisions about the business.
Application	Financial accounting is prepared to reflect true and fair picture of financial affairs.	Management accounting helps management to take meaningful steps and strategize.
Scope	The scope is pervasive, but not as much as the management accounting.	The scope is much broader.
Information type	Quantitative.	Quantitative and qualitative.
Inter dependence	It is not dependent on management accounting.	Management accounting is basically decision-making accounting and depends on information created by Financial Accounting as well as Cost Accounting.
Statutory requirement	It is legally mandatory to prepare financial accounts of all companies. (for example, in the Indian Context Companies Act 2013, relevant rules of accounting standards furnish the statutory requirements)	Management accounting has no statutory requirement.

Format	Financial accounting has specific formats for presenting and recording information.	There's no set format for presenting information in management accounting.
Users	Mainly for potential investors as well as all stakeholders.	Only for management;
Verifiable	The information presented is verifiable.	The information presented is predictive and not immediately verifiable.

Important Cost Accounting Terms

1.2

In this section some of the cost accounting terms, which are of prime importance for conceptualising the subject of cost accounting.

1. **Cost** - Cost is defined as the expenditure (actual or notional) incurred on or attributable to a given product or service. It can also be described as the resources that have been sacrificed or must be sacrificed to attain a particular objective. In other words, cost is the amount of resources used for something which must be measured in terms of money.

   For example – Cost of preparing one cup of tea is the amount incurred on the elements like material, labour and other expenses. Similarly cost of offering any services like banking is the amount of expenditure for offering that service. Thus, cost of production or cost of service can be calculated by ascertaining the resources used for the production or services.

   CIMA Official Terminology[17] defines cost either as a noun or as a verb. The following are the two-definition put forward in the official document

   The term 'cost' as a noun – The amount of cash or cash equivalent paid or the fair value of other consideration given to acquire an asset at the time of its acquisition or construction.

   The term 'cost' as a verb – To ascertain the cost of a specified thing or activity. The word cost can rarely stand alone and should be qualified as to its nature and limitations.

   From the above discussion it is clear that the usual connotation of the term cost is the historical cost which is used as a measurement basis for recording cost accounting transactions. But costs can also mean economic costs[18] which are pertinent for decision making purpose.

   The Institute of Cost Accountants of India, previously known as The Institute of Cost and Works Accountants of India, was established in 1944 as a registered company under the Companies Act 1913 with the objects of promoting, regulating and developing the profession of Cost Accountancy. In 1959, it is converted to a statutory body by an Act of Parliament.

   The Institute recognized the need for structured approach to the measurement of cost in manufacture or service sector and considered their responsibility to provide guidance to the stakeholders of the economy to achieve uniformity and consistency in classification, measurement and assignment of cost to product and services. They constituted the Cost Accounting Standards Board (CASB) in 2001 -2002, with the objective of formulating the Cost Accounting Standards (CAS[19]).

---

17. CIMA Official Terminology, 2005, The Chartered Institute of Management Accountants (CIMA Publishing, an imprint of Elsevier).
18. This includes opportunity cost which is pertinent for decision making purpose. This is taken up in later part of this module.
19. This are, thus, the guiding principles of cost accountancy. A comprehensive discussion is undertaken in Module III of this study note.

Para 4.5 of CAS 1 states that cost is a measurement, in monetary terms, of the amount of resources used for the purpose of production of goods or rendering services.

Thus 'cost' can be classified either as historical cost or as economic cost

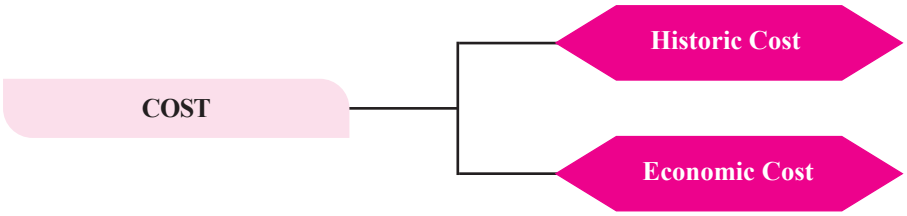


Figure 1.3: Types of Cost

Historical cost is the factual cost incurred for the production of goods or services, encompassing direct material costs, direct labour costs, and manufacturing overheads costs. It emphasizes the retrospective nature of the cost, reflecting the real expenditures made in the past to produce a particular unit of output.

- **Out-of-Pocket Cost** – this refers to the actual expenditures or payments made by an individual or a business for goods, services, or resources. These costs are tangible and represent real cash outlays. Out-of-pocket costs can include expenses such as direct payments for goods, services, wages, and other tangible items. It is often historical in nature but is pertinent to decision making.

Economic cost – This is also referred as opportunity cost. It is the value of the best alternative course of action that was not chosen. In other words, it is what could have been accomplished with the resources used in the course of action if they were employed in the next best alternative. It represents opportunities forgone.

Example

If a person has a job offer that pays ₹ 25 for an hour's work. But instead, he chooses to take a nap for an hour then the historical cost of the nap is zero as the person did not dash out any money in order to take the nap. However, the economic cost of the nap is ₹ 25. This is what he could have been earned if he worked and did not take the nap. Thus, ₹ 25 is a cost of the decision of taking the nap as it is the benefit foregone in taking the nap.

Sunk Cost – Cost that has been irreversibly incurred or committed and cannot therefore be considered relevant to a decision. Sunk costs may also be termed irrecoverable costs.

Imputed Costs – Imputed costs are hypothetical or notional costs, not involving cash outlay computed only for the purpose of decision making. In this respect, imputed costs are similar to opportunity costs. Interest on funds generated internally, payment for which is not actually made is an example of imputed cost.

Relevant Costs: Relevant costs are costs which are relevant for a specific purpose or situation. In the context of decision making, only those costs are relevant which are pertinent to the decision at hand.

Since we are concerned with future costs only while making a decision, historical costs, unless they remain unchanged in the future period are irrelevant to the decision-making process.

Avoidable Costs & Unavoidable Costs – Avoidable Costs are those which under given conditions of performance efficiency should not have been incurred. Unavoidable Costs which are inescapable costs, which are essentially to be incurred, within the limits or norms provided for. It is the cost that must be incurred under a programme of business restriction. It is fixed in nature and inescapable

Controllable and Non-Controllable Costs – Controllable Cost is that cost which is subject to direct control at some level of managerial supervision. Non-controllable Cost is the cost which is not subject to control at any level of managerial supervision.

2. Cost Object

A cost object is any item for which cost measurement is required, for example, a product or a customer. Examples of cost objects include:

- A product
- A service to a hotel guest
- A sales territory

CIMA Official Terminology states, A cost object is, for example, a product, service, centre, activity, customer or distribution channel in relation to which costs are ascertained.

GACAP[20] defines a cost object as an activity, contract, cost centre, customer, process, product, project, service or any other object for which costs are ascertained. This definition is also corroborated in paragraph 4.7 of CAS 1.

3. Cost Unit: Cost Unit is a device for the purpose of breaking up or separating costs into smaller sub divisions attributable to products or services. CIMA official Terminology defines a cost unit as a unit of product or service in relation to which costs are ascertained. Cost unit should be appropriate to the type of business. It is important to note that once costs are traced to cost centres, they are further analysed in order to establish the cost per cost unit. Alternatively, some items of costs may be charged directly to a cost unit, for example direct materials and direct labour costs.

GACAP[23] defines a cost unit as a form of measurement of volume of production of a product or a service. Cost unit is generally adopted on the basis of convenience and practice in the industry concerned. This is also corroborated in paragraph 4.5 of CAS 1.

Example of cost unit

Business	Appropriate Cost Unit
Car manufacturer	Particular brand of car
Cigarette manufacturer	Packet/ piece of cigarette
Builder	Particular building /Flat
Audit company	Audit File / Chargeable hour

4. Composite Cost Unit[21] **–** The cost units for services are intangible and often comprise of two parts. Thus, they are referred as composite cost units. For example, if costs of a delivery service are being monitored and controlled by measuring the cost per tonne delivered then 'tonne delivered' is not an appropriate cost unit because it would not be valid to compare the cost per tonne delivered from place A to place B with the cost per tonne delivered from place M to place N. This is due to the simple fact that the distance is a major factor and delivering one tonne over a distance of one KM is not the same as delivering one tonne over a distance of 10 KM. Thus, Composite cost units. Composite cost units help to improve cost control in service organisations.

Examples of composite cost units might be as follows:

Business	Composite Cost Unit
Hospital	Patient – Day
Transport (Freight)	Tonne – kilometre
Transport (Passenger)	Passenger -KM

20. The GACAP is the abbreviated form of Generally Accepted Generally Accepted Cost Accounting Principles. It is issued by the Institute of Cost Accountants of India. This document is like a preface to the Cost Accounting Standards. (https://icmai.in/upload/CASB/2015/GACAP-Final.pdf)

21. This is discussed in details in module 5 of this study note.

5. **Cost Centre -** Cost centres are collecting places for costs before they are further analysed. For cost accounting purposes, departments are termed cost centres and the product produced by an organisation is termed the cost unit.

   CIMA Official Terminology defines a cost centre as a production or service location, function, activity or item of equipment for which costs are accumulated.

   GACAP[23] defines a cost unit as any unit of an entity selected with a view to accumulating all cost under that unit. The unit can be division, department, section, group of plant and machinery, group of employees or combination of several units. This definition is also corroborated in paragraph 4.6 of CAS 1.

   Cost Centre and Cost Object is the logical sub-unit for collection of cost. Cost Centre may be of two types personal and impersonal cost centres. Personal cost centre consists of a person or a group of persons. Cost centres which are not personal cost centres are impersonal cost centres. Again Cost centres may be divided into broad types i.e. Production Cost Centres and Service Cost Centres.

   - Production Cost Centres are those which are engaged in production like Machine shop, Welding shop, Assembly shop etc.
   - Service Cost centres[22] are for rendering service to production cost centre like Power house, Maintenance, Stores, Purchase office etc.

   Cost centre is often referred as a responsibility centre whose managers are normally accountable for only those costs that are under their control, also known as expense centres.

6. **Responsibility Centre -** Responsibility Center refers to a particular segment or unit of an organization for which a particular manager, employee, or department is held responsible and accountable for its business goals and objectives. It refers to the part of the company where a manager has authority and responsibility. A responsibility center is a functional entity within a business that tends to have its own goals and objectives, policies, and procedures, thereby giving managers specific responsibility for revenues, expenses incurred, funds invested, etc.

   CIMA official terminology defines responsibility centre as departmental or organisational function whose performance is the direct responsibility of a specific manager.

   There are usually four types of responsibility center which are identified as under.

   (a) Cost Centre – Under the cost center , the manager is held responsible only for the costs, including a production department, maintenance department, human resource department, etc. this is discussed in previous section.

   (b) Profit Centre – Under the profit center the manager is responsible for all costs and revenues. Here the manager would have all of the responsibility to make decisions that would affect both the price and the revenue.

   CIMA official terminology defines profit centre as part of a business accountable for both costs and revenues.

   (c) Revenue Centre – This segment is primarily responsible for attaining sales revenue. The performance would be evaluated by comparing the actual revenue attained with the budgeted revenue.

   CIMA official terminology defines revenue centre as centre devoted to raising revenue with no responsibility for costs, for example a sales centre. Often used in not-for-profit organisations.

---

22. Service cost centre provide services to other cost centres. When the output of an organisation is a service, rather than goods, an alternative name is normally used, for example support cost centre or utility cost centre (CIMA Official Terminology, 2005).

(d) Investment Centre – Apart from looking into the profits, this center looks into returns on the funds invested in the group's operations during its time.

CIMA official terminology defines investment centres as a profit centre with additional responsibilities for capital investment and possibly for financing, and whose performance is measured by its return on investment.

7. **Cost of Production:** To arrive at cost of production of goods, including those dispatched for captive consumption, adjustment for stock of work-in-process, finished goods, recoveries for sales of scrap, wastage and the like, shall be made. Cost of production of a service means cost of the service rendered.

GACAP[23] states, cost of production of a product or a service consists of cost of materials consumed, direct employee costs, direct expenses, production overheads, quality control costs, packing costs, research and development costs and administrative overheads relating to production.

To arrive at cost of production of goods dispatched for captive consumption[23], adjustment for Stock of work-in-Process, finished goods, recoveries for sales of scrap, wastage shall be made.

Thus Cost of production (for captive consumption) = cost of materials consumed + direct employee costs + direct expenses + production overheads + quality control costs + packing costs + research and development costs + administrative overheads ± adjustment for stock of WIP and FG

This definition is corroborated in paragraph 4.8 of CAS 1.

8. **Conversion Cost:** This term is defined as the sum of direct wages, direct expenses and overheads costs of converting raw material to the finished products or converting a material from one stage of production to another stage.

CIMA official terminology defines conversion cost as cost of converting material into finished product, typically including direct labour, direct expense and production overheads.

Para 4.4 of CAS 1 defines conversion cost is the production cost excluding the cost of direct materials.

9. **Overheads Cost:** An item of expense/cost which is not directly traceable to the product

CIMA official terminology defines overheads cost as expenditure on labour, materials or services that cannot be economically identified with a specific saleable cost unit.

GACAP[23] defines Overheads comprise costs of indirect materials, indirect employees and indirect expenses. This defnition is also coroborated in paragraph 4.24 of CAS 1

From the above defnitions two important perspectives are noted regarding overheads cost[24].

1. Overheads costs are not economically identifiable with the cost unit. Thus they are also referred as indirect costs.
2. Indirect costs comprise of indirect material, indirect labour[25] and indirect expenses.

The overheads expenditure is identified under a particular head based on the purpose of the expenditure based on the functions that are accomplished by the expenditure incurred. The functional classification[26] overheads are given as under.

---

23. 'Captive Consumption means the consumption of goods manufactured by one division or unit and consumed by another division or unit of the same entity or related undertaking for manufacturing another product(s)'. GACAP
24. A synonymous term 'burden' is in common use in the US and in subsidiaries of American companies.
25. CAS 7 specifies details about employee cost which is the connotation for the traditional term 'labour'. Thus, whenever the term 'labour' is used, it implies 'employee cost'
26. In standard books only this is mentioned as factory (production) overheads, administrative overheads and selling and distribution overheads. Here the classification is as mentioned in CAS 1.

1. Production Overheads: Indirect costs involved in the production of a product or in rendering service. (as noted in Para 4.27, CAS 1)
2. Administrative Overheads: Cost of all activities relating to general management and administration of an entity. (as noted in Para 4.2, CAS 1)
3. Distribution Overheads: Distribution overheads, also known as distribution costs, are the costs incurred in handling a product or service from the time it is ready for dispatch or delivery until it reaches the ultimate consumer including the units receiving the product or service in an inter-unit transfer. (as noted in Para 4.15, CAS 1)
4. Selling Overheads: Selling overheads are the expenses related to sale of products or services and include all indirect expenses incurred in selling the products or services. (as noted in Para 4.29, CAS 1)
5. Marketing overheads: Marketing Overheads comprise of selling overheads and distribution overheads. (as noted in Para 4.21, CAS 1)

The above classification is pictorially represented as follows:

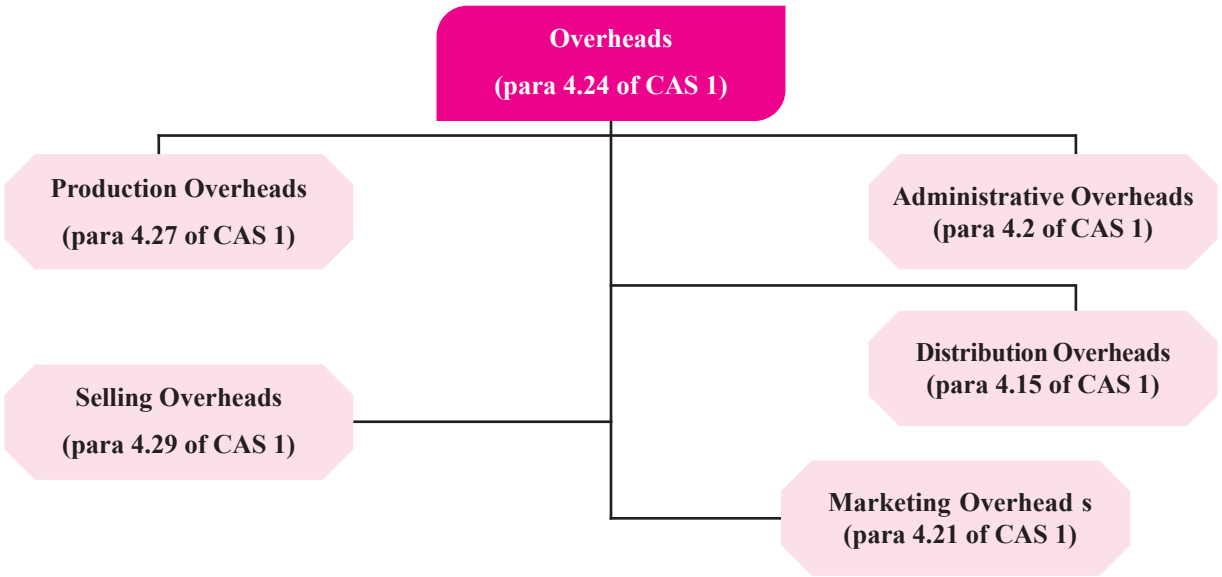


Figure 1.4: Types of Overheads

10. Cost Accounting Standards[27]

The Institute of Cost Accountants of India, recognizing the need for structured approach to the measurement of cost in manufacture or service sector and to provide guidance to the user organizations, government bodies, regulators, research agencies and academic institutions to achieve uniformity and consistency in classification, measurement and assignment of cost to product and services, has constituted Cost Accounting Standards Board (CASB) with the objective of formulating the Cost Accounting Standards. Till date, the Board has issued 24 Cost Accounting Standards, Generally Accepted Cost Accounting Principles, 11 Guidance Notes[28].

[27] This is discussed in details in Module 3 of this study note.

[28] Of the eleven guidance issued so far, nine is on Cost Accounting Standards and two on "Treatment of Costs Relating to Corporate Social Responsibility (CSR) Activities" and "Maintenance of Cost Accounting Records for Construction Industry Including Real Estate and Property Development Activity" respectively. (https://icmai.in/CASB/casb-about).

11. **Cost Allocation -** When items of cost (overheads) are identifiable directly with some products or departments such costs are charged to such cost centres. This process is known as cost allocation. Wages paid to workers of service department can be allocated to the particular department. Indirect materials used by a particular department can also be allocated to the department. Cost allocation calls for two basic factors –

    a. Concerned department/product should have caused the cost to be incurred, and

    b. Exact amount of cost should be computable.

12. **Cost Apportionment –** When items of cost (overheads) cannot be directly charged to or accurately identifiable with any cost centres, they are prorated or distributed amongst the cost centres on some predetermined basis. This method is known as cost apportionment. Thus, items of indirect costs residual to the process of cost allocation are covered by cost apportionment. The predetermination of suitable basis of apportionment is very important and usually following principles are adopted (in order to find suitable relation between the cost object and the cost to be apportioned).

    a. Service or use

    b. Survey method

    c. Ability to bear.

    The basis ultimately adopted should ensure an equitable share of common expenses for the cost centres and the basis once adopted should be reviewed at periodic intervals to improve upon the accuracy of apportionment.

    The term allocate is defined by the CIMA official terminology to assign a whole item of cost, or of revenue, to a single cost unit, centre, account or time period. In the US, "allocate" does not have this precise meaning, it is used more generally to refer to the whole process of overheads apportionment, allocation and absorption.

13. **Cost Absorption**[29] **-** Ultimately the indirect costs or overheads as they are commonly known, will have to be distributed over the final products so that the charge is complete. This process is known as cost absorption, meaning thereby that the costs absorbed by the production during the period. Usually any of the following methods are adopted for cost absorption:

    1. Percentage of direct material cost
    2. Percentage of direct labour cost
    3. Percentage of prime cost
    4. Direct labour hour rate
    5. Machine hour rate.

    The basis should be selected after careful maximum accuracy of cost distribution to various production units. The basis should be reviewed periodically and corrective action whatever needed should be taken for improving upon the accuracy of the absorption.

    CIMA official terminology defines overheads absorption rate (OAR) as a means of attributing overheads to a product or service, based for example on direct labour hours, direct labour cost or machine hours.

14. **Under/over absorption of overheads**[30] **-** Costs, as such, are either direct costs which are traceable to the cost unit or are indirect costs (also referred as overheads) which are not traceable to the cost unit. Thus, in the cost accumulation process the direct costs can be added specifically to the cost unit as they directly attribute to the product. But the overheads or indirect cost cannot be directly added to the product cost. In this respect, absorption costing recommends the use of pre-determined rates for absorption of overheads cost to the products.

---

29. This is fundamental aspect of the absorption costing system.
30. This is discussed in details under the section 'overheads' in Module 2.

Overheads absorption rates are usually predetermined, that is, they are calculated in advance of the period over which they will be used. The advantage of using predetermined rates is that managers have an overheads rate permanently available which they can use in product costing and fixation of sale price.

But this gives rise to the problem of under/over absorption as the actual figures for overheads and for the absorption base are likely to be different from the estimates used in calculating the absorption rate.

When this happens, the overheads will be either under absorbed or over absorbed. If the actual overheads incurred is higher than the overheads absorbed, then overheads is under absorbed and if the actual overheads incurred is lower than the overheads absorbed then the overheads is over absorbed.

Illustration 1

Data for MNQ Company for a particular period is as under

Particulars	Machining Department	Finishing Department
Estimated/budget data		
Production overheads	₹ 3,40,000	₹ 1,20,000
Machine hours	1,70,000	4,200
Direct labour hours	16,500	40,000
Actual results		
Production overheads incurred	₹ 3,60,000	₹ 1,29,400
Machine hours	1,50,000	3,900
Direct labour hours	18,290	44,100

It is company policy to use machine hour rate to absorb production overheads in the machining department. The finishing department is more labour intensive and therefore labour hour rate is considered as more appropriate overheads absorption rate.

Solution:

The overheads absorption rates (OARs), the under and over absorbed overheads are calculated as follows;

Particulars	Machining Department	Finishing Department
OAR	$\frac{340000}{170000}$ = ₹2 per machine hour	$\frac{120000}{40000}$ = ₹3 per labour hour
Overheads absorbed	₹ 3,00,000 =(₹ 2 × 150000 labour hour)	₹ 1,32,300 (₹3 × 44100 machine hours)
Actual overheads (incurred)	₹3,60,000	₹1,29,400
Under/Over absorbed overheads	₹ 60,000 (absorbed overheads is less than actual overheads, thus under absorbed)	₹2,900 (absorbed overheads is greater than actual overheads, thus over absorbed)

Elements of Cost

1.3

Costs are either direct (traceable to the cost unit) or indirect, referred as overheads (not traceable to the product) and thus has to be absorbed to the product on the basis of some pre-determined basis. This is briefly discussed in the previous section. The elements of cost along with the classification may be represented as follows.

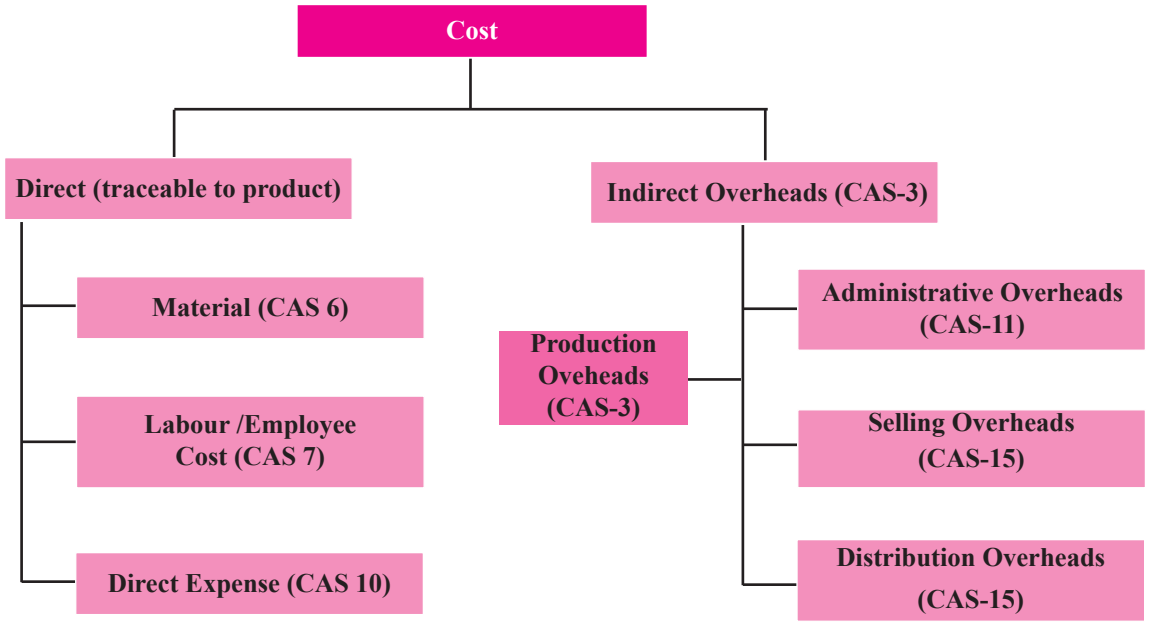


Figure 1.5: Elements of Cost

Raw materials are converted into finished products by a manufacturing concern with the help of labour, plants etc. The elements that constitute the cost of manufacturing are known as elements of cost. The elements of cost include the following:

- Material
- Labour[31]
- Expenses

But as it is previously noted that each of the above element of cost includes both direct cost and indirect costs, the indirect cost are also referred as overheads. This is pictorially represented in the following diagram.

[31] Labour cost is referred as employee cost as per CAS 7

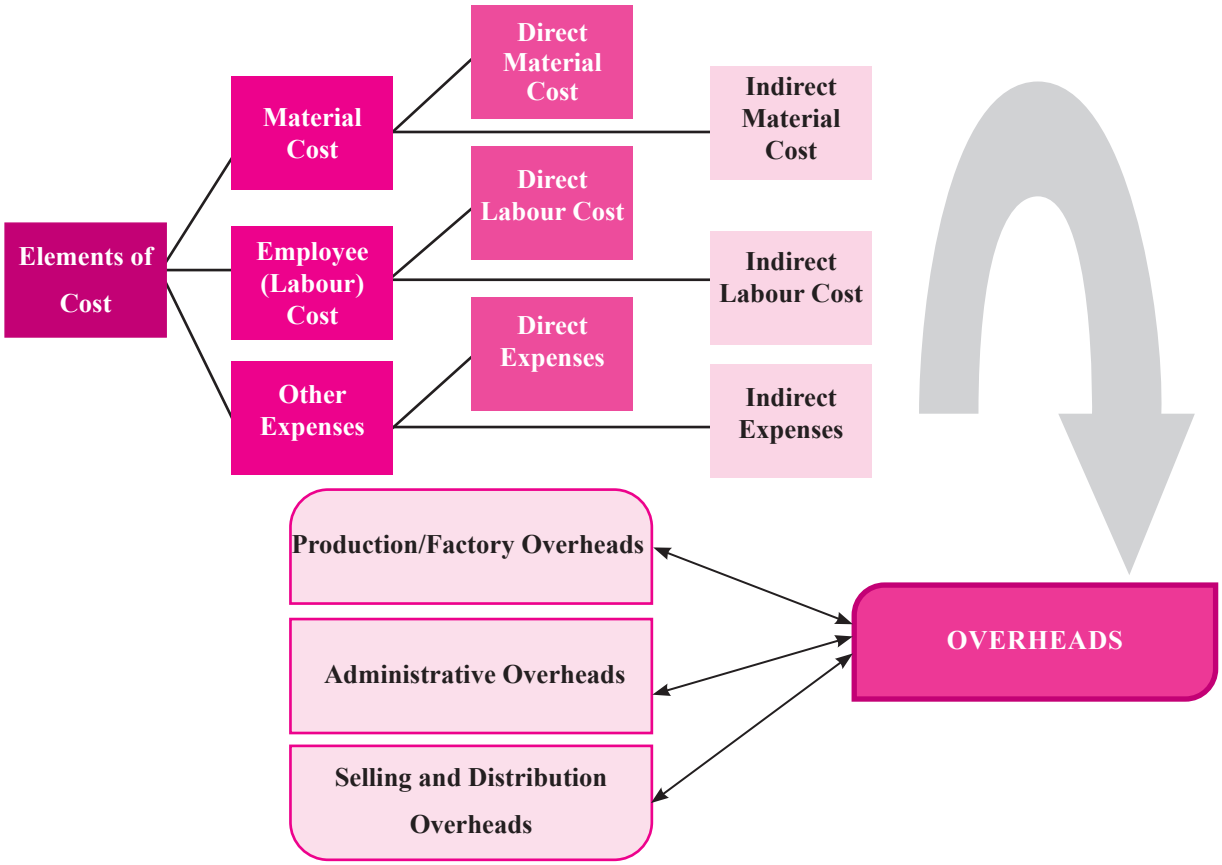


Figure 1.6: Classification of Elements of Cost into Direct and Indirect Costs

It is important to note that all the traceable costs (direct material, direct labour and direct expenses) are grouped together and is referred as prime cost.

Para 4.26 of CAS 1 defines Prime cost as the aggregate of direct material cost, direct employee cost and direct expenses.

Thus,

Prime Cost = Direct Material Cost + Direct Labour (Employee) + Direct Expenses

It was previously noted in this study note, that the traditional cost accounting system is the absorption costing system which is, more frequently used. Under generally accepted accounting principles (GAAP), absorption costing is required for external reporting. This is an accounting method that captures all of the costs involved in manufacturing a product when valuing inventory. The method includes direct costs and indirect costs and is helpful in determining the cost to produce one unit of goods[32]. thus, absorption costing also referred as full costing or traditional costing is GAAP compliant.

[32] https://corporatefinanceinstitute.com/resources/knowledge/accounting/absorption-costing-guide/

Classification of Cost

1.4

Cost Classification is the process of segregating the company's costs into different categories that gives a fair idea to the decision-maker about the spending pattern. This bifurcation allows teams to efficiently use the data for accounting purposes and financial modelling, leading the management to decide which cost is more important than others.

The Cost Accounting Standard (CAS) 1 (Revised 2015) issued by the Council of the Institute of Cost Accountants of India for determination of Classification of Cost. This section of the study note is in tandem with the provisions of the said document.

Para 4.3 CAS 1 state that classification of cost as the arrangement of items of costs in logical groups having regard to their nature (subjective classification) and purpose (objective classification).

Thus, two type of classification (logical groups) is recommended

- Subjective classification (classification on the basis of nature) and
- Objective classification (on the basis of purpose)

A reading of para 6 of CAS 1 suggest five classifications along with some sub classifications, which is represented below:

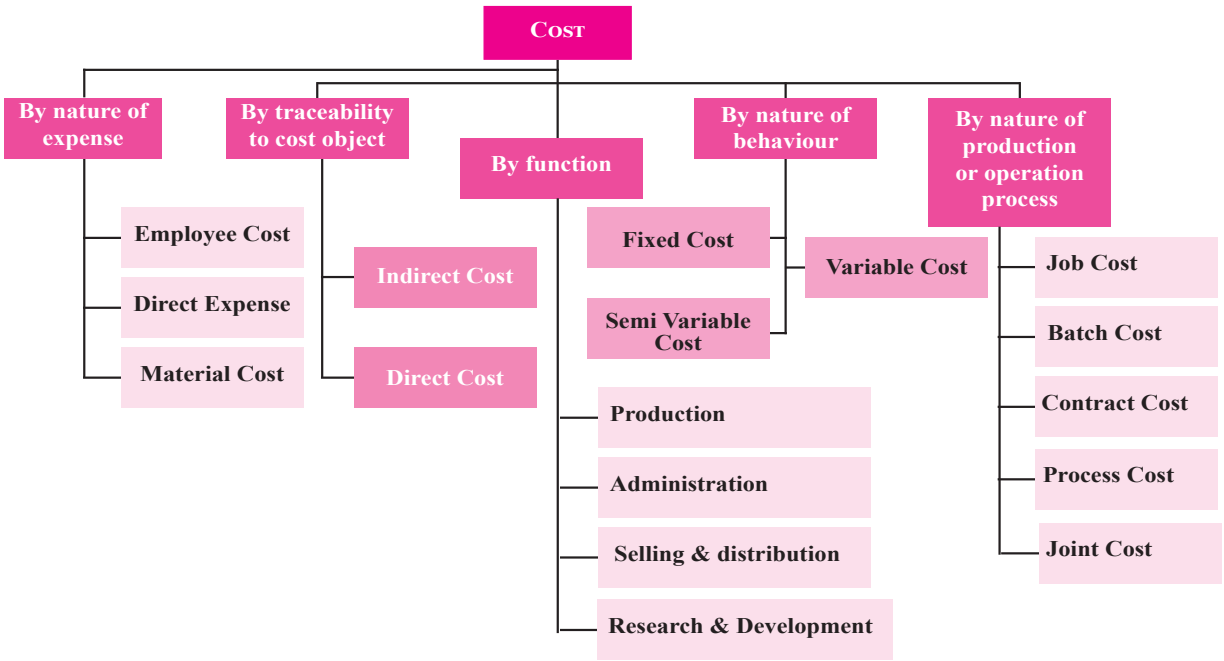


Figure 1.8: Types of Cost Classification

1. **Classification by nature of expense** (para 6.1) – on the basis of nature of the expense the elements of cost can be classified in the following three categories:
   a. Material – Material Costs are cost of materials used for the purpose of production of a product or rendering of a service, net of trade discounts, rebates, taxes and duties refundable that can be quantified with reasonable accuracy.
   b. Employee - Employee Costs are consideration, including benefits paid or payable to employees, permanent or temporary, for the purpose of production of a product or rendering of a service.
   c. Expenses - Expenses are costs other than material cost and employee cost for the purpose of production of a product or rendering of a service. (example - cost of utilities, payment for bought out services, job processing charge)
2. **Classification by traceability of the cost to a cost object** (para 6.2) – on the basis of traceability costs are either direct cost or indirect cost.
   a. Direct cost - If a cost can be assigned to a cost object in an economically feasible way, it shall be termed as direct to that cost object. These are of three types
      i. Direct material cost - Direct Material Costs are the cost of materials which can be assigned to a cost object in an economically feasible way.
      ii. Direct employee cost - Direct Employee Cost are employee costs, which can be assigned to a cost object in an economically feasible way.
      iii. Direct expenses - Direct Expenses are expenses except direct material and direct employee cost which can be assigned to a cost object.
   b. Indirect cost – if a cost is not identifiable as a direct cost then it is referred as indirect cost. It comprises of the following.
      i. Indirect material - Indirect Material Costs are cost of materials, which cannot be directly assigned to a particular cost object in an economically feasible way
      ii. Indirect employee cost - Indirect Employee costs are employee costs, which cannot be directly assigned to a particular cost object in an economically feasible way.
      iii. Indirect expenses - Indirect Expenses are expenses, which cannot be directly assigned to a particular cost object in an economically feasible way.
3. **Classification by function** (para 6.3) – costs can be classified according the functions which are
   a. Production;
   b. Administration;
   c. Selling;
   d. Distribution;
   e. Research; and
   f. Development
4. **Classification by nature of behaviour of the cost** (para 6.4) - Costs shall be classified based on behaviour in response to the changes in the activity levels such as, fixed cost, variable cost and semi-variable cost. Accordingly, costs are
   a. Fixed cost
   b. Variable cost
   c. Semi variable cost

5. **Classification by nature of production or operation process** (para 6.5) - Costs shall also be classified on the basis of nature of production or operation process. Operation Cost shall be the cost a specific operation involved in production of goods or rendering of services. Accordingly, costs are

   a. Job cost

   b. Batch cost

   c. Contract cost

   d. Process cost

   e. Joint costs are the costs of common resources used for producing two or more products or rendering two or more services simultaneously

A diagram regarding the types of classification is presented for easy comprehension.

1.4.1. Cost Behaviour Analysis

It is discussed in the previous section that costs can be classified according to its behaviour. Cost behavior analysis refers to management's attempt to understand how operating costs change in relation to a change in an organization's level of activity. These costs may include direct materials, direct labour, and overheads costs that are incurred in developing a product. Management typically performs cost behavior analysis through mathematical cost functions.

Cost functions are descriptions of how a cost (e.g., material, labour, or overheads) changes with changes in the level of activity relating to that cost. For example, total variable costs will change in relation to increased activity, while fixed costs will remain the same. Cost functions may come in various forms.

CIMA Official Terminology states that cost behaviour is the Variability of input costs with activity undertaken. Cost may increase proportionately with increasing activity (a variable cost), or it may not change with increased activity (a fixed cost). Some costs (semi-variable) may have both variable and fixed elements. Other behaviour is possible; costs may increase more or less than in direct proportion, and there may be step changes in cost, for example. To a large extent, cost behaviour will be dependent on the timescale assumed.

The level of activity refers to the amount of work done, or the number of events that have occurred. Depending on circumstances, the level of activity may refer to the volume of production in a period or the number of units sold. From the above discussion it is obvious that, in general, three types of costs is noticed. It is very important to understand the nature of the cost. As the treatment of fixed cost and variable cost is different in the two most important cost accounting systems: absorption costing and marginal costing. And as such semi –variable cost cannot be allowed to remain and should be segregated into fixed and semi –variable cost.

1. **Fixed cost** – fixed cost is referred as period and refers to a cost which is incurred for a particular period. It remains fixed over a relevant range[35]. GACAP defines fixed costs as costs which do not vary with the change in the volume of activity. Fixed indirect costs are termed fixed overheads.

   CIMA Official Terminology defines a fixed cost as a cost incurred for an accounting period, that, within certain output or turnover limits, tends to be unaffected by fluctuations in the levels of activity (output or turnover).

   Total fixed cost remains while per unit fixed cost reduces as number of units increases (a diagrammatic representation is shown below)

2. **Variable cost** – the variable cost is often referred as the product cost. The per unit variable cost remains fixed over the relevant range. GACAP defines variable Costs are the cost which tend to directly vary with the volume of activity. CIMA official terminology defines variable cost as a cost that varies with a measure of activity.

[35] The relevant range is Activity levels within which assumptions about cost behaviour in breakeven analysis remain valid. This is discussed in details in Module 6 of this study note.

3. **Semi-variable cost** – this are dual natured. A part of these cost remains fixed while the other part behaves as a variable cost. CIMA official terminology defines a semi-variable cost as a cost containing both fixed and variable components and thus partly affected by a change in the level of activity.

The following five figures (1 -5) is a pictorial representation of the costs discussed above.

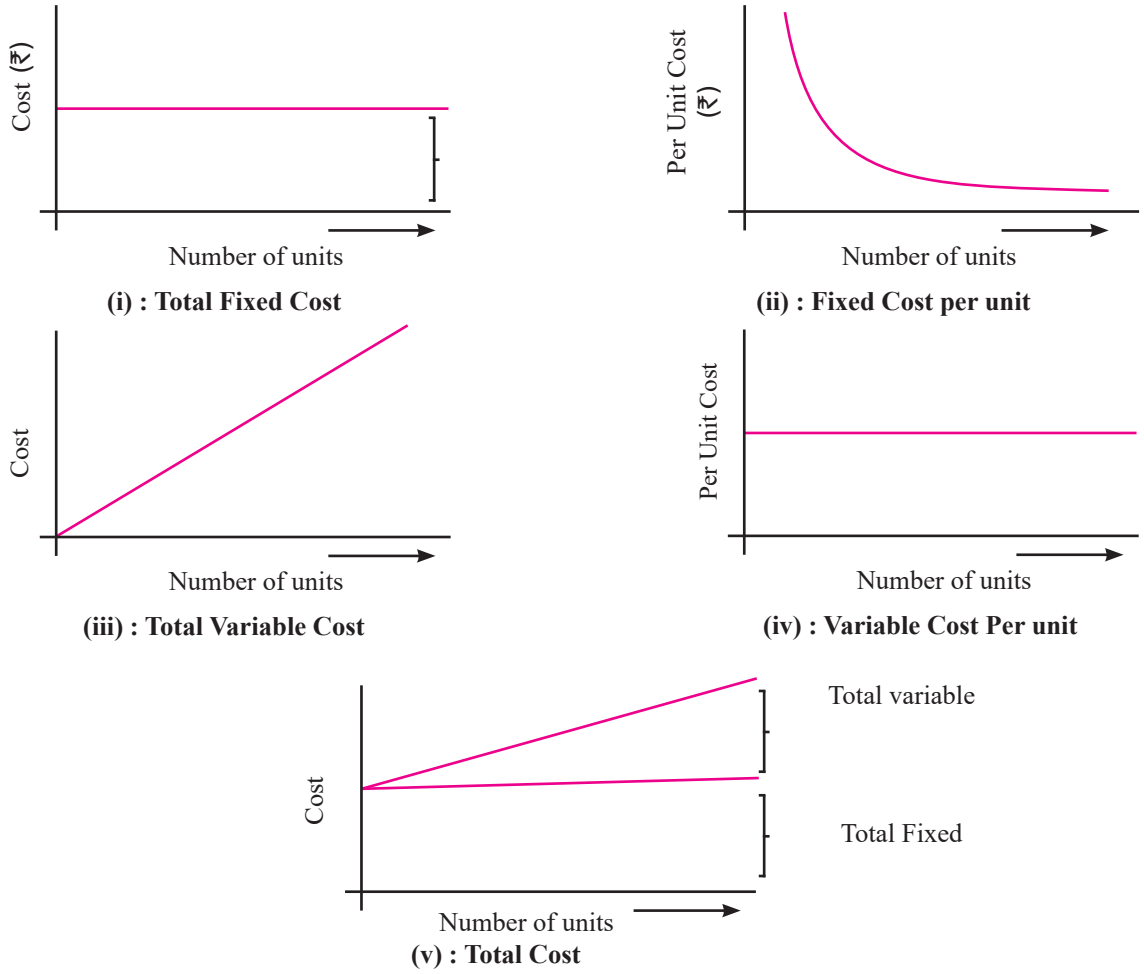


Figure 1.9: Graphical Representation of Different Total Costs and per unit costs under Cost Behaviour Analysis

Figure (i): total fixed cost remains fixed and does not change as number of units is increased. This holds good within the relevant range.

Figure (ii): the per unit fixed cost curve is a rectangular hyperbola and reduces as number of units produced increases.

Figure (iii): total variable cost increases at a steady rate as units produced increases.

Figure (iv): the per unit variable cost is a straight line parallel to the X axis. This is one basic assumption which shall have to hold good during the relevant range.

Figure (v): total cost curve comprising of fixed cost and variable cost is represented in this figure. This may be also represented as a straight-line curve where the fixed cost is the Y – intercept and the variable cost per unit is the m (slope of the total cost function).

1.4.2 Segregation of Semi Variable Costs

In both absorption costing system and marginal costing system costs must be identified as fixed cost or variable cost as their treatment differs because their nature differs. Thus semi –variable costs are not allowed to remain as they are. These costs are to be segregated into its component parts; fixed portion and variable portion. When managers have identified a semi-variable cost they will need to know how much of it is fixed and how much is variable. Only when they have determined this will they be able to estimate the cost to be incurred at relevant activity levels. Past records of costs and their associated activity levels are usually used to carry out the analysis. Before segregation of semi-variable costs, managers need to identify the same semi variable cost. The below illustration would clarify the issue.

Illustration 2

Let us assume that a company identified two sets of costs for two consequent months which are as follows.

January 2022, 60 tables are produced with total cost of ₹ 1,700

February 2022, 70 tables are produced with total cost of ₹ 1,900

It is a given fact that total fixed costs don't change within the relevant range with increase in units produced. So, the increase in total cost of ₹ 200 (₹ 1,900 - ₹ 1,700) during January –February is caused by an increase of 10 units (70 tables – 60 tables)

This is given as

₹ 1,900 – ₹ 1,700 = ₹ 200 (change in costs) (increase).

70 tables – 60 tables = 10 (changes in tables) (increase)

Thus, variable cost per unit = $\frac{₹\ 200}{10\ \text{units}}$ = ₹ 20 per table

Thus, the total cost is semi variable in nature as there are both fixed and variable element in the total cost of producing table.

If the total cost is variable, then in January the total cost would be ₹ 1,200 (60 × 20) and in February the total cost would be ₹ 1,400 (70 × 20), which they are not. The TC in January is Rs 1700 and in February it is ₹ 1,900.

Given, total cost = total variable costs + total fixed costs

For January (60 tables)

TC = TVC + TFC = (Variable cost per unit × number of units) + TFC

$\Rightarrow$ 1700 = (20 × 60) + TFC

$\Rightarrow$ TFC = 1700 -1200 = 500

Check (for February) (70 tables)

TC = TVC + TFC = Variable cost per unit × number of units + TFC

$\Rightarrow$ 1900 = 20 × 70 + 500

$\Rightarrow$ LHS = RHS

In other words, the cost function is given as

TC = TVC + TFC = (Variable cost per unit × number of units) + TFC

$Y = m \times x + C$

Where Y = TC, m = slope of the cost function (variable cost per unit) and

C = y intercept (total fixed cost)

Where,

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Change in TC}}{\text{Change in output}}$$

The four most common methods[36] used to separate the fixed and variable elements are as follows

1. **Graphical Method** – This method takes account of all available historical data and it is very simple to use. However, it is very prone to inaccuracies that arise due to subjectivity and the likelihood of human error.

   a. First a scatter graph is drawn which plots all available pairs of data on a graph.

   b. Then a line of best fit is drawn by eye. This is the line which, in the judgement of the user, appears to be the best representation of the gradient of the sets of points on the graph.

   c. The point where the extrapolation of this line cuts the vertical axis (the intercept) is then read off as the total fixed cost element. The variable cost per unit is given by the gradient of the line

2. **High and Low Method –** The highest and lowest levels of output and costs are taken and the differential is found. This difference arises only due to variable costs. The remaining portion will be fixed costs. Under this method the variable cost per unit will be computed first and then the fixed cost will be derived. Variable cost per unit is computed by dividing the difference in cost at highest level and lowest level with the difference in volume between highest and lowest level.

   CIMA official terminology defines the high low method as a method of estimating cost behaviour by comparing the total costs associated with two different levels of output. The difference in costs is assumed to be caused by variable costs increasing, allowing unit variable cost to be calculated. Following from this, since total cost is known, the fixed cost can be derived.

3. **Linear Equation Method –** This uses the straight-line equation of y = m x + c where y represents total cost, m is variable cost per unit, x is the level of output and c is fixed costs. The total costs at two different volumes are put into these equations which are solved for the values of m and c.

4. **Least Square Method –** This statistical tool uses straight line equation and finds the line of best fit to solve the equations. Also known as Simple Regression Method. Under this method first the mean of volume and mean of costs are computed. The deviations in volume (X) from the mean and deviation in cost (Y) from mean are computed.

[36] These are discussed in details in later part of the study note.

Illustration 3 (Segregation of Semi-Variable Cost (High/Low Method and linear equation method)

The costs of operating the maintenance department of a computer manufacturer, XYZ Company, for the last four months have been as follows.

Month	Cost (₹)	Production volume (Units)
1	1,10,000	7,000
2	1,15,000	8,000
3	1,11,000	7,700
4	97,000	6,000

High/low method

Variable cost P.U. = $\frac{\text{Change in Total Cost}}{\text{Change in output}}$ (consider only the highest and the lowest points)

therefore

High	8000 units	₹ 1,15,000
Low	6000 units	₹ 97,000
Change	2000 units	₹ 18,000

Variable cost P.U = $\frac{\text{Change in Total Cost}}{\text{Change in output}} = \frac{₹\ 18,000}{2000 \text{ units}} = ₹\ 9$ per unit

Calcualtion of Fixed cost element (substituting value of VC in high point and low point)

	High point	Low point
Total Cost (given)	₹ 1,15,000	₹ 97,000
Variable Cost @ ₹ 9 per unit		
8000 × ₹ 9; 6000 × ₹ 9	₹ 72,000	₹ 54,000
Fixed cost (balancing figure)	₹ 43,000	₹ 43,000

Linear equation method

The Total Cost function is given as

TC = TVC + TFC = Variable cost per unit × number of units + TFC

$Y = m \times x + C$

Where Y = TC, m = slope of the cost function (variable cost per unit) and

C = y intercept (total fixed cost)

Where,

$$m = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Change in Total Cost}}{\text{Change in output}}$$

m = variable cost per unit $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{Change in Total Cost}}{\text{Change in output}} = \frac{₹\ 18,000}{2000 \text{ units}} = ₹\ 9$ per unit.

At 8000 units of production

Variable cost = 8000 units × ₹ 9 per unit = ₹ 72,000

Fixed cost (Balancing Figure) = ₹ 43,000

Total Cost (given) = ₹ 1,15,000

Thus the total cost function is given as

Y = 9x + 43000

TC = Variable cost per unit × units produced + Total fixed cost

Preparation of Cost Sheet and Ascertainment of Profit

1.5

A cost sheet, also referred as statement of cost, is a statement that shows the various components of total cost for a product and shows previous data for comparison. The selling price (after adding certain percentage of profit to the cost) can be deduced for a product based on the cost sheet. It is depiction of the cost accumulation process of a single output based on a single cost unit. An estimated cost sheet is prepared based on estimated cost just before the production begins.

Under absorption costing system, direct material, direct labour, direct expenses, fixed and variable production overheads are considered as composing the factory (works) cost. Administrative overheads added to works cost gives the cost of production. Selling and distribution overheads adds to cost of production to give the cost of sales.

The term conversion cost is used to represent the cost of converting raw material into finished goods. Thus conversion cost is the sum of direct labour cost, direct expenses and production overheads. Cost sheet shows the operating results.

Importance and objectives of cost sheet

Cost sheets help with a number of essential business processes:

1. **Determining cost:** The main objective of the cost sheet is to obtain an accurate product cost. Both the total cost and cost per unit of a product is calculated with accuracy.
2. **Fixing selling price:** The cost sheet furnishes the production cost which helps fixation of selling price.
3. **Cost comparison:** It helps the management compare the current cost of a product with a previous per unit cost for the same product. Comparing the costs helps management take corrective measures if costs have increased.
4. **Cost control:** The cost sheet is an important document for a manufacturing unit, as it helps in controlling production costs. Using an estimated cost sheet aids in monitoring labour, material and overheads costs at each step of production.
5. **Decision-making:** Some of the most important decisions management makes are based on the cost sheet. Whenever a business needs to produce or buy a component, or quote prices for its goods on a tender, managers refer to the cost sheet.
6. Inter-firm and intra-firm comparison

Grouping of costs[37]

By grouping of the above elements of cost, the following divisions of cost are obtained:

1. Prime Cost = Direct Materials + Direct Labour + Direct Expenses
2. Works Cost (Factory) = Prime Cost + Factory Overheads
3. Cost of Production = Works (Factory) Cost + Office and Administrative Overheads
4. Cost of Sales = Cost of Production + Selling and Distribution Overheads

[37] There is no standard format for presentation of costs in a cost sheet. It has to suit the type of business, need of the details, and management's requirement of control over costs. Thus the format presented in this section is only a suitable way. This is adopted from Principles and Practice of Cost Accounting (3rd edition) by Asish Bhattacharya. An alternative is presented in the book itself.

In a manufacturing concern, inventory (stock) comprises of

1. Raw material stock – this is adjusted at the raw material consumed stage
2. Work in progress stock – this is generally adjusted at the works cost stage unless otherwise stated.
3. Finished goods stock – this is adjusted in the cost or production stage.

Thus the above simple grouping may be restated as

1. Prime Cost

Details	(₹)	(₹)
Opening Stock of Raw Material	**	
Add: Purchase of Raw Material	**	
Less: Closing Stock of Raw Material	**	
Add: Direct charges related to Raw Material	**	
Raw Material Consumed		**
Direct Labour		**
Direct Expenses		**
Prime Cost		**

2. Works (factory) cost

Details	(₹)	(₹)
Prime Cost		**
Add: Production Overheads		**
Works (factory) cost		**
Opening Stock of WIP	**	
Less: Closing Stock of WIP	**	**
Adjusted Work (factory) cost		**

3. Cost of production and Cost of goods sold

Details	(₹)	(₹)
Adjusted Work (factory) cost		**
Add: Administrative overheads		**
Cost of Production		**
Add: Opening Stock of Finished Goods	**	
Less: Closing Stock of Finished Goods	**	**
Cost of Goods Sold		**

4. Cost of Sales

Details	(₹)	(₹)
Cost of Goods Sold		**
Add: Selling and Distribution Overheads		**
Cost of Sales		**

5. Statement of Profit

Details	(₹)	(₹)
Cost of Sales		**
Add: Profit (as a percentage of cost of sales or as a percentage of sales)		**
Sales		**

It is imperative to note that cost of goods sold is the costs assigned to the units sold. Whereas cost of sales is the total of production costs assigned to units sold plus selling and distribution expenses. It is interesting to note that as per paragraph 13 (c) of AS 2, administrative cost do not form part of cost of production[38].

Cost Treatment of Goods & Service Tax (GST):

A. On Recurring/Revenue Expenses:

Example: Raw Materials Purchase:

Purchase of Cement from M/s X & Co

Cement	10 Bags	@ ₹ 100/- per Bag	₹ 1000.00
CGST (9%)			₹ 90.00
SGST (9%)			₹ 90.00
Total			₹ 1180.00

i. If the Buyer (M/s Y & Co.) is GST Registered Firm:

In it's Books, the journal entry will be:

Cement/ Purchase A/c	Dr.	1,000.00	
Input CGST A/c	Dr.	90.00	
Input SGST A/c	Dr.	90.00	
To M/s X & Co			1,180.00

Cost Treatment:

Profit & Loss Account/ Cost Sheet				Balance Sheet			
Dr.	Amount	Cr.	Amount	Liabilities	Amount	Assets	Amount
To Purchase/ Cost of Materials Consumed/ Material Cost	1,000	Cl. Stock/ WIP	1,000	M/s X & Co	1,180	Cl. Stock/ WIP	1,000
						Input CGST 9%	90
						Input SGST 9%	90
Total	1,000		1,000		1,180		1,180

38. AS 2 states in determining the cost of inventories it is appropriate to exclude certain costs and recognise them as expenses in the period in which they are incurred. This includes ……. (c) administrative overheads that do not contribute to bringing the inventories to their present location and condition; If cost sheet is prepared accordingly, then administrative overheads is to be added after calculating the Cost of Production. In this study note, this has not been followed. Rather the traditional presentation of cost sheet is followed.

ii. If the Buyer (M/s Y & Co.) is not a GST Registered Firm/ End User:

In it's Books, the journal entry will be:

Cement/ Purchase A/c	Dr.	1,180.00	
To M/s X & Co			1,180.00

Cost Treatment:

Profit & Loss Account/ Cost Sheet				Balance Sheet			
Dr.	Amount	Cr.	Amount	Liabilities	Amount	Assets	Amount
To Purchase/ Cost of Materials Consumed/ Material Cost	1,180	Cl. Stock/ WIP	1,180	M/s X & Co	1,180	Cl. Stock/ WIP	1,180
Total	1,180		1,180		1,180		1,180

B. On Capital Expenses Expenses on which ITC is available (Ex: Plant & Machinary):

Example: Purchase of Machinery:

Purchase of Machinery from M/s X & Co

Machinery	1 Nos	₹ 1000.00
CGST (9%)		₹ 90.00
SGST (9%)		₹ 90.00
Total		₹ 1180.00

i. If the Buyer (M/s Y & Co.) is GST Registered Firm:

In it's Books, the journal entry will be:

Machinery A/c	Dr.	1,000.00	
Input CGST A/c	Dr.	90.00	
Input SGST A/c	Dr.	90.00	
To M/s X & Co			1,180.00

Cost Treatment:

Depreciation A/c	Dr.	100.00	
To Machinery A/c			100.00

Profit & Loss Account/ Cost Sheet				Balance Sheet			
Dr.	Amount	Cr.	Amount	Liabilities	Amount	Assets	Amount
To Depreciation (10% of ₹ 1,000/-)	100	By Loss	100	M/s X & Co	1,180	WDV of Machinery	900
						Input CGST 9%	90
						Input SGST 9%	90
						Profit & Loss A/c	100
Total	100		100		1,180		1,180

ii. If the Buyer (M/s Y & Co.) is not GST Registered Firm/ End User:

In it's Books, the journal entry will be:

Machinery A/c	Dr	1,180.00	
To M/s X & Co			1,180.00

Cost Treatment:

Depreciation A/c	Dr	118.00	
To Machinery A/c			118.00

Profit & Loss Account/ Cost Sheet				Balance Sheet			
Dr.	Amount	Cr.	Amount	Liabilities	Amount	Assets	Amount
To Depreciation (10% of ₹ 1180/-)	118	By Loss	118	M/s X & Co	1,180	WDV of Machinery	1,062
						Profit & Loss A/c	118
Total	118		118		1,180		1,180

C. On Capital Expenses on which ITC is not available (Ex: Mobile):

Example: Purchase of Mobile:

Purchase of Machinery from M/s X & Co

Mobile	1 Nos	₹ 1,000.00
CGST (9%)		₹ 90.00
SGST (9%)		₹ 90.00
Total		₹ 1180.00

iii. If the Buyer (M/s Y & Co.):

In it's Books, the journal entry will be:

Mobile A/c	Dr	1,180.00	
To M/s X & Co			1,180.00

Cost Treatment:

Depreciation A/c	Dr	118.00	
To Machinery A/c			118.00

Profit & Loss Account/ Cost Sheet				Balance Sheet			
Dr.	Amount	Cr.	Amount	Liabilities	Amount	Assets	Amount
To Depreciation (10% of ₹ 1180/-)	118	By Loss	118	M/s X & Co	1,180	WDV of Mobile	1,062
						Profit & Loss A/c	118
Total	118		118		1,180		1,180

Conclusion:

Cost Treatment of GST depends on following factors:

1. Status of the Organisation (GST Registered or Not)
2. Depends on Nature of Expenses (Revenue or Capital)
3. ITC on GST is applicable or Not.

Illustration 4

MNQ LLP submits the following information on 31st March 2022. Based on the given data prepare a statement of cost.

Details	₹
Sales for the year	2,75,000
Inventories at the beginning of the year: Finished goods	7,000
Work in Progress	4,000
Purchase of the material for the year	1,10,000
Material inventory: At the beginning of the year	3,000
At the end of the year	4,000
Direct Labour	65,000
Factory overheads: 60% of direct labour cost	
Inventories at the end of the year: Finished goods	8,000
Work in Progress	6,000
Other expenses for year:	
Selling expenses - 10% of sales	
Administrative expense – 5% of sales	

Solution

Details	₹	₹
Inventory (RM) at the beginning of the year		
Add Purchase of RM during the year	3,000	
	1,10,000	
Less Inventory (RM) at the end of the year	1,13,000	
	(4,000)	
Material consumed		**1,09,000**
Add Direct Labour		65,000
Prime Cost		**1,74,000**
Add Factory Overheads @ 60% of direct labour		39,000
Works Cost		**2,13,000**
Adjustment for work in progress		
Opening WIP	4,000	
Less Closing WIP	(6,000)	(2,000)
		2,11,000
Add Administrative Overheads		
@ 5% of Sales (275000)		13,750
Cost of Production		**2,24,750**
Adjustment for Finished goods		
Opening Stock of Finished Goods	7,000	
Less Closing stock of Finished Goods	(8,000)	(1,000)
Cost of goods sold		**2,23,750**
Selling overheads		
@ 10% of sales (275000)		27,500
Cost of Sales		**2,51,250**
Profit (Balancing figure)		**23,750**
Sales		**2,75,000**

Illustration 5

X Ltd Provides you the following figures for the year 2021-22:

Details	Amount (₹)
Direct Material	3,20,000
Direct Wages	8,00,000
Production Overheads (25% variable)	4,80,000
Administration Overheads (75% fixed)	1,60,000
Selling and Distribution Overheads ($^{2}/_{3rd}$ fixed)	2,40,000
Sales @ ₹ 125 per unit	25,00,000

For the year 2022-23, it is estimated that:

1. Output and sales quantity will increase by 20% by incurring additional advertisement expenses of ₹ 45,200.
2. Material prices will go up 10%.
3. Wage Rate will go up by 5% along with, increase in overall direct labour efficiency by 12%.
4. Variable Overheads will increase by 5%.
5. Fixed Production Overheads will increase by $33^{1}/_{3}$%.

Required:

a) Calculate the Cost of Sales for the year 2021-22 and 2022-23.

b) Find out the new selling price for the year 2022-23.

   i) If the same amount of profit is to be earned as in 2021-22.

   ii) If the same percentage of profit to sales is to be earned as in 2021-22.

   iii) If the existing percentage of profit to sales is to be increased by 25%.

   iv) If Profit per unit ₹10 is to be earned.

Solution:

a) Computation of Cost of Sales for the year 2021-22 and 2022-23

	2021-22	2022-23	
Sales Unit	$= \frac{₹25,00,000}{₹125} = 20,000$	20,000 × 120% = 24,000	
Direct Material Cost	3,20,000	3,20,000×120%×110%	4,22,400
Direct Wages	8,00,000	$8,00,000 \times 120\% \times 105\% \times \frac{100}{112}$	9,00,000
Prime Cost	**11,20,000**		**13,22,400**
Add: Variable Production OH	4,80,000 × 25% = 1,20,000	1,20,000 × 120% × 105%	1,51,200
Fixed Production OH	4,80,000 × 75% = 3,60,000	3,60,000 × $133^{1}/_{3}$%	4,80,000
Works Cost	**16,00,000**		**19,53,600**
Add: Variable Administrative OH	1,60,000 × 25% = 40,000	40,000 × 120% × 105%	50,400
Fixed Administrative OH	1,60,000 × 75% = 1,20,000		1,20,000
Cost of Production	**17,60,000**		**21,24,000**

Add: Variable S&D OH	$^1/_3 \times 2,40,000 = 80,000$	$80,000 \times 120\% \times 105\%$	1,00,800
Fixed S & D OH	$^2/_3 \times 2,40,000 = 1,60,000$		1,60,000
Advertisement Exp.			45,200
Cost of Sales	**20,00,000**		**24,30,000**

b) i) Selling Price of 2022-23 if same amount of profit is to be earned as in 2021-22

$$= \frac{\text{Cost of Sales + Expected Profit}}{\text{No. of Sales Unit}} = \frac{24,30,000 + 5,00,000}{24,000} = ₹\ 122.08$$

Profit for the year 2021-22 = Sales – Cost of Sales = 25,00,000 – 20,00,000 = ₹5,00,000

ii) Selling Price of 2022-23 if the same percentage of profit to sales is to be earned as in 2021-22

Percentage of Profit to Sales in 2021-22 $= \frac{5,00,000}{25,00,000} \times 100 = 20\%$

Cost of Sales + Profit = Sales

or, 24,30,000 + 20% of Sales = Sales

or, Sales $= \frac{24,30,000}{80\%} = ₹30,37,500$

Selling Price per unit $= \frac{₹30,37,500}{24,000} = ₹\ 126.5625$

iii) Selling Price of 2022-23 if the existing profit to sales percentage is increased by 25%

$\therefore$ Profit to Sales percentage = 20 + 25% × 20 = 25%

Cost of Sales + Profit = Sales

or, 24,30,000 + 25% of Sales = Sales

or, Sales $= \frac{24,30,000}{75\%} = ₹\ 32,40,000$

Selling Price per unit $= \frac{₹32,40,000}{24,000} = ₹\ 135$

iv) Selling Price of 2022-23 if profit per unit of ₹10 is to be earned

Sales = 24,30,000 + 10 × 24,000 = ₹26,70,000

Selling Price per unit $= \frac{₹26,70,000}{24,000} = ₹111.25$

Illustration 6

The following are the costing records for the year 2021 of a manufacturer:

Production 10,000 units; Cost of Raw Materials ₹2,00,000; Labour Cost ₹1,20,000; Factory Overheads ₹ 80,000; Office Overheads ₹40,000; Selling Expenses ₹10,000, Rate of Profit 25% on the Selling Price.

The manufacturer decided to produce 15,000 units in 2022. It is estimated that the cost of raw materials will increase by 20%, the labour cost will increase by 10%, 50% of the overheads charges are fixed and the other 50% are variable. The selling expenses per unit will be reduced by 20%. The rate of profit will remain the same.

Prepare a Cost Statement for the year 2022 showing the total profit and selling price per unit.

Solution:

Cost Sheet for the year 2021

Production Unit	10,000		
		Cost per unit ₹	Total ₹
Direct Material	$\frac{2,00,000}{10,000}$ = ₹ 20	20	2,00,000
Labour Cost	$\frac{1,20,000}{10,000}$ = ₹ 12	12	1,20,000
Prime Cost		**32**	**3,20,000**
Add: Factory OH			
Variable 80,000 × 50%	$\frac{40,000}{10,000}$ = ₹ 4	4	40,000
Fixed 80,000 × 50%		4	40,000
Works Cost		**40**	**4,00,000**
Add: Office OH			
Variable 40,000 × 50%	$\frac{20,000}{10,000}$ = ₹ 2	2	20,000
Fixed 40,000 × 50%		2	20,000
Cost of Production		**44**	**4,40,000**
Add: S & D OH	$\frac{10,000}{10,000}$ = ₹ 1	1	10,000
Cost of Sales		**45**	**4,50,000**
Add: Profit (Bal. fig.)		15	1,50,000
Sales	(WN 1)	**60**	**6,00,000**

Working Notes:

1. Computation of Selling Price of 2021

Cost of Sales + Profit = Sales

or, 4,50,000 + 25% of Sales = Sales

or, Sales = $\frac{4,50,000}{75\%}$ = ₹ 6,00,000

∴ Selling Price per unit = $\frac{6,00,000}{10,000}$ = ₹ 60

Cost Sheet for the year 2022

Production Unit	15,000		
		Total ₹	Cost per unit ₹
Direct Material	15,000 × (20 × 120%) = 15,000 × 24	3,60,000	24.00
Labour Cost	15,000 × (12 × 110%) = 15,000 ×13.20	1,98,000	13.20
Prime Cost		**5,58,000**	**37.20**
Add: Factory OH			
Variable	15,000 × 4	60,000	4

Fixed		40,000	2.67
Works Cost		**6,58,000**	**43.87**
Add: Office OH			
Variable	15,000 × 2	30,000	**2**
Fixed		20,000	1.33
Cost of Production		**7,08,000**	**47.20**
Add: S & D OH	15,000 × 1 × 80%	12,000	0.80
Cost of Sales		**7,20,000**	**48.00**
Add: Profit (Bal. fig.)		2,40,000	16
Sales (WN 2)	(WN 1)	**9,60,000**	**64**

Working Notes 2

Computation of Selling Price of 2022

Cost of Sales + Profit = Sales

or, 7,20,000 + 25% of Sales = Sales

or, Sales = $\frac{7,20,000}{75\%}$ = ₹ 9,60,000

∴ Selling Price per unit = $\frac{9,60,000}{15,000}$ = ₹ 64.

Illustration 7

Following data is available from the cost records of a company for the month of March 2022:

1. Opening stock of job as on 1st March 2022

   Job no. A 99: Direct Material - ₹80, Direct Wages - ₹150 and Factory Overheads - ₹200.

   Job no. A 77: Direct Material - ₹420, Direct Wages - ₹450 and Factory Overheads - ₹400.

2. Direct material issued during the month of March 2022 was:

   Job no. A 99 - ₹120

   Job no. A 77 - ₹280

   Job no. A 66 - ₹225

   Job no. A 55 - ₹300

3. Direct labour details for March 2022 were:

Job no.	Hours	Amount (₹)
A 99	400	600
A 77	200	450
A 66	300	675
A 55	100	225

4. Factory Overheads are applied to jobs on production according to direct labour hour rate which is ₹2.10 per hour.

5. Factory Overheads incurred in March 2022 were ₹2,100

6. Job numbers A 99 and A 77 were completed during the month. They were billed to the customers at a price which included 15% of the price of the job for Selling & Distribution expenses and another 10% of the price for Profit.

Prepare

a. Job Cost Sheet for Job No. A 77 and A 99.

b. Determine the selling price for the jobs.

c. Calculate the value of work in process.

Solution:

Working Notes

1. The Factory Overheads actually incurred are ₹2,100. This amount to be apportioned on the basis of labour hours. So, the rate to be considered as ₹ 2.10 per unit $(=\frac{₹\ 2,100}{1,000\ \text{hours}})$ and not ₹ 2 per unit. If we consider the above mentioned point the calculations for Job Sheets and for the work in progress will change accordingly.
2. Work in progress is to be calculated for the incomplete jobs hence job no. A 66 and A 55 should only be included in the calculations of work in progress.

a. Job Cost Sheets for the month of March 2022

Cost Items	Job A 77 Amount (₹)		Job A 99 Amount (₹)	
Direct Material Issued		280		120
Direct Labour		450		600
Prime Cost		730		720
Add: Factory Overheads	2.10 x 200 =	420	2.10 x 400	840
Add: Opening WIP	420 + 450 + 400 =	1,270	80 + 150 + 200 =	430
Factory Cost		2,420		1,990
Add: S&D Overheads (WN 1)		484		398
Cost of Sales		2,904		2,388
Add: Profit (WN 1)		323		265
b) Selling Price		**3,227**		**2,653**

Working Note

1. Factory cost + Selling & Distribution Overheads + Profit = Selling Price

Job A 77

Let Selling Price be ₹x

∴ Selling & Distribution Overheads = 15% × Selling Price = 0.15x

and, Profit = 10% × Selling Price = 0.10x

or, 2,420 + 0.15x + 0.10x = x

or, $x = \frac{2,420}{0.75} = ₹\ 3,227$

∴ Selling & Distribution Overheads = 0.15 × 3,227 = ₹484

and, Profit = 0.10 × 3,227 = ₹323

Similarly

Selling Price of Job 99 $= \frac{₹\ 1,990}{0.75} = ₹\ 2,653$

∴ Selling & Distribution Overheads = 0.15 × 2,653 = ₹398

and, Profit = 0.10 × 2,653 = ₹265

c) Calculation of Closing Work in Progress of Job A 55 and A 66

	Job A 55 Amount (₹)	Job A 66 Amount (₹)
Direct Material Issued	300	225
Direct Labour	225	675
Prime Cost	525	900
Add: Factory Overheads	100 × 2.10 = 210	300 × 2.10 = 630
Value of Work in Progress	735	1,530

∴ Total Value of Work in Progress = 735 + 1,530 = ₹2,265

Illustration 8

Prepare Cost Sheet for an engineering company which produces standard components in batches of 1,000 pieces each. A batch passes through three processes viz. Foundry, Machining and Assembly.

The materials used for a batch number 001 were: Foundry 1,300 tonnes @ ₹ 50 per tonne of which 50 tonnes were sent back to stores.

Other details

Process	Direct Labour	Overheads
Foundry	200 Hours @ ₹10	₹15 per Labour Hour
Machining	100 Hours @ ₹5	₹20 per Labour Hour
Assembly	100 Hours @ ₹15	₹10 per Labour Hour

A comparison of actual costs with estimated cost discloses that material and overheads have exceeded the estimates by 20% whereas the estimated labour cost is 10% more than the actual. Show the variances with respect to the estimates.

Solution:

Cost sheet for the batch no. 001

Standard batch size of 1,000 pieces

Cost Items	Actual ₹		Estimated ₹		Variance ₹	Favourable / Adverse
Direct Material	1,250 × 50	62,500	$62,500 \times \frac{100}{120}$	52,083	10,417	A
Direct Labour Foundry	200 × 10	2,000	$2,000 \times \frac{110}{100}$	2,200	200	F
Machining	100 × 5	500	$500 \times \frac{110}{100}$	550	50	F
Assembly	100 × 15	1,500	$1,500 \times \frac{110}{100}$	1,650	150	F
Prime Cost		**66,500**		**56,483**	**10,017**	**A**

Add: Factory Overheads Foundry	200 × 15	3,000	$3,000 \times \frac{100}{120}$	2,500	500	A
Machining	100 × 20	2,000	$2,000 \times \frac{100}{120}$	1,667	333	A
Assembly	100 × 10	1,000	$1,000 \times \frac{100}{120}$	833	167	A
Factory Cost		**72,500**		**61,483**	**11,017**	**A**

Working Note

1. For Material and Factory Overheads

   Actual cost is 20% excess than Estimated cost

   Let Estimated cost be x

   $\therefore$ x + 20%x = 62,500 (Actual Material Cost)

   or, $x = 62,500 \times \frac{100}{120}$ = ₹ 52,083 (Estimated Material Cost)

   Similarly, Factory Overheads cost has been calculated

2. For Direct Labour

   Estimated Cost is 10% more than Actual Cost

   So, Estimated Cost = Actual Cost $\times \frac{110}{100}$

Illustration 9

An advertising agency has received an enquiry for which you are supposed to submit the quotation. Bill of material prepared by the production department for the job states the following requirement of material:

Paper 10 reams @ ₹1,800 per ream

Ink and other printing material ₹ 5,000

Binding material & other consumables ₹ 3,000

Some photography is required for the job. The agency does not have a photographer as an employee. It decides to hire one by paying ₹10,000 to him. Estimated job card prepared by production department specifies that service of following employees will be required for this job:

Artist (₹12,000 per month) 80 hours

Copywriter (₹10,000 per month) 75 hours

Client servicing (₹9,000 per month) 30 hours

The primary packing material will be required to the tune of ₹4,000. Production Overheads 40% of direct cost, while the Selling & Distribution Overheads are likely to be 25% on Production Cost. The agency expects a profit of 20% on the quoted price. The agency works 25 days in a month and 6 hours a day.

Solution:

Quotation for a Printing Job

Items	Amount (₹)	Amount (₹)
Direct Material		
⅄ Paper	10 ×1,800 = 18,000	
⅄ Ink and other printing material	5,000	
⅄ Binding material & consumables	3,000	
⅄ Primary packing material	4,000	30,000
Direct Labour		
⅄ Photographer's Charge	10,000	
⅄ Artist (WN 1)	6,400	
⅄ Copywriter (WN 2)	5,000	
⅄ Client Servicing (WN 3)	1,800	23,200
Prime Cost		**53,200**
Add: Production Overheads	40% × 53,200	21,280
Factory Cost		**74,480**
Add: Selling & Distribution Overheads	25% × 74,480	18,620
Cost of Sales		**93,100**
Add: Profit (WN 4)		23,275
Price to be quoted		**1,16,375**

Working Notes:

1. Charge per month ₹ 12,000
   Working Hours per month (25 × 6) 150 hours
   Actual Hours worked 80
   ∴ Labour charge for Artist = $12,000 \times \frac{80}{150}$ = ₹ 6,400
2. Charge per month ₹ 10,000
   Working Hours per month (25 × 6) 150 hours
   Actual Hours worked 75
   ∴ Labour charge for Copywriter = $10,000 \times \frac{75}{150}$ = ₹ 5,000
3. Charge per month ₹ 9,000
   Working Hours per month (25 x 6) 150 hours
   Actual Hours worked 30
   ∴ Labour charge for Client servicing = $9,000 \times \frac{30}{150}$ = ₹ 1,800
4. Cost of Sales + Profit = Price to be quoted
   or, 93,100 + 20% × Price to be quoted = Price to be quoted
   or, Price to be quoted = $93,100 \times \frac{100}{80}$ = ₹ 1,16,375
   Profit = 1,16,375 – 93,100 = ₹23,275

Illustration 10

The following figures were extracted from the Trial Balance of a company as on 31st December, 2021.

Particulars	Debit Amount (₹)	Credit Amount (₹)
Inventories		
Raw Material	1,40,000	
Work in Progress	2,00,000	
Finished Goods	80,000	
Office Appliances	17,400	
Plant and Machinery	4,60,500	
Buildings	2,00,000	
Sales		7,68,000
Sales Returns	14,000	
Material Purchased	3,20,000	
Freight on materials	16,000	
Purchase Returns		4,800
Direct Labour	1,60,000	
Indirect Labour	18,000	
Factory Supervision	10,000	
Factory repairs and upkeep	14,000	
Heat, Light & Power	65,000	
Rates & Taxes	6,300	
Miscellaneous Factory Expenses	18,700	
Sales Commission	33,600	
Sales Travelling	11,000	
Sales Promotion	22,500	
Distribution Department Salaries and Wages	18,000	
Office Salaries	8,600	
Interest on borrowed funds	2,000	

Further details are given as follows:

Closing inventories are Material ₹1,80,000, Work in Progress ₹1,92,000 and Finished Goods ₹1,15,000.

Accrued expenses are Direct Labour ₹8,000, Indirect Labour ₹1,200 and Interest ₹2,000.

Depreciation should be provided as 5% on Office Appliances, 10% on Machinery and 4% on Buildings.

Heat, light and power are to be distributed in the ratio of 8: 1: 1 among factory, office and distribution respectively.

Rates & Taxes apply 2/3rd to the factory and 1/3rd to office.

Depreciation on building to be distributed in the ratio of 8: 1: 1 among factory, office and distribution respectively.

Prepare a Cost Sheet showing all important components and also a condensed Profit & Loss Account for the year.

Solution:

Particulars	Amount (₹)	Amount (₹)
Direct Materials		
Opening Stock of Raw Material	1,40,000	
Add: Purchases	3,20,000	
Add: Freight	16,000	
Less: Returns	4,800	
Less: Closing Stock	1,80,000	2,91,200
Direct Labour	1,60,000	
Add: Accrued	8,000	1,68,000
Prime Cost		**4,59,200**
Add: Factory Overheads		
Indirect Labour	18,000	
Add: Accrued indirect labour	1,200	
Factory supervision	10,000	
Factory Repairs & upkeep	14,000	
Heat, Light & Power (8/10 × 65,000)	52,000	
Rates & Taxes (2/3 × 6,300)	4,200	
Miscellaneous Factory Expenses	18,700	
Depreciation on Plant & Machinery (10% × 4,60,500)	46,050	
Depreciation on Buildings (8/10 × 4% × 2,00,000)	6,400	
	1,70,550	
Add: Opening WIP	2,00,000	
Less: Closing WIP	(1,92,000)	1,78,550
Factory Cost		6,37,750
Add: Administration Overheads		
Heat, Light & Power (1/10 x 65,000)	6,500	
Rates & Taxes(1/3 x 6,300)	2,100	
Depreciation on Buildings(1/10 x 4% x 2,00,000)	800	
Depreciation on office appliances (5% x 17,400)	870	
Office salaries	8,600	18,870

Cost of Production		6,56,620
Add: Opening Stock of Finished Goods	80,000	
Less: Closing Stock of Finished Goods	1,15,000	(35,000)
Cost of Goods Sold		6,21,620
Add: Selling & Distribution Overheads		
Heat, Light & Power (1/10 × 65,000)	6,500	
Depreciation on Buildings (1/10× 4% × 2,00,000)	800	
Sales Commission	33,600	
Sales Travelling	11,000	
Sales Promotion	22,500	
Distribution department salaries & wages	18,000	92,400
Cost of Sales		**7,14,020**

Condensed Profit and Loss Account for the year ended 31-12-2021

Particulars	₹	₹	Particulars	₹	₹
To Cost of Sales		7,14,020	By Sales	7,68,000	7,54,000
To Interest on Borrowings	2,000		Less: Sales Return	14,000	
Add: Accrued	2,000	4,000			
To Profit (Bal.fig)		35,980			
		7,54,000			7,54,000

Illustration 11

PR Ltd manufactures and sells a typical brand of Tiffin Boxes under its on brand name. The installed capacity of the plant is 1,20,000 units per year distributable evenly over each month of calendar year. The Cost Accountant of the company has informed the following cost structure of the product, which is as follows:

Raw Material ₹ 20 per unit.
Direct Labour ₹ 12 per unit.
Direct Expenses ₹ 2 per unit
Variable Overheads ₹ 16 per unit
Fixed Overheads ₹ 3,00,000.

Semi-variable Overheads are as follows:

₹ 7,500 per month upto 50% capacity and additional ₹ 2,500 per month for every additional 25% capacity utilization or part thereof.

The plant was operating at 50% capacity during the first seven months of the calendar year 2021, at 100% capacity in the remaining months of the year.

The selling price for the period from 1st January, 2021 to 31st July, 2021 was fixed at ₹ 69 per unit. The firm has been monitoring the profitability and revising the selling price to meet its annual profit target of ₹ 8,00,000. You

are required to suggest the selling price per unit for the period from 1st August, 2021to 31st December, 2021.

Prepare Cost Sheet clearly showing the total and per unit cost and also profit for the period.

1. From 1st January to 31st July, 2021.
2. From 1st August to 31st December, 2021.

Solution:

Cost Sheet

Capacity Utilisation Period	50% Capacity 1st January – 31st July		100% Capacity 1st August– 31st December	
Units	$\frac{1,20,000}{12} \times 7 \times 50\% = 35,000$		$\frac{1,20,000}{12} \times 5 \times 100\% = 50,000$	
Raw Material	20 × 35,000	7,00,000	20 × 50,000	10,00,000
Direct Labour	12 × 35,000	4,20,000	12 × 50,000	6,00,000
Direct Expenses	2 × 35,000	70,000	2 × 50,000	1,00,000
Variable Overheads	16 × 35,000	5,60,000	16 × 50,000	8,00,000
Fixed Overheads	$\frac{3,00,000}{12} \times 7$	1,75,000	$\frac{3,00,000}{12} \times 5$	1,25,000
Semi-Variable Overheads	7,500 × 7	52,500	12,500 × 5	62,500
Total Cost		19,77,500		26,87,500
Profit (WN 1)		4,37,500		3,62,500
Sales (WN 2)	69 × 35,000	24,15,000		30,50,000
Selling Price per unit (WN 2)		69	$\frac{30,50,000}{50,000}$	61
Cost per unit	$\frac{19,77,500}{35,000}$	56.50	$\frac{26,87,500}{50,000}$	53.75

Working Notes:

1. Selling Price for 1st January – 31st July = ₹69

   ∴ Sales = 69 × 35,000 = ₹24,15,000

   Profit for 1st January – 31st July = 24,15,000 – 19,77,500 = ₹4,37,500

2. Expected total profit for the year ₹8,00,000

   ∴ Profit to earn from 1st August – 31st December = 8,00,000 – 4,37,500 = ₹3,62,500

   ∴ Expected Sale from 1st August – 31st December = ₹30,50,000

   Expected Selling price per unit from 1st August – 31st December = (₹ 30,50,000)/50,000 = ₹ 61

Exercise

A. Theoretical Questions:

⊙ **Multiple Choice Questions:**

1. Prime cost is _____
   a. all costs incurred in manufacturing a product
   b. the total of direct costs
   c. the material cost of a product
   d. the cost of operating a department
2. A company employs three drivers to deliver goods to its customers. The salaries paid to these drivers are:
   a. a part of prime cost
   b. a direct production expense
   c. a production overheads
   d. a selling and distribution overheads
3. A company has to pay a Re 1 per unit royalty to the designer of a product which it manufactures and sells. The royalty charge would be classified in the company's accounts as a ____
   a. Direct expense
   b. Production overheads
   c. Administrative overheads
   d. Selling overheads
4. _____ is a method of dealing with overheads which involves spreading common costs over cost centers on the basis of benefit received.
   a. overheads absorption
   b. overheads apportionment
   c. overheads allocation
   d. overheads analysis
5. Which of the following classification is meant for distinction between direct cost and indirect cost?
   a. Function
   b. Element
   c. Variability
   d. Controllability
6. Which of the following is applicable for Cost Control?
   a. It is related with the future
   b. It is a corrective function
   c. It ends when the targets are achieved
   d. It challenges the standards set
7. _____ is anything for which a separate measurement of cost is required.
   a. Cost driver
   b. Cost centre
   c. Cost unit
   d. Cost object
8. Ticket counter in a Metro Station is an example of
   a. Profit centre
   b. Investment centre
   c. Cost centre

d. Revenue centre

9. Which of the following is an example of functional classification of cost?
   a. Direct labour cost
   b. Direct material cost
   c. Factory overheads
   d. Indirect material cost
10. Absorption costing is also referred as _____
   a. Historical costing
   b. Traditional costing
   c. Full costing
   d. All of the above terms
11. What is the primary objective of cost accounting?
   a. Maximize profits
   b. Record financial transactions
   c. Provide financial statements
   d. Facilitate cost control and decision-making
12. What does the term "opportunity cost" refer to in cost accounting?
   a. Actual monetary expenditure
   b. Cost of the next best alternative foregone
   c. Fixed manufacturing costs
   d. Variable selling expenses
13. In the context of cost elements, which category includes the cost of raw materials, direct labour, and direct expenses?
   a. Prime Cost
   b. Conversion Cost
   c. Overheads Cost
   d. Indirect Cost
14. What type of cost is incurred to support multiple cost objects but cannot be directly traced to any specific one?
   a. Direct Cost
   b. Indirect Cost
   c. Variable Cost
   d. Fixed Cost
15. What is the formula for calculating the cost of production in a manufacturing entity?
   a. Total Cost - Opening Stock
   b. Opening Stock + Purchases - Closing Stock
   c. Direct Materials + Direct Labour + Factory Overheads
   d. Selling Price - Gross Profit
16. Which of the following is deducted from the total cost to calculate the net profit?
   a. Selling Expenses
   b. Opening Stock
   c. Direct Materials
   d. Indirect Labour
17. If a business has an opportunity cost of ₹10,000 for choosing one project over another, what is the economic cost?
   a. ₹ 10,000

b. ₹ 0
c. The same as opportunity cost
d. Cannot be determined

18. If direct materials cost ₹ 20,000, direct labour is ₹ 15,000, and direct expenses are ₹ 5,000, what is the prime cost?
    a. ₹ 40,000
    b. ₹ 35,000
    c. ₹ 20,000
    d. ₹ 15,000
19. If fixed manufacturing costs are ₹ 50,000 and the number of units produced is 5,000, what is the fixed cost per unit?
    a. ₹10
    b. ₹ 5
    c. ₹ 50
    d. ₹ 0.1
20. If the direct materials consumed are ₹ 30,000, direct labour is ₹ 20,000, and factory overheads is ₹15,000, what is the total manufacturing cost?
    a. ₹ 50,000
    b. ₹ 65,000
    c. ₹ 30,000
    d. ₹ 20,000
21. If the gross profit is ₹ 40,000, selling expenses are ₹ 10,000, and administrative expenses are ₹ 5,000, what is the net profit?
    a. ₹ 40,000
    b. ₹ 35,000
    c. ₹ 25,000
    d. ₹ 15,000

Answer:

1	2	3	4	5	6	7	8	9	10	
b	d	a	b	b	c	d	d	c	d	
11	12	13	14	15	16	17	18	19	20	21
d	b	a	b	c	a	a	a	a	b	c

⊙ **Fill in the blanks**

1. Historical costs that cannot be recovered by any decision made now or in the future are called _____
2. Factory overheads costs are all manufacturing costs incurred in the factory except for _____ and _____ and _____
3. The sum of direct labour and factory overheads is termed _____
4. Product costs are _____ costs, that is, they are until they are sold; whereas period costs are matched immediately against the _____in the period in which it is earned.
5. Variable costs change _____in direct proportion to changes in output.
6. The net revenue forgone as a result of the rejection of an alternative is called an _____
7. Three inventory accounts are commonly used in manufacturing firms. They are raw materials, _____, and finished goods.
8. The beginning finished goods inventory plus the _____, minus the ending finished goods

inventory equals the cost of goods sold for a manufacturer.

9. The cost of direct materials used is the _____ plus _____minus the ending inventory of direct materials.
10. A variable cost is_____ per unit

Answer:

1	sunk costs	**2**	direct materials, direct labour, direct expenses
3	conversion cost	**4**	inventoriable, assets, revenue
5	in total	**6**	opportunity cost
7	work-in-process	**8**	cost of goods manufactured
9	beginning inventory of direct materials, purchases	**10**	constant

⊙ **Essay Type Questions**

1. Define the meaning of the term 'cost object' and provide three examples of cost objects.
2. Distinguish between a direct and indirect cost.
3. Describe how a given direct cost item can be both a direct and indirect cost.
4. Provide examples of each of the following:
   a. direct labour,
   b. indirect labour,
   c. direct materials,
   d. indirect materials, and
   e. indirect expenses.
5. Explain the meaning of the terms:
   a. prime cost,
   b. overheads, and
   c. cost allocations.
6. Distinguish between product costs and period costs.
7. Provide examples of decisions that require knowledge of how costs and revenues vary with different levels of activity.
8. Explain the meaning of each of the following terms:
   a. variable costs,
   b. fixed costs,
   c. semi-fixed costs, and
   d. semi-variable costs.

   Provide examples of costs for each of the four categories.
9. Distinguish between relevant (avoidable) and irrelevant (unavoidable) costs and provide examples of each type of cost.
10. Explain the meaning of the term 'sunk cost'.
11. Distinguish between incremental and marginal costs.
12. What is an opportunity cost? Give some examples.
13. Explain responsibility accounting.

Case Study[39]

The Northshire Hospital Trust operates two types of specialist X-ray scanning machines, XR1 and XR50. Details for the next period are estimated as follows:

Machine	XR1	XR50
Running hours	1100	2000
Variable running costs (excluding plates)	27500	64000
Fixed costs	20000	97500

A brain scan is normally carried out on machine type XR1: this task uses special X-ray plates costing ₹ 40 each and takes four hours of machine time. Because of the nature of the process, around 10 per cent of the scans produce blurred and therefore useless results.

Required:

a. Calculate the cost of a satisfactory brain scan on machine type XR1.

b. Brain scans can also be done on machine type XR50 and would take only 1.8 hours per scan with a reduced reject rate of 6 per cent. However, the cost of the X-ray plates would be ₹ 55 per scan.

Required: Advise which type should be used, assuming sufficient capacity is available on both types of machine.

Solution (Case Study)

a. Cost of a Satisfactory Brain Scan on Machine XR1:

$$\text{Variable Running Costs (XRI)} = 1100 \text{ running hours} \times \frac{₹20{,}000}{20{,}000 \text{ running hours}} = ₹\ 11{,}000$$

$$\text{Cost of X-ray Plates (XRI)} = (90\% \times \text{Number of Scans}) \times \text{Cost per Plate}$$

$$= (90\% \times \frac{1100 \text{ running hours}}{4 \text{ hours per scan}}) \times ₹\ 40 = ₹\ 9{,}900$$

Total Cost (XRI) = Variable Running Costs + Fixed Costs + Cost of X-ray Plates

= ₹ 11,000 + ₹ 27,500 + ₹ 9,900

= ₹ 48,400

b. Comparison and Recommendation:

For machine XR50, the cost of a brain scan includes variable running costs, fixed costs, and the cost of X-ray plates for a successful scan.

$$\text{Variable Running Costs (XR50)} = 2000 \text{ running hours} \times \frac{₹64{,}000}{20{,}000 \text{ running hours}} = ₹\ 64{,}000$$

Cost of X-ray Plates (XR50) = (94% × Number of Scans) × Cost per Plate

$$= (94\% \times \frac{2000 \text{ running hours}}{1.8 \text{ hours per scan}}) \times ₹\ 55 = ₹\ 57{,}900$$

Total Cost (XR50) = Variable Running Costs + Fixed Costs + Cost of X-ray Plates

= ₹ 64,000 + ₹ 97,500 + ₹ 57,900

= ₹ 2,19,400

Recommendation:

Based on the cost analysis, machine XRI is more cost-effective for performing brain scans. The total cost for a satisfactory brain scan on XRI is ₹ 48,400, while the total cost for XR50 is ₹ 2,19,400. Therefore, it is advisable to use machine XRI for brain scans, assuming sufficient capacity is available on both types of machines.

[39] Adopted from Management and Cost Accounting, Eighth Edition, by Colin Drury.

Cost Ascertainment – Elements of Cost

2

This Module Includes

2.1 Material Costs

2.2 Employee Costs

2.3 Direct Expenses

2.4 Overheads

Cost Ascertainment – Elements of Cost

SLOB Mapped against the Module:

To attain in-depth knowledge about element-wise cost ascertainment with a detail coverage of inventory management and control and apportionment of overheads costs. (CMLO 2b 5b)

Module Learning Objectives:

After studying this module, the students will be able to –

- Conceptualize the various elements of cost which are basic to the cost accumulation process
- Understand aspects of accounting for material cost
- Understand aspects of accounting for employee (labour) cost
- Understand aspects of accounting for overheads applicable in absorption costing system

Introduction

2

In the last section of the previous module it is discussed that while ascertaining the cost of a product the first stage is to compute the prime cost which comprises of material cost, labour cost[1], and direct expenses. COST ACCOUNTING STANDARD - 1 (CAS - 1)[2] issued by the Council of the Institute of Cost Accountants of India gives various aspects of 'Classification of Cost'. According to para 6.1.1, 'items of costs differ on the basis of their nature. The natural groupings of cost are given as material, employee and expenses. According to this para, the elements of cost can be classified in the following three categories:

1. Material Cost
2. Employee Cost
3. Expenses

Accordingly, costs can be classified in the following three categories:

- Material Costs[3] – Material Costs are cost of materials used for the purpose of production of a product or rendering of a service, net of trade discounts, rebates, taxes and duties refundable that can be quantified with reasonable accuracy. It is important to note that these costs can be quantified with judicious exactness and thus are said to be traceable costs. If some portion of the material cost cannot be traced to the product or service, it is referred as indirect cost. Thus, material cost is recognized either as:
  - Direct material cost – these are the cost of materials which can be assigned to a cost object in an economically feasible way, or
  - Indirect material cost –these are cost of materials, which cannot be directly assigned to a particular cost object in an economically feasible way.
- Employee Costs[3] - Employee Costs are consideration, including benefits paid or payable to employees, permanent or temporary, for the purpose of production of a product or rendering of a service. In various cost accounting books, this is referred as Labour cost. It is important to note that these can be quantified with judicious exactness. Thus these costs are traceable costs. If some portion of the labour cost cannot be traced to the product or service, it is referred as indirect cost. Thus, labour cost is identified either as:
  - Direct employee cost – these are employee costs, which can be assigned to a cost object in an economically feasible way, or
  - Indirect employee cost – these are employee costs, which cannot be directly assigned to a particular cost object in an economically feasible way.

1. This is referred as Employee cost as per Cost Accounting Standard (CAS) 7, issued by the Council of the Institute of Cost Accountants of India (this along with the other CASs is covered in brief in Module 3 of this study note). In this study note the two terms are used interchangeably.
2. This standard was revised in 2015.
3. The definitions mentioned, are adopted from CAS 1

- Expenses - Expenses are costs other than material cost and employee cost incurred for the purpose of production of a product or rendering of a service. (example - cost of utilities, payment for bought out services, job processing charge etc.). It is important to note that these can be quantified with reasonable accuracy and are thus said to be traceable costs. If some portion of the expenses cannot be traced to the product or service, it is referred as indirect cost. Thus, expenses are either as:
  - Direct expenses – these are expenses except direct material and direct employee cost which can be assigned to a cost object.
  - Indirect expenses – these are expenses, which cannot be directly assigned to a particular cost object in an economically feasible way.

Indirect material, indirect employee cost and indirect expenses are summed up and referred as Overheads. Under absorption costing system[4], Overheads costs are absorbed to the product on a pre-determined rate[5]. Over /Under absorption arises when the overheads absorbed is more/less than the actual overheads incurred.

In this module, the elements of cost (material cost, employee/ labour cost and direct expenses) that are traceable to the products/ service are taken up for discussion in sections 2.1, 2.2 and 2.3 respectively. In section 2.4, the process of allocation, apportionment and absorption of overheads costs to the cost objects and cost units is discussed in details. It is important to note that the provision of the below mentioned cost accounting standards are predominantly[6] relevant for the purpose of conceptualising the various elements of cost:

Production and Operation Overheads	CAS 3
Material Cost	CAS 6
Employee Cost	CAS 7
Direct Expenses	CAS 10
Administrative Overheads	CAS 11
Selling and Distribution Overheads	CAS 15

4. Absorption costing is a costing system that is used in valuing inventory. It not only includes the cost of materials, labour and direct expenses, but also overheads costs (both variable and fixed manufacturing). Absorption costing is also referred to as full costing. (https://corporatefinanceinstitute.com/resources/knowledge/accounting/absorption-costing-guide/). The main advantage of using the method is that it is GAAP-compliant. It is required in preparing reports for financial statements and stock valuation purposes. AS 2 (Valuation of inventories) specifically includes 'Other costs which are incurred in bringing the inventories to their present location and condition', 'Other expenditure which is directly attributable to the purchase' and 'Trade discounts, rebates, duty drawbacks and other similar items are deducted in determining the costs of purchase'. Thus it is obvious that AS 2 recommends absorption costing system for valuation of inventories.
5. This, along with the issue of under/over absorption is discoursed in Module 1 of this study note and is also discussed in detail in the last section of this module.
6. There are other CAS which are also relevant for the purpose.

Material Costs

2.1

Material cost[7] is the cost of materials used to manufacture a product or provide a service. Material is the most important element of cost. In most manufacturing organisations, 50% to 70% of the total cost of a product is represented by the cost of the material. The percentages may differ from industry to industry. Especially for manufacturing sector, the material costs are of great significance. Inventory also constitutes a vital element in the working capital. So, it is conceptually equivalent to cash. Materials, as such, are the substances that are transformed into finished goods. Materials costs may be either direct or indirect.

- **Direct Materials** – There are three characteristics of direct materials:

  1. They are traceable to the cost unit.
  2. They represent a major element of the finished product cost.
  3. They can be identified directly with production of the product.

Paragraph 4.7.1 of CAS 6 defines direct material as materials the costs of which can be attributed to a cost object in an economically feasible way.

Examples may include cotton used for spinning cotton yarn, wood used in making furniture, or leather used in shoe-making.

- **Indirect Materials** –These include all other materials used in production (for example: nails in furniture manufacturing) and are considered to be a factory overheads cost[8].

Paragraph 4.7.2 of CAS 6 defines indirect material as materials, the costs of which cannot be directly attributed to particular cost object.

Material Control

Since material cost comprises a significant portion of the total cost of the product, it requires control. Material control may be defined as a system which ensures availability of the required quantity of material of proper quality at the proper time without unnecessarily blocking up of capital in stores. The system of material control should be so comprehensive that it covers the whole procedure from the point when order is placed with the suppliers up to the stage until the materials are consumed in production. In general, to effectively control materials, a business must maintain: (1) limited access, (2) segregation of duties, and (3) accuracy in recording. Some authors define material control as a management activity that administers how the inventory employed in the production process

7. This is discussed in CAS 6, issued by the Council of the Institute of Cost Accountants of India.
8. This is discussed in section 2.4 of this module.

is procured, handled and utilized. It is a process that requires planning, organisation and auditing of all the elements employed in certain productive activity. Materials control is based on (1) the physical control or safeguarding of materials and (2) control over the investment in materials.

The two important aspects of material control are:

1. To ensure the smooth flow of production without interruptions.
2. Prevention of excessive investments in materials stock.

In the below mentioned lines the objectives of material control are discussed.

Objectives of Material Control: The following steps have to be taken to see that there is no inefficiency as regards materials:

- **Availability:** The various materials and stores[9] necessary for carrying on production smoothly should always be available. This means not only ensuring supplies of the main raw materials and the chief stores which are required but also of small and inexpensive but necessary materials. For example, in a cotton textile mill supplies of cotton and coal will always be looked after, but it is also necessary that the proper lubricating oil for machines is also always available. Stoppage of production due to any reason is very costly and the person in charge of supply of materials and stores must see to it that production is not interrupted for want of any item of materials and stores.
- **Proper quality and price:** While purchasing the materials and stores, care should be taken to see that the requisite quality of materials is purchased and that the price paid is reasonably low. It is no use purchasing goods of inferior quality or of very superior quality.
- **Minimum wastage:** While various materials are being stored in the godowns, the loss or damage of various items must be kept as low as possible. The losses usually are pilferage or damage due to rust, dust, dirt or water. All these losses must be thoroughly kept under control.
- **No overstocking:** Investment in stocks of materials and stores must be kept as low as possible. This means that unnecessarily large stocks must not be maintained.
- **Information about availability of stocks:** Information must be continuously available regarding stock. This will ensure proper planning of work and also replenishment on time.
- **Minimum loss during process:** While the materials are being used in the factory the wastage must be kept at the minimum possible level. Some wastage is bound to be there, but efficiency demands that the wastage must not be allowed to go above the minimum level.

From the above mentioned objectives, the importance of material control can be stated as follows (represented pictorially)

9. The term 'Stores' is often used synonymously with materials, however, stores has a wider connotation covers not only raw materials consumed or utilized in production but also such other items as sundry supplies, maintenance stores, fabricated parts, components, tools, jigs, other items, consumables, lubricants etc. Finished and partly finished products are also often included under the term 'Stores'.

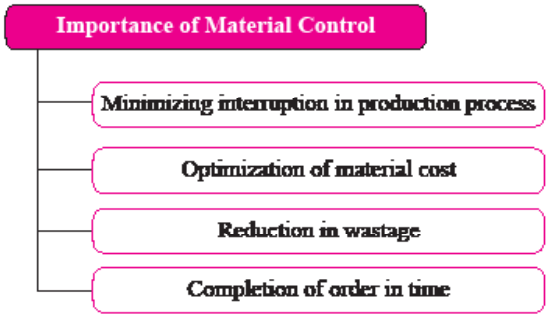


Figure 2.1: Importance of Material Control

The following are the requisites of material control system:

1. Coordination and cooperation between the various departments concerned viz purchase, receiving, inspection, storage, issues and accounts and cost departments.
2. Use of standard forms and documents in all the stages of control.
3. Classification, coordination, standardization and simplification of materials.
4. Planning of requirement of material.
5. Efficient purchase organisation.
6. Budgetary control of purchases.
7. Planned storage of materials, physical control as well as efficient book control through satisfactory storage control procedures, forms and documents.
8. Appropriate records to control issues and utilization of stores in production.
9. Efficient system of internal audit and internal checks.
10. System of reporting to management regarding material purchase, storage and utilization.

There are three broad areas where material control can be implemented:

1. Purchase and receipt
2. Stores and
3. Issue of material

This is pictorially represented as follows:

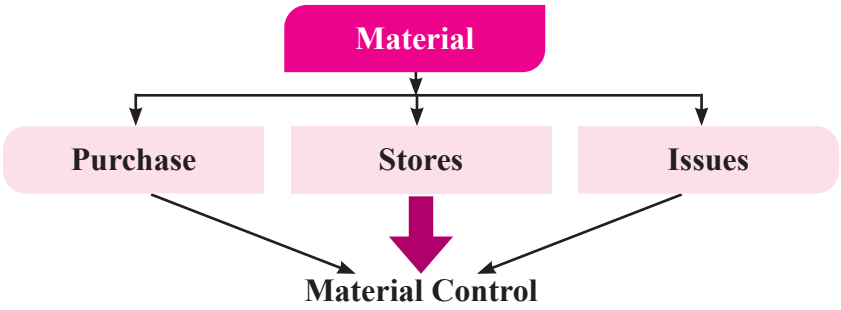


Figure 2.2: Implementation Areas of Material Control

Thus, the first aspect where material control can be effected is procurement of material (purchase) which is taken up in the following lines.

2.1.1 Procurement of Materials

The crucial function of procurement of material lies with the purchase department. Before proceeding with the function the manager in charge of purchase along with other top management personnel would have to be clear about a set of questions which are mentioned as below:

1. What to purchase? – Right Material with good quality
2. When to purchase? – Right Time
3. Where to purchase? – Right Source
4. How much to purchase? – Right Quantity
5. At what price to purchase? – Right Price

Purchase Function:

As such, purchasing involves procurement of materials of requisite quantity and quality at economic price. It is of extreme importance particularly to a manufacturing concern because it has bearing on all vital factors of manufacture such as quantity, cost, efficiency, economy, prompt delivery, volume of production and so on.

The purchase function in an organisation can be categorized either as centralized purchasing system or de-centralized purchasing system. Purchasing process in most of the organisation is a centralized function because the advantages of a centralized purchasing outweighs its disadvantages.

Feature	Centralized Purchase	Decentralized Purchase
Decision-Making Authority	Centralized authority makes decisions and controls purchases.	Decision-making authority is distributed among various departments or units.
Efficiency	Streamlined processes can lead to increased efficiency and cost savings.	May have more flexibility but could result in duplication of efforts and potential inefficiencies.
Communication	Clear communication channels due to a single authority overseeing purchases.	Communication may be more complex, with different departments managing their own purchasing.
Volume Discounts	Centralized purchasing may leverage bulk buying for better volume discounts.	Decentralized purchasing may miss out on volume discounts due to smaller, scattered orders.
Customization	Limited customization options as decisions are made centrally.	Departments have more autonomy for customization based on specific needs.
Adaptability	May be slower to adapt to changes as decisions need to go through a central authority.	Can be more adaptable to the specific needs of different departments or units.
Supplier Relationships	Centralized purchasing can build stronger relationships with suppliers.	Decentralized purchasing may lead to diverse supplier relationships across departments.
Cost Control	Easier to control costs through centralized monitoring and analysis.	May face challenges in controlling costs due to dispersed decision-making.

It's important to note that the choice between centralized and decentralized purchasing depends on the specific needs, size, and structure of the organization. Some organizations may even adopt a hybrid approach, combining elements of both centralized and decentralized purchasing to balance efficiency and autonomy.

Documentation

Below listed is a set of documents which enables procurement function of the purchase department:

1. Bill of Material

Bill of Material is a complete schedule of parts and materials required for a particular order prepared by the drawing office and issued by it together with necessary blue prints of drawings. For standard products, printed copies of bill of material are kept with blank spaces for any special details of modification to be filled in for a particular job / order. The schedule details everything, even to bolts and nuts, sizes and weights. The documents solve a number of useful purposes, such as:

a. It provides a quantitative estimate of budget of material required for a given job, process or operation which might be used for control purposes.

b. It substitutes material requisitions and expedite issue of materials.

c. The store keeper can draw up a programme of material purchases and issue for a given period.

d. It provides the basis for charging material cost to the respective job / process.

The specimen form of Bill of Material is shown below:

<table>
<tr><td colspan="11">Modern Ltd</td></tr>
<tr><td colspan="11">Bill of Materials</td></tr>
<tr><td colspan="5">No……
Date……..</td><td colspan="6">Order No……..
Job No…….
Assembly drawing no…….</td></tr>
<tr><td colspan="3">Component Parts</td><td colspan="3">Materials</td><td colspan="5">For use of purchase dept.</td></tr>
<tr><td>Symbol No.</td><td>Description</td><td>No. reqd.</td><td>Description</td><td>Code No.</td><td>Qty. Reqd.</td><td>Date</td><td>Regn. No.</td><td>Order No.</td><td>Date of Delivery</td><td>Remarks</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Purchase dept. copy</td><td>Date of order Delivery</td><td></td><td colspan="3">Prepared by:

Checked by:</td><td colspan="5">Purchase order given by:</td></tr>
</table>

2. Material Requisition Note

Material Requisition Note is a document issued by a department in charge requesting the storekeeper to issue certain materials to a job or standing order number. It is an important document as it authorises issue of materials from stores and thereby should be authenticated by appropriate authority. It forms the basis of crediting the marginal account in the stores ledger as the materials are taken out on the strength of such documents. The corresponding debit to work in progress account for job account for standing order number is also made on the basis of such documents. The document enables the accounts department to value the issue of the materials to find out the cost of materials issued. The storekeeper uses this to check total item wise issues made by him during a certain period by adding up the details of issue from this document.

3. Purchase Requisition

Purchase Requisition Note is a request made to the Purchase Department to procure materials of given description and of the required quality and quantity within a specified period. It is a formal request and it authorises the purchase department to issue a purchase order to secure materials intended for periodic requirements to provide guidance to the purchase department to estimate the future requirements in order to secure maximum purchase benefits in the form of higher discount and better credit terms. The extent and range of materials requirements provide a basis for preparation of purchase budget. The actual requirements of a given period can be summarised from the purchase requisition and compared with the purchase budget in order to determine the variances and reason thereof. This form is prepared by storekeeper for regular items and by the departmental head for special materials not stocked as regular items.

The purchase requisition is prepared in three copies. Original will be sent to purchase department, duplicate copy will be retained by the indenting (request initiating) department and the triplicate will be sent to approver for approving the purchase requisition.

Purchase Requisition provides the three basic things:

a. What type of material is to be purchased?

b. When to be purchased?

c. How much is to be purchased?

The specimen form of Purchase Requisition is as shown below:

Modern Ltd

Purchase Requisition or Indent

Purchase Req. Type: Special / Regular:

Purchase Req. No: Purchase Requisition Date:

Department:

S. No.	Material Code	Description of the Goods	Quantity Required	Material Required by date	Remarks

Requested by Approved by

For use in Purchase Department

Quotations from

(1) PO Placed: Yes / No

(2) PO No:

(3)

A number of factors should be considered before deciding from where the purchase should be made viz. inquiry and call for tenders or quotations, analysis of tenders called, selection of the appropriate source with appropriate fixation of price, quality, time of delivery, terms of payment, mode of delivery, etc.

4. Purchase Order

Purchase Order (PO) is a request made in writing to selected supplier to deliver goods of requisite quality, quantity, (as per the purchase requisition) at the prices, terms and conditions agreed upon. It is a commitment on the part of the purchaser to accept the delivery of goods contained in the Purchase Order if the terms included therein, are fulfilled. Purchase Order contains the following details:

(a) Purchase Order No; (b) PO Date; (c) Supplier Name and Address; (d) Material Code; (e) Material description; (f) Grade and Other particulars of the material; (g) Quantity to be supplied; (h) Price; (i) Place of delivery; (j) Taxes; (k) Terms of Payment (Credit period) etc.

Usually, a purchase order is made in five copies, one each for suppliers, Receiving / Stores Department, Originating Department, Accounts Department and filing. Thus, all the concerned departments with the materials are informed fully about all the details of every purchase and it becomes easier for everyone to follow up on any relevant matter.

The Specimen form of Purchase Order is as shown below:

Modern Ltd

Purchase Order

To

Supplier_____ PO No:

Address PO date:

Quotation Reference:

PR No.

Please supply the following items in accordance with the instructions mentioned therein on the following terms and conditions.

S. No.	Material Code	Material Description	Quantity	Rate per unit	Amount	Delivery Date	Remarks
				Packing and Freight			
				Taxes			
				Total Amount			

Delivery: Goods to be delivered at

Delivery date:

Payment terms:

Authorised Signatory

5. Goods Received cum Inspection Note

The stores department will receive the material after the gate entry. It will compare the quantities received with the PO Quantity. It is a valuable document as it forms the basis of accounting entry in the stores ledger and stock records. It is the document basis for quality control department to carry inspection of the material in warded.

It also forms the basis of payments to be made to the supplier in respect of the materials supplied by him. Supplier's invoices are checked with goods received notes for actual receipt of the goods supplied by the supplier. One copy of such note is also sent to inspection department who after inspection of materials approves the notes for stores department to receive the materials. Outstanding goods received notes which are not linked with supplier's bills enable the accounts department to estimate at the year end the liability for goods purchased for which supplier's bills not received.

The specimen of the Goods Received cum Inspection Note as below:

New India Ltd

Goods Received cum Inspection Note

Received from: GRN No:

GR Date:

Received at: PO Ref. No:

Gate Entry No:

S. No.	Material Code	Material Description	Quantity Received	Quantity Accepted	Quantity Rejected	Reason for Rejection	Remarks

Prepare by Inspected by

Received by Storekeeper

6. Material Transfer Note

Material Transfer Note is a document used for transferring the material from one department to other department or one site to other site or one job to other job. The need for Material Transfer Note arises under the following conditions:

a. Great urgency for such materials as normal procedure for requisitioning the materials may result in delay in completion of the job.

b. Where two jobs are being executed side by side or very near to each other and stores department is situated at a great distance, adoption of normal procedure for requisitioning the materials may mean unnecessary expenditure in handling and transportation, especially in cases of heavy materials.

c. Frequent shifting of materials (for returning to stores and for re-issue) may result in wastage or breakage.

d. If the goods are of perishable nature (e.g., Vegetable or Fruits) and refrigeration may not keep them fresh for a long time.

7. Material Return Note

At times materials have to be returned to the suppliers after these are received in the factory. If the return takes place before the preparation of Goods Received Note, such materials will not be included and shown in the stores ledger. However, if the material is returned after the entry into the Goods Received Note, a document called "Material Return Note" will be prepared simultaneously to exclude the quantity and value of the returned material from the stores ledger.

Purchase Quantity

Important requirement for an efficient system of purchase control is to ensure that only the correct quantity of materials is purchased. The basic factors to be considered while fixing the ordering quantity are as follows:

a. There should be no overstocking.

b. Materials should always be available in sufficient quantity to meet the requirements of production and to avoid plant shut down.

c. Purchases should be made in economic lots.

Other factors to be considered are quantity already ordered, availability of funds, business cycle etc.

Purchase department in manufacturing concerns is usually faced with the problem of deciding the quantity of various items, which they should purchase basing on the above factors. If purchases of material are made in bulk, then inventory cost will be high. On the other hand, if the order size is small each time, then the ordering cost will be very high. In order to minimize ordering and carrying cost it is necessary to determine the order quantity which minimizes these two costs. Thus Economic Order Quantity (EOQ) should be determined.

Economic Order Quantity (EOQ)

The total costs of a material usually consist of Buying Cost + Total Ordering Cost + Total Carrying Cost.

Economic Order Quantity is 'The size of the order for which total cost of material is minimum'.

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

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

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., lead time is zero.

The famous mathematician 'WILSON' derived the formula for determining the size of order for each purchase at which total material cost is minimum.

$$\text{Economic Order Quantity} = \sqrt{\frac{2AO}{C}}$$

where, A = Annual demand / consumption
O = Ordering Cost per Order
C = Carrying Cost per unit per annum

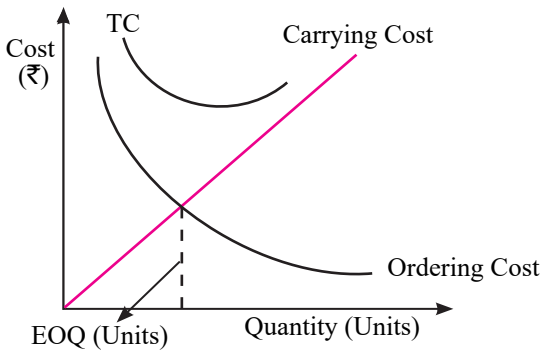


Figure 2.3: Graphical representation of EOQ

2.1.2 Inventory Management and Control

Material Storage and Control

Once the material is received, it is the responsibility of the stores in charge, to ensure that material movements in and out of stores are done only against the authorised documents. Stores in charge is responsible for proper utilization of storage space and exercise better control over the material in the stores to ensure that the material is well protected against all losses as theft, pilferage, fire, misappropriation etc.

Different classes of stores

Broadly speaking, there are three classes of stores:

1. **Centralized Stores**

   The usual practice in most of the concerns is to have a central store. Separate store to meet the requirements of each production department are not popular because of the heavy expenditure involved. In case of centralized stores materials are received by and issued from one store department. This enables better control, supervision and vigilance. All materials are kept at one central store. However central storage involves high transportation cost, chances of loss in transit and delay in receipt of stores by the departments.

2. **Decentralized stores**

   Under this type of stores, independent stores are situated in various departments. Handling of stores is undertaken by the store keeper in each department. The departments requiring stores can draw them from their respective stores situated in their departments. The disadvantages of centralized stores can be eliminated, if there are decentralized stores. But these types of stores are uncommon because of heavy expenditure involved.

3. Central stores with sub-stores / Imprest Stores

In large organisation, factories / workshops may be located at different places which are far from the central stores. So, in order to keep the transportation costs and handling charges to the minimum level, sub-stores are situated near to the factory. For each item of materials, a quantity is determined and this should be kept in the stock at the beginning of any period. At the end of a period, the store keepers of each sub-store will requisition from the central stores the quantity of the materials consumed to bring the stock up to the predetermined quantity. In short, this type of stores operates in a similar way to a petty cash system, so this system of stores is also known as the imprest system of stores control.

Classification and Codification of Material

In case of large organisations, the number and types of materials used is considerable and unless each item is distinguished and stored separately it would be impossible to find them out when they are required for production or any other operation. It may happen that either one type of material is in excess or another type may be altogether non-existent. It is therefore, essential that a proper system of classification and codification is developed.

For example, material can be Classified into different categories according to their nature or type, viz., mild steel, tool steel, brass, bronze, copper, glass, timber, etc., and then again within such broad classification into rounds, bars, strips, angles, etc. There are two steps in the classification and codification of materials – determination of the number of items, their nature, other characteristics and classification of items of comparable nature or type into suitable groups or classes.

Various classes of coding are in practice and the common types are stated below:

i. **Alphabetical Scheme:** Alphabets are only used for codification. Like Mild Steel Sheets are coded as MSS.

ii. **Numeric Scheme:** In this scheme numericals are used instead of alphabets. For example, if steel is given main code of 300, mild steel may be coded as 310 and mild steel sheet may be coded as 311, mild steel bar may be coded as 312.

iii. **Decimal Scheme:** It is similar to the numeric scheme in which the groups are represented by number and digits after the decimal indicate sub-groups of items. For example, where the steel is coded as 3.00 mild steel may be coded as 3.10 and mild steel sheet can be coded as 3.11 and mild sheet bar as 3.12 and so on.

iv. **Block Scheme:** In this case block of number are allotted for classification of specific groups such as for material classification the block of number 1 to 999 may be reserved, for raw materials; 1000 to 1999 for stores and spares; 2000 to 2999 for finished goods.

v. **Combination Scheme:** Here the code structure takes in account both alphabetic and numeric schemes and strikes a balance between the two. Mild steel coded as MS and the sheets, bars, strips, rounds of mild steel may be coded as MS01, MS02, MS03 and so on. This code is most commonly used because this system has got the advantage of both the alphabetic and numeric systems and is quite flexible in nature.

Advantages of Classification and Codification

i. The procedure assists in the easy identification and location of the materials because of their classification.

ii. It minimizes the recording of the nature / type of the materials with detailed description on every document relating to the transaction of materials.

iii. Codification is a must in the case of mechanization of the stores accounting.

iv. The method is simple to operate and definitely saves time and money in respect of both physical location / identification of materials as well as recording of the materials.

After the material classification and codification is done for all the materials, for each material code, minimum level, maximum level, re-order level and re-order quantity is to be fixed. It is the storekeeper's responsibility to ensure that inventory of any material is maintained between the minimum level and maximum level.

Maximum Level

The maximum level indicates the maximum quantity of an item of material that can be held in stock at any time. The stock in hand is regulated in such a manner that normally it does not exceed this level.

While fixing the level, the following factors are to be taken into consideration:

i. Maximum requirement of the store for production purpose, at any point of time.

ii. Rate of consumption and lead time.

iii. Nature and properties of the store: for instance, the maximum level is necessarily kept low for materials that are liable to quick deterioration or obsolescence during storage.

iv. Storage facilities that can be conveniently spared for the item without determinant to the requirements of other items of stores.

v. Cost of storage and insurance.

vi. Economy in prices: for seasonal supplies purchased in bulk during the season, the maximum level is generally high.

vii. Financial considerations: Availability of funds and the price of the stores are to be kept in view. For costly items, the maximum level should be as low as possible. Another point to be considered is the future market trend. If prices are likely to rise, the concern may like large stock in reserve for long term future uses and in such a case, the level is pushed up.

viii. Maximum level will depend on the Rules framed by the government for import or procurement. If due to these and other causes materials are difficult to obtain and supplies are irregular the maximum level should be set high.

ix. The maximum level is also dependent on the economic ordering quantity.

Maximum Level = Re-Order Level + Re-Order Quantity – (Minimum Rate of Consumption × Minimum Re-Order Period)

Minimum Level

The minimum level indicates the lowest of an item of material which must be maintained at all times so that there is no stoppage of production due to the material being not available. In fixing the minimum level, the following factors are to be considered:

i. Nature of the item: For special material purchased against customer's specific orders, no minimum level is necessary. This applies to other levels also.

ii. The minimum time required for replenishing supply. This is known as the lead time and are defined as the anticipated time lag between the dates of issuing orders and the receipts of materials. Longer the lead time, lower is minimum level, the re-order point remaining constant.

iii. Rate of consumption (normal, minimum or maximum) of the material.

Minimum Level = Re-Order Level – (Normal Rate of Consumption × Normal Re-Order Period)

Re-Order Level

It is at the re-ordering level that the store keeper has to initiate the action to replenish the material. This level is fixed somewhere between the maximum and minimum levels in such a manner that the difference of quantity of the material between the Re-Ordering Level and Minimum Level will be sufficient to meet the requirements of production up to the time the fresh supply of materials is received.

The basic factors which are taken into consideration in fixing a Re-Ordering Level for a store item include minimum quantity of item to be kept, rate of consumption and lead time which are applied for computing of this level.

Re-Ordering Level = Minimum Level + (Normal Rate of Consumption × Normal Re-Order Period)

or

= Minimum Level + Consumption during Lead Time

or

= Maximum Rate of Consumption × Maximum Re-Order Period (Lead Time)

Danger Level

It is the level at which normal issue of raw materials are stopped and only emergency issues are only made. This is a level fixed usually below the minimum level. When the stock reaches this level very urgent action for purchases is indicated. This presupposes that the minimum level contains a cushion to cover such contingencies. The normal lead time cannot be afforded at this stage. It is necessary to resort to unorthodox hasty purchase procedure resulting in higher purchase cost.

The practice in some firms is to fix danger level below the Re-Ordering Level but above the minimum level. In such case, action for purchase of an item is taken when the stock reaches the re-ordering level, the danger level is of no significance except that a check with the purchases department may be made as soon as the danger level is reached to ensure that everything is all right and that delivery will be made on the scheduled date.

Danger Level = Normal Rate of Consumption × Maximum Re-Order Period for emergency purchases

Perpetual Inventory System

Perpetual inventory system may be defined as 'a system of records maintained by the controlling department, which reflects the physical movements of stocks and their current balance'. Thus, it is a system of ascertaining balance after every receipt and issue of materials through stock records to facilitate regular checking and to avoid closing down the firm for stock taking. To ensure the accuracy of the perpetual inventory records (bin card and stores ledger), physical verification of stores is made by a programme of continuous stock taking.

Continuous Stock Taking is an essential feature of perpetual inventory system, which involves only the physical verification of the stock records with actual stocks.

In continuous stock taking, physical verification is spread throughout the year. Everyday 10 to 15 items are taken at random by rotation and checked so that the surprise element in stock verification may be maintained and each item may be checked for a number of times each year. On the other hand, the surprise element is missing in case of periodical checking, because checking is usually done at the end of the year. Continuous stock taking system constantly monitors inventory levels in real-time. Whereas, periodic stock taking conducts periodic physical counts of inventory at specific intervals.

ABC Analysis

ABC analysis, also known as Pareto analysis, is a technique used in inventory management to categorize items based on their significance.

The analysis is named after the Pareto Principle, which states that roughly 80% of the effects come from 20% of the causes. In the context of inventory management, it means that a small percentage of items often contribute to a significant portion of the total value.

Under this system, the materials stocked may be classified into a number of categories according to their importance, i.e., their value and frequency of replenishment during a period. The first category (also known as group 'A' items) may consist of only a small percentage of total items handled but combined value may be a large portion of the total stock value. The second category, naming it as group 'B' items, may be relatively less important. In the third category, consisting of group 'C' items, all the remaining items of stock may be included which are quite large in number but their value is not high.

This concept may be clear by the following example:

Category	No. of Items	% of the Total No. of Items	Value Amount (₹)	% of the Total Value Item	Average Value Amount (₹)
A	75	6	70,000	70	933.33
B	375	30	20,000	20	53.33
C	800	64	10,000	10	12.50
	1,250	100	1,00,000	100	

Category 'A' items represent 70% of the total investment but as little as only 6% of the number of items. Maximum control must be exercised on these items. Category 'B' is of secondary importance and normal control procedures may be followed. Category 'C' comprising of 64% in quantity but only 10% in value, needs a simpler, less elaborate and economic system of control.

Advantages of ABC Analysis:

i. Closer and stricter control of those items which represent a major portion of total stock value is maintained.

ii. Investment in inventory can be regulated and funds can be utilized in the best possible manner. 'A' class items are ordered as and when need arises, so that the working capital can be utilized in a best possible way.

iii. With greater control over the inventories, savings in material cost will be realised.

iv. It helps in maintaining enough safety stock for 'C' category of items.

v. Scientific and selective control helps in the maintenance of high stock turnover ratio.

VED Analysis

VED analysis is a technique used in inventory management to categorize items based on their criticality and importance in the production or operational processes. The acronym VED stands for Vital, Essential, and Desirable. This analysis helps organizations prioritize their efforts in managing inventory, especially when it comes to spare parts or materials needed for production.

Vital – The spares, stock-out of which even for a short time will stop the production for quite some time, and where in the stock-out cost is very high are known as Vital spares. For a car assembly company, 'Engine' is a vital part, without the engine the assembly activity will not be started.

Essential – The spares or material absence of which cannot be tolerated for more than few hours or a day and the cost of lost production is high and which is essential for production to continue are known as Essential items. For a car assembly company 'Tyres' is an essential item, without fixing the tyres the assembly of car will not be completed.

Desirable – The Desirable spares are those parts which are needed, but their absence for even a week or more also will not lead to stoppage of production. For example, CD player, for a car assembly company.

Some spares though small in value, may be vital for production, requires constant attention. Such spares may not attention to if the organisation adopts ABC analysis.

FSN Analysis

FSN analysis is another inventory management technique used to classify items based on their usage patterns. The acronym FSN represents Fast-moving, Slow-moving, and Non-moving items. This analysis helps organizations understand the velocity or movement of items within their inventory, allowing for better decision-making in terms of stock control and procurement.

Just-in-Time (JIT)

Just-In-Time (JIT) is a production and inventory management philosophy that originated in Japan and is widely used in manufacturing and other industries. The primary goal of JIT is to produce or deliver goods at the exact time they are needed, eliminating excess inventory and minimizing waste. The JIT inventory system focuses on "the right material, at the right time, at the right place, and in the exact amount" without the safety net of inventory.

Advantages

i. Increased emphasis on supplier relationship. A company without inventory does not want a supply system problem that creates a part shortage. This makes supplier relationships extremely important.

ii. Supplies come in at regular intervals throughout the production day. Supply is synchronized with production demand and the optimal amount of inventory is on hand at any time. When parts move directly from the truck to the point of assembly, the need for storage facilities is reduced.

iii. Reduces the working capital requirements, as very little inventory is maintained.

iv. Minimizes storage space.

v. Reduces the chance of inventory obsolescence or damage.

Inventory Turnover Ratio

Inventory turnover signifies a ratio of the value of materials consumed during a given period to the average level of inventory held during that period. The ratio is worked out on the basis of the following formula:

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

The purpose of the above ratio is to ascertain the speed of movement of a particular item. A high ratio indicates that the item is moving fast with a minimum investment involved at any point of time. On the other hand, a low ratio indicates the slow moving item. Thus, inventory turnover ratio may indicate slow moving dormant and obsolete stock highlighting the need for appropriate managerial actions.

2.1.3 Inventory Accounting & Valuation

Valuation of Material Receipts

Principles of valuation of receipt of materials as per CAS – 6 are as follows:

1. The material receipt should be valued at purchase price including duties and taxes, freight inwards, insurance and other expenditure directly attributable to procurement (net of trade discounts, rebates, taxes and duties refundable or to be credited by the taxing authorities) that can be quantified with reasonable accuracy at the time of acquisition.
2. Finance costs incurred in connection with the acquisition of materials shall not form part of material cost.
3. Self manufactured materials shall be valued including direct material cost, direct employee cost, direct expenses, factory overheads, share of administrative overheads relating to production but excluding share of other administrative overheads, finance cost and marketing overheads. In case of captive consumption, the valuation shall be in accordance with Cost Accounting Standard 4.
4. Spares which are specific to an item of equipment shall not be taken to inventory, but shall be capitalized with the cost of the specific equipment. Cost of capital spares and / or insurance spares, whether procured with the equipment or subsequently, shall be amortised over a period, not exceeding the useful life of the equipment,
5. Normal loss or spoilage of material prior to reaching the factory or at places where the services are provided shall be absorbed in the cost of balance materials net of amounts recoverable from suppliers, insurers, carriers or recoveries from disposal.
6. Losses due to shrinkage or evaporation and gain due to elongation or absorption of moisture etc., before the material is received shall be absorbed in material cost to the extent they are normal, with corresponding adjustment in the quantity.
7. The forex component of imported material cost shall be converted at the rate on the date of the transaction. Any subsequent change in the exchange rate till payment or otherwise shall not form part of the material cost.
8. Any demurrage or detention charges, or penalty levied by transport or other authorities shall not form part of the cost of materials.
9. Subsidy / Grant / Incentive and any such payment received / receivable with respect to any material shall be reduced from cost for ascertainment of the cost of the object to which such amounts are related.

Valuation of Material Issues

Principles of valuation of issue of materials as per CAS – 6 are as follows:

1. Issues shall be valued using appropriate assumptions on cost flow.

   E.g., First In First Out, Last In First Out, Weighted Average Rate.

   The method of valuation shall be followed on a consistent basis.

2. Where materials are accounted at standard cost, the price variances related to materials shall be treated as part of material cost.
3. Any abnormal cost shall be excluded from the material cost.
4. Wherever, material costs include transportation cost, determination of costs of transportation shall be governed by CAS 5 – Cost Accounting Standard on Determination of Average (Equalized) Cost of Transportation.
5. Material cost may include imputed costs not considered in financial accounts. Such costs which are not recognized in financial accounts may be determined by imputing a cost to the usage or by measuring the benefit from an alternate use of the resource.
6. Self manufactured components and sub-assemblies shall be valued including direct material cost, direct employee cost, direct expenses, factory overheads, share of administrative overheads relating to production but excluding share of other administrative overheads, finance cost and marketing overheads. In case of captive consumption, the valuation shall be in accordance with Cost Accounting Standard 4.
7. The material cost of normal scrap / defectives which are rejects shall be included in the material cost of goods manufactured. The material cost of actual scrap / defectives, not exceeding the normal shall be adjusted in the material cost of good production. Material Cost of abnormal scrap / defectives should not be included in material cost but treated as loss after giving credit to the realisable value of such scrap / defectives.

Materials issued from stores should be priced at the price at which they are carried in inventory. Material may be purchased from different suppliers at different prices in different situations, where as consumption the entire inventory may happen at a time or at different lots etc. So, issue of materials should be valued after considering the following factors:

a. Nature of business and production process.
b. Management policy relating to the closing stock valuation.
c. Frequency of purchases and price fluctuations.

Several **methods of pricing of material issues** have been evolved; these may be classified into the following:

Cost Price Method

i. First in First Out
ii. Last in First Out
iii. Base Stock Method

Specific price method

i. Average Price Method
ii. Simple Average Price Method
iii. Weighted Average Price Method
iv. Moving Simple Average Method
v. Moving Weighted Average Method

Market Price Methods

i. Replacement Method
ii. Realisable Price Method

Notional Price Methods

i. Standard Price Method

ii. Inflated Price Method

Brief discussion of the above methods is as follow:

1. First in First Out Method (FIFO Method)

   It is a method of pricing the issue 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. 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. In case of rising prices this method is not suitable.

2. Last in First Out Method (LIFO Method)

   Under this method the prices of last received batch (lot) are used for pricing the issues, until it is exhausted and so on. During the inflationary period or period of rising prices, the use of LIFO would help to ensure the cost of production determined approximately on the above basis is approximately the current one. Under LIFO stocks would be valued at old prices, but not represent the current prices.

3. Base Stock Method

   A minimum quantity of stock under this method is always held at a fixed price as reserve in the stock, to meet a state of emergency, if 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. The quantity in excess of the base stock may be valued either on the LIFO basis or FIFO basis. This method is not an independent method as it FIFO or LIFO. Its advantages and disadvantages therefore will depend upon the use of the other method.

4. Specific Price Method

   This method is useful, especially when the materials are purchased for a specific job or work order, and as such these materials are issued subsequently to that specific job or work order at the price at which they were purchased. The cost of materials issued for production purposes to specific jobs represent actual and correct costs. This method is specific for non-standard products. This method is difficult to operate, especially when purchases and issues are numerous.

5. Simple Average Price Method

   Under this method materials are issued at the average price which is calculated by dividing the total of unit purchase prices of different lots in stock on the date of issue by the number of prices used in the calculation and quantity of different lots is not considered.

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

6. Weighted Average Price Method

   This method removes the limitation of Simple Average Price Method in that it also takes into account the quantities which are used as weights in order to find the issue price. This method uses total cost of material available for issue divided by the quantity available for issue.

$$\text{Material Issue Price} = \frac{\text{Total Cost of Materials in Stock}}{\text{Total Quantity of Materials in Stock}}$$

7. Moving Simple Average Price Method

   Under this method the rate for material issue is determined by dividing the total of the periodic simple average prices of a given number of periods by the number of periods. For determining the moving simple average price, it is necessary to fix up first period to be taken for determining the average. Suppose a three monthly period is decided upon and moving average rate for the month of April is to be computed. Under such situation, we have to make a simple list of the simple average price from January to March, add them up, and divide the total by three. To compute the moving average for May, we have to omit simple average rate pertains to January and add the rate relating to the April and divide the total by three.

8. Moving Weighted Average Price Method

   Under this method, the issue, rate is computed by dividing the total of the periodic weighted average price of a given number of periods by the number of periods.

9. Replacement 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 replacement cost of the items. Advantage of this method is issue cost reflects the current market price. But the difficulties involved under this method is determination of market price of material before each issue.

10. 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 less than the cost price, at which it was originally purchased.

11. Standard Price Method

    Under this method, materials are priced at some predetermined rate of standard price irrespective of the actual purchase cost of the materials. Standard cost is usually fixed after taking into consideration the current price, anticipated market trends. This method facilities the control of material cost and task of judging the efficiency of purchase department, but it is very difficult to fix the standard price when the prices fluctuate frequently.

12. Inflated Price Method

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

Valuation of Work in Progress

Unlike closing stock of finished goods, which is valued at cost or net realisable value, whichever is lower, work in progress is always valued on the basis of cost. The problem arises whether overheads should be included in the cost of work in progress.

There are three ways of valuing work in progress:

a. At prime cost

This is a conservative method of valuation. Overheads are not added to prime cost for valuing work in progress. Consequently, the exclusion of overheads leads to an understatement of costs for the subsequent period, while inflating the cost of production for the current period.

b. Prime Cost plus Variable Overheads

Under Marginal Costing Method, work in progress is valued at prime cost plus variable overheads. Fixed overheads are excluded on the basis that these are period costs and should be recovered from revenue, i.e., sales only.

c. At Total Cost

The valuation is done at full costs inclusive of both variable and fixed overheads. The logic behind this method is that work in progress should carry the proportionate cost of the overheads and cost of production of completed items should not be burdened. This method is most commonly used.

2.1.4 Physical Verification, Slow and Non-moving Stock and Treatment of Losses

Physical verification are of two types: Continuous verification and Periodic verification

Continuous physical verification, also known as perpetual inventory counting, is an inventory management practice where physical counts of items are conducted on an ongoing basis rather than periodically. This approach helps maintain accurate and up-to-date records of inventory levels, providing real-time information about the stock on hand. Continuous physical verification is often used in conjunction with a perpetual inventory system.

Periodic physical verification, also known as periodic inventory counting or periodic stocktaking, is an inventory management practice where physical counts of items are conducted at scheduled intervals. Unlike continuous physical verification, which involves ongoing and frequent counts, periodic physical verification is performed less frequently, such as annually, semi-annually, or quarterly.

Slow and Non-moving Stock and Treatment of Losses

Slow moving stock refers to those inventory items in the godown which has a low turnover ratio and generally varies between 1 to 3. Non-moving stock are those inventory items which has a turnover ratio of less than 1. These items may be purchased to meet emergency purposes. There may be reasons for accumulation of stocks which may result in low turnover ratio such as:

i. Uncertainty of supply in near future.

ii. There may be high cost for ordering.

iii. Availability of stock at cheap price.

iv. High cost of stock out.

As per Indian Accounting Standard 2 inventories shall be measured at the lower of cost and net realisable value. Net realisable value is the estimated selling price in the ordinary course of business less the estimated cost of completion and the estimated costs necessary to make the sale.

The cost of inventories shall comprise all costs of purchase, cost of conversion and other costs incurred in bringing the inventories to their present location and condition.

Here, a distinction has to be made for slow and non-moving inventories which are lying in stock with reference to their purpose of holding. The inventories which are finished goods and are ready for sale but for some reason or the other the finished goods remained in the godown and were not sold. So, if there is any impairment in the value of those stocks then it will be valued as per the Accounting Standard. If the slow and non-moving stocks are not for sale and have been purchased with an objective of use in the production then the impairment in the value of those stocks shall be ignored for cost accounting purpose.

2.1.5 Scrap, Spoilage, Defectives and Wastage

Abnormal and Normal Wastage of Materials

Wastage may be classified as normal and abnormal according to the circumstances. Normal wastages denote that part of the wastage which is generally bound to arise in a manufacturing processing on account of evaporation, shrinkage of basic raw materials or on account of typical manufacturing process being involved. Usually, such wastage remains within certain normal ratio or percentage of the input.

On the other abnormal wastage is that loss which does not arise in the ordinary course of manufacturing process but is the result of certain adverse circumstances such as power failure, major breakdown of machinery non-availability of the basic raw materials, etc. It is generally not possible to estimate the extent of such wastage before as they are much more than the normal ratio / percentage of loss compared to the input of basic materials.

Since the normal wastage of the materials is an unavoidable and uncontrollable issue, it should be recovered through good production. The cost of such normal wastages will be recovered as production overheads and apportioned on the number of units produced. Necessary, allowance should however be made for any amount which the wastage should realize when it is disposed of. On the contrary, the cost of abnormal wastage should be separately collected and charged off to the costing profit and loss account so as to vitiate the production cost of good units produced.

Waste

This is the residue such a smoke, dust, gases, slag, etc., which arises in course of manufacturing process and practically no measurable sale or utility value. In certain types of processes and operations, some material physically disappears on account of shrinkage, evaporation etc., with the result that the quantity of the output is less than the input. Such wastage is termed invisible waste where the residual instead of fetching any value, creates a problem for its dispose which entails further costs. Special arrangements have to be made for disposal and refuse, effluent, obnoxious gases etc.

Accounting treatment of waste: As waste has practically no value, its accounting is relatively simple. The effect of the waste is to reduce the quantity of output; in order to arrive at the unit cost of the process, operation or job, the total cost of the process, etc., is distributed over the reduced output, i.e., the units of good production only. The cost of abnormal waste, should, however, be excluded from the total cost and charged to the profit and loss account.

The actual waste is observed against standards and periodically reported to the management.

Scrap

This is also in the form of incidental material residue coming out of certain types of manufacturing processes but it is usually in small amounts and has low measurable utility or market value, recoverable without further processing. Numerous examples of scrap may be given; scrap may arise in the form of turnings, borings, trimmings, fillings, shavings etc., from metals on which machine operations are carried out; saw dust and trimmings in the timber industry; dead heads and bottom ends in foundries; and cuttings, pieces, and split in leather industries. Scrap should always be physically available unlike waste which may or may not be present in the form of a residue.

Accounting treatment of scrap is as follows:

a. Sales credited to revenue

In this method, the scrap is not considered a cost, and its value does not appear separately in the cost accounts. Only a quantitative record of the scrap returned to the storeroom from the shops is maintained, and the sale value realized from time to time is credited to the profit and loss account as miscellaneous revenue.

b. Credit to overheads

In this method and in the following method the scrap is assigned a cost. The cost is usually the sale value of the scrap less selling and distribution costs. If the scrap has no ready market but has only utility or use value, and is taken as a credit to manufacturing overheads. The effect of this credit is to reduce the overheads recovery rate. When predetermined overheads rates are in use, it is more expedient to credit an estimated allowance for the scrap instead of the amount of actual scrap.

c. Credit to jobs

The scrap is assigned a cost and is traced to the job which yielded the scrap. This affords a reasonable amount of credit to the jobs and widely different.

d. Transfer to other jobs

Scrap arising in one job may be issued for utilization in another job. Such transfers of scrap from one job to another should be affected through Material Transfer Notes. Alternatively, scrap may be returned to store room and subsequently issued to another job for utilisation. The latter method is more appropriate when some further processing is required on the scrap before it can be utilized for other jobs.

Control of Scrap

Scrap is also an unavoidable residue material arising in the process of manufacture. The basic difference between scrap and waste is that while waste may not have any value, scrap must necessarily have a value, though a comparatively small one. Scrap may be sold or re-used in some process. In some industries, arising of scraps of various types in significant quantities is a regular feature and, in such cases, it would be worthwhile having a proper administrative set-up for control of scrap. A scrap survey committee may be constituted which would be responsible for such matters as:

i. Classifying the various types of scrap;

ii. Assessing the quantum of each, and

iii. Deciding upon the manner of their use or disposal.

Control of scrap should start from the designing stage of the products. At the designing stage, the type, shape and form of materials which all result in the minimum of waste or the least quantity of scrap in manufacturing process are decided. The quantity of scrap resulting from a process also depends upon the manufacturing equipment used and the efficiency of the operative who performs the work. In order to minimize scrap, production should be planned so that the best possible equipment is used and properly trained personnel are employed on the job.

Spoilage

When production does not come up to the standard specifications or quality it has to be rejected outright. The components or materials are so damaged in the manufacturing process that they cannot be brought back to the normal specifications by repairs or reconditioning. Some spoiled work may be sold as seconds but in most cases, the entire production is sold for small value in the form of scrap or treated as waste if it has no market value. Spoilage involves not only loss of materials but also of labour and manufacturing overheads incurred up to the stage when the spoilage incurred.

Accounting and Control of Spoilage

Spoilage arises when the production output is damaged in such a manner and to such an extent that it cannot be used for the original purpose for which it was designed but is to be disposed off in some suitable manner without

further processing. The distinction between scrap and spoiled work is that while normal scrap arises mostly as a result of the processing of materials, spoilage occurs due to some defect in operations or materials which may or may not be inherent in the manufacturing process or operation. Further, scrap has always a relatively low but some definite value, but the value of spoilage may range from low, if it is a waste, to comparatively high values if the spoilage is to be sold as seconds.

Spoilage involves not only the loss of material but also labour and manufacturing overheads.

Treatment of Other Items of Cost

1. Treatment of Packing Cost

Packing materials is of two types – primary and secondary. Primary containers are essential to put the goods in a saleable condition like ink in a bottle, jam in a jar, etc. Secondary containers are required for delivery / transportation like crates etc., they are returnable and reusable.

The cost of primary containers should be charged off as a production overheads and included in production cost. On the other hand, the cost of secondary containers should charge as a selling and distribution overheads. The cost of reusable container should be charged when they could not be used any more due to damage, wear and tear, etc. In some cases, the primary packing materials may be made decorative with a view to promote sales, and in such a case a part of the primary packing materials should be apportioned as a selling cost.

2. Carriage and Cartage Expenses

Carriage and cartage expenses are incurred in the course of movement of materials or goods. Materials may mean direct materials or indirect materials. The treatment of the carriage and cartage expenses differ with the kind of materials / goods transported. The carriage and cartage expenses relating to raw materials are treated as a part of direct materials cost and those relating to distribution of materials or finished goods are treated as distribution overheads. In case where the carriage and cartage are abnormal due to any reason the same is charged off to costing profit and loss account.

3. Treatment of Tools Cost

Tools may be classified as

i. Large tools and

ii. Small tools

Large tools are normally capitalized and depreciation charged to factory overheads. For small tools the following treatment may apply:

a. Capitalization Method: In line with large tools.

b. Revaluation Method: At the end of the year revaluation for unused life of the tools is made and the difference between original cost and revalued cost is charged as factory overheads.

c. Write off Method: Whenever, such small tools are issued the department is debited with the cost. Alternatively, the cost of tools issued during a period is accumulated and distributed to various departments based on some suitable basis, such as hours worked

4. Treatment of Discount Allowed by Suppliers for Bulk Purchases

Discounts allowed on purchased are of two types, viz., cash discount, and quantity discount and trade discount. Cash discount is usually allowed for prompt payment and the quantity and trade discount for heavy purchases. The amount of the latter discount is already credited in the invoice and the net landed cost of the material exclusive of the discount is considered as the material cost.

5. Treatment of Variance detected at Stock Trading

If the variances are due to normal causes, i.e., due to normal dry age, shrinkage, evaporation, etc., these are valued at the ruling ledger rates of the items of material concerned and the amount is taken as an item of stores overheads and recovered from production as a percentage of direct material cost consumed. If the variances are due to abnormal causes, viz., theft, fraud, misappropriation etc., these are valued by writing off to costing profit and loss account.

2.1.6 Slow and Non-Moving Stock and Provision for write down of value

Slow moving stock refers to those inventory items in the godown which has a low turnover ratio which generally varies between 1 to 3. Non-moving stock are those inventory items which has a turnover ratio of less than 1. These items may be purchased to meet emergency purposes. There may be reasons for accumulation of stocks which may result in low turnover ratio such as:

i. Uncertainty of supply in near future.

ii. There may be high cost for ordering.

iii. Availability of stock at cheap price.

iv. High cost of stock out.

As per Indian Accounting Standard 2 inventories shall be measured at the lower of cost and net realisable value. Net realisable value is the estimated selling price in the ordinary course of business less the estimated cost of completion and the estimated costs necessary to make the sale.

The cost of inventories shall comprise all costs of purchase, cost of conversion and other costs incurred in bringing the inventories to their present location and condition.

Here, a distinction has to be made for slow and non-moving inventories which are lying in stock with reference to their purpose of holding. The inventories which are finished goods and are ready for sale but for some reason remained in the godown and were not sold. If there is any impairment in the value of such goods then it will be valued as per the Accounting Standard. If the slow and non-moving stocks are not for sale and have been purchased with an objective of use in the production then the impairment in the value of those stocks shall be ignored for cost accounting purpose.

Illustration 1

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:

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

A = Annual Demand (Units Consumed during the year) = 10,000 kg
O = Ordering Cost per order = ₹ 50
C = Carrying Cost per unit per annum = ₹ 2 × 8% = ₹ 0.16

$$EOQ = \sqrt{\frac{2 \times 10,000 \times 50}{0.16}} = 2,500 \text{ units}$$

$$\text{Number of orders to be placed in a year} = \frac{\text{Total Consumption of Materials per annum}}{EOQ}$$

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

Illustration 2

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

Solution:

$$EOQ = \sqrt{\frac{2 \times 18,250 \times 50}{36.50 \times 20\%}}$$

$$= \sqrt{\frac{18,25,000}{7.30}} = 500 \text{ units}$$

A = Annual Consumption = 18,250 units
O = Ordering Cost per order = ₹ 50
C = Carrying Cost per unit per annum = 36.50 × 20% = ₹ 7.30

Illustration 3

The components A and B are used as follows:

Normal usage	300 units per week each
Maximum usage	450 units per week each
Minimum usage	150 units per week each
Re-order Quantity	A 2,400 units; B 3,600 units
Re-order period	A 4 to 6 weeks, B 2 to 4 weeks

Calculate for each component:

(a) Re-order Level; (b) Minimum Level; (c) Maximum Level; (d) Average Stock Level.

Solution:

	Particulars	Component A	Component B
a)	Re-order Level = Maximum Usage × Maximum Re-order period	450 × 6 = 2,700 units	450 × 4 = 1,800 units
b)	Minimum Level = Re-order Level – (Normal Usage × Normal Re-order period)	2,700 – (300 × $\frac{4+6}{2}$) = 1,200 units	1,800 – (300 × $\frac{2+4}{2}$) = 900 units
c)	Maximum Level = Re-order Level + Re-order Quantity – (Minimum Usage × Minimum Re-order period)	= 2,700 + 2,400 – (150 × 4) = 4,500 units	= 1,800 + 3,600 – (150 × 2) = 5,100 units
d)	Average Stock Level = $\frac{\text{Minimum Level+Maximum Level}}{2}$	= $\frac{1,200 + 4,500}{2}$ = 2,850 units	= $\frac{900 + 5,100}{2}$ = 3,000 units

Illustration 4

Compute the inventory turnover ratio from the following:

Opening Stock	₹ 10,000
Closing Stock	₹ 16,000
Material Consumed	₹ 78,000

Solution

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

$$\text{Value of average stock held during the period} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

$$= \frac{10,000+16,000}{2} = 13,000$$

$$= \frac{78,000}{13,000} = 6 \text{ times}$$

Illustration 5

Prepare a statement showing the pricing of issues, on the basis of

a. Simple Average and

b. Weighted Average methods from the following information pertaining to Material D

2022 March	1	Purchased 100 units @ ₹ 10 each
	2	Purchased 200 units @ ₹ 10.20 each
	5	Issued 250 units to Job X vide M.R. No. 12
	7	Purchased 200 units @ ₹ 10.50 each
	10	Purchased 300 units @ ₹ 10.80 each
	13	Issued 200 units to Job Y vide M.R. No. 15
	18	Issued 200 units to Job Z vide M.R. No. 17
	20	Purchased 100 units @ ₹ 11 each
	25	Issued 150 units to Job K vide M.R. No. 25

Solution:

a. **Simple Average Method**

Stores Ledger Account

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
2022									
01/03	100	10	1,000				100	10	1,000
02/03	200	10.20	2,040				300		3,040
05/03				250	10.10	2,525	50		515
07/03	200	10.50	2,100				250		2,615
10/03	300	10.80	3,240				550		5,855
13/03				200	10.50	2,100	350		3,755
18/03				200	10.65	2,130	150		1,625
20/03	100	11	1,100				250		2,725
25/03				150	10.90	1,635	100		1,090

Working Notes

1. Calculation of Simple Average Price for

$$\text{Issue on } 05/03/2022 = \frac{10 + 10.20}{2} = ₹\ 10.10$$

$$\text{Issue on } 13/03/2022 = \frac{10.20 + 10.50 + 10.80}{3} = ₹\ 10.50$$

$$\text{Issue on } 18/03/2022 = \frac{10.50 + 10.80}{2} = ₹\ 10.65$$

Issue on 25/03/2022 = $\frac{10.80 + 11}{2}$ = ₹ 10.90

b. **Weighted Average Method**

Stores Ledger Account

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹*	Amount ₹
2022									
01/03	100	10	1,000				100	10	1,000
02/03	200	10.20	2,040				300	10.13	3,040
05/03				250	10.13	2,533	50	10.13	507
07/03	200	10.50	2,100				250	10.43	2,607
10/03	300	10.80	3,240				550	10.63	5,847
13/03				200	10.63	2,126	350	10.63	3,721
18/03				200	10.63	2,126	150	10.63	1,595
20/03	100	11	1,100				250	10.78	2,695
25/03				150	10.78	1,617	100	10.78	1,078

Illustration 6

The stock of material held on 1-4-2022 was 400 units @ ₹ 50 per unit. The following receipts and issues were recorded. You are required to prepare the Stores Ledger Account, showing how the values of issues would be calculated under Base Stock Method, both through FIFO and LIFO base being 100 units.

2-4-2022 Purchased 100 units @ ₹ 55 per unit
6-4-2022 Issued 400 units
10-4-2022 Purchased 600 units @ ₹ 55 per unit
13-4-2022 Issued 400 units
20-4-2022 Purchased 500 units @ ₹ 65 per unit
25-4-2022 Issued 600 units
10-5-2022 Purchased 800 units @ ₹ 70 per unit
12-5-2022 Issued 500 units
13-5-2022 Issued 200 units
15-5-2022 Purchased 500 units @ ₹ 75 per unit
12-6-2022 Issued 400 units
15-6-2022 Purchased 300 units @ ₹ 80 per unit

Solution:

Stores Ledger Account (under Base Stock through FIFO Method)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
2022									
01/04							100	50	5,000
							300	50	15,000
02/04	100	55	5,500				100	50	5,000
							300	50	15,000
							100	55	5,500
06/04				300	50	15,000	100	50	5,000
				100	55	5,500			
10/04	600	55	33,000				100	50	5,000
							600	55	33,000
13/04				400	55	22,000	100	50	5,000
							200	55	11,000
20/04	500	65	32,500				100	50	5,000
							200	55	11,000
							500	65	32,500
25/04				200	55	11,000	100	50	5,000
				400	65	26,000	100	65	6,500
10/05	800	70	56,000				100	50	5,000
							100	65	6,500
							800	70	56,000
12/05				100	65	6,500	100	50	5,000
				400	70	28,000	400	70	28,000
13/05				200	70	14,000	100	50	5,000
							200	70	14,000
15/05	500	75	37,500				100	50	5,000
							200	70	14,000
							500	75	37,500
12/06				200	70	14,000	100	50	5,000
				200	75	15,000	300	75	22,500
15/06	300	80	24,000				100	50	5,000
							300	75	22,500
							300	80	24,000

Stores Ledger Account (under Base Stock through LIFO Method)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
2022									
01/04							100	50	5,000
							300	50	15,000
02/04	100	55	5,500				100	50	5,000
							300	50	15,000
							100	55	5,500
06/04				100	55	5,500	100	50	5,000
				300	50	15,000			
10/04	600	55	33,000				100	50	5,000
							600	55	33,000
13/04				400	55	22,000	100	50	5,000
							200	55	11,000
20/04	500	65	32,500				100	50	5,000
							200	55	11,000
							500	65	32,500
25/04				500	65	32,500	100	50	5,000
				100	55	5,500	100	55	5,500
10/05	800	70	56,000				100	50	5,000
							100	55	5,500
							800	70	56,000
12/05				500	70	35,000	100	50	5,000
							100	55	5,500
							300	70	21,000
13/05				200	70	14,000	100	50	5,000
							100	55	5,500
							100	70	7,000
15/05	500	75	37,500				100	50	5,000
							100	55	5,500
							100	70	7,000
							500	75	37,500
12/06				400	75	30,000	100	50	5,000
							100	55	5,500
							100	70	7,000
							100	75	7,500
15/06	300	80	24,000				100	50	5,000

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
							100	55	5,500
							100	70	7,000
							100	75	7,500
							300	80	24,000

Illustration 7

Prepare a Stores Ledger Account from the following information adopting FIFO method of pricing of issues of Materials

2022 March
1. Opening Balance 500 tonnes @ ₹ 200
3. Issue 70 tonnes
4. Issue 100 tonnes
5. Issue 80 tonnes
13. Received from suppliers 200 tonnes @ ₹ 190
14. Returned from Department A 15 tonnes
16. Issued 180 tonnes
20. Received from supplier 240 tonnes @ ₹ 195
24. Issue 300 tonnes
25. Received from supplier 320 tonnes @ ₹ 200
26. Issue 115 tonnes to Department B
27. Returned from Department B 35 tonnes
28. Received from supplier 100 tonnes @ ₹ 200

Solution:

Stores Ledger Account (FIFO Method)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
2022									
01/03							500	200	1,00,000
03/03				70	200	14,000	430	200	86,000
04/03				100	200	20,000	330	200	66,000
05/03				80	200	16,000	250	200	50,000
13/03	200	190	38,000				250	200	50,000
							200	190	38,000
14/03	15	200	3,000				250	200	50,000
							200	190	38,000
							15	200	3,000
16/03				180	200	36,000	70	200	14,000

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
							200	190	38,000
							15	200	3,000
20/03	240	195	46,800				70	200	14,000
							200	190	38,000
							15	200	3,000
							240	195	46,800
24/03				70	200	14,000	225	195	43,875
				200	190	38,000			
				15	200	3,000			
				15	195	2,925			
25/03	320	200	64,000				225	195	43,875
							320	200	64,000
26/03				115	195	22,425	110	195	21,450
							320	200	64,000
27/03	35	195	6,825				110	195	21,450
							320	200	64,000
							35	195	6,825
28/03	100	200	20,000				110	195	21,450
							320	200	64,000
							35	195	6,825
							100	200	20,000

Illustration 8

From this information provided as under, you are required to prepare a statement showing how the issues would be priced if LIFO method is followed.

2022 February
1. Opening Balance 100 units @ ₹ 10 per unit
2. Received 200 units @ ₹ 10.50 per unit
3. Received 300 units @ ₹ 10.60 per unit
4. Issued 400 units to Job A vide M.R. No. 015
6. Issued 120 units to Job B vide M.R. No. 020
7. Received 400 units @ ₹ 11 per unit
8. Issued 200 units to Job B vide M.R. No. 031
12. Received 300 units @ ₹ 11.40 per unit
13. Received 200 units @ ₹ 11.50 per unit
17. Issued 400 units to Job D vide M.R. No. 040

Solution:

Stores Ledger Account (LIFO Method)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
2022									
01/02							100	10	1,000
02/02	200	10.50	2,100				100	10	1,000
							200	10.50	2,100
03/02	300	10.60	3,180				100	10	1,000
							200	10.50	2,100
							300	10.60	3,180
04/02				300	10.60	3,180	100	10	1,000
				100	10.50	1,050	100	10.50	1,050
06/02				100	10.50	1,050	80	10	800
				20	10	200			
07/02	400	11	4,400				80	10	800
							400	11	4,400
08/02				200	11	2,200	80	10	800
							200	11	2,200
12/02	300	11.40	3,420				80	10	800
							200	11	2,200
							300	11.40	3,420
13/02	200	11.50	2,300				80	10	800
							200	11	2,200
							300	11.40	3,420
							200	11.50	2,300
17/02				200	11.50	2,300	80	10	800
				200	11.40	2,280	200	11	2,200
							100	11.40	1,140

Illustration 9

Prepare Stores Ledger Account showing pricing of material issues on Replacement Price basis from the following particulars:

Opening balance 400 units @ ₹ 4 per unit

10-3-2022 Received 100 units @ ₹ 4.10 per unit

15-3-2022 Issued 300 units to Job XY vide M.R. No. 14

17-3-2022 Received 200 units @ ₹ 4.30 per unit

20-3-2022 Issued 250 units to Job AB vide M.R. No. 20

25-3-2022 Received 400 units @ ₹ 4.50 per unit

26-3-2022 Issued 200 units to Job JK vide M.R. No. 27

27-3-2022 Received 100 units @ ₹ 4.60 per unit

30-3-2022 Issued 300 units to Job PQ vide M.R. No. 32

Replacement Price on various dates:

15-3-2022 ₹ 4.20

20-3-2022 ₹ 4.40

26-3-2022 ₹ 4.60 &

30-3-2022 ₹ 4.80

Solution:

Stores Ledger Account (Replacement Price Method)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
2022									
01/03							400	4	1,600
10/03	100	4.10	410				500		2,010
15/03				300	4.20	1,260	200		750
17/03	200	4.30	860				400		1,610
20/03				250	4.40	1,100	150		510
25/03	400	4.50	1,800				550		2,310
26/03				200	4.60	920	350		1,390
27/03	100	4.60	460				450		1,850
30/03				300	4.80	1,440	150		410

Illustration 10

Stocks are issued at a standard price and the following transactions occurred for a specific material:

1st January	Opening Stock	10	tonnes @ ₹ 240 per tonne
4th January	Purchased	5	tonnes @ ₹ 260 per tonne
5th January	Issued	3	tonnes
12th January	Issued	4	tonnes
13th January	Purchased	3	tonnes @ ₹ 250 per tonne
19th January	Issued	4	tonnes
26th January	Issued	3	tonnes
30th January	Purchased	4	tonnes @ ₹ 280 per tonne
31st January	Issued	3	tonnes

The debit balance of price variation on 1st January was ₹ 20. Show the stock account for the material for the month

of January, indicating how you would deal with the difference in material price variance, when preparing the Profit and Loss Account for the month.

Solution:

$$\text{Standard Price} = \frac{10 \times 240 + 20}{10} = ₹\ 242$$

Stores Ledger Account (Standard Price Method)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
01/01							10	240	2,400
04/01	5	260	1,300				15		3,700
05/01				3	242	726	12		2,974
12/01				4	242	968	8		2,006
13/01	3	250	750				11		2,756
19/01				4	242	968	7		1,788
26/01				3	242	726	4		1,062
30/01	4	280	1,120				8		2,182
31/01				3	242	726	5		1,456

Valuation of Closing Stock at Standard Price = 5 × 242 = ₹ 1,210

Valuation of Closing Stock (as per store ledger) = ₹ 1,456

Material Price Variance = 1,210 – 1,456 = ₹ 246 (A) will be charged to Profit and Loss A/c

Illustration 11

Receipts and issues of an item of stores are made as follows:

There was no balance before 9th January.

Date	Receipts Quantity	Price (₹)	Issues Quantity
January 9th	10	17.00	
19th	25	10.00	
20th			10
29th			20
30th	15	8.00	
February 13th	20	12.00	
27th	10	16.90	
28th			40
March 30th	20	20.00	
31st			20

i. What is the simple average of February receipts?

ii. What are the moving monthly simple average price for January – February and February – March?

iii. If a weighted average is used for pricing issues how does the value of the balance in stock change during January?

iv. If a weighted average price is calculated at the end of each month and is then used for pricing the issue of that month, what will be the value of the month end balance?

Solution:

i. Simple Average of February Receipts = $\frac{12 + 16.90}{2}$ = ₹ 14.45

ii. Simple Average of January Receipts = $\frac{17 + 10 + 8}{3}$ = ₹ 11.67

Moving Monthly Average of January – February = $\frac{14.45 + 11.67}{2}$ = ₹ 13.06

Moving Monthly Average of February – March = $\frac{14.45 + 20}{2}$ = ₹ 17.225

iii. Stores Ledger Account (Weighted Average Method)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
09/01	10	17	170				10	17	170
19/01	25	10	250				35	12 $\left(\frac{420}{35}\right)$	420
20/01				10	12	120	25	12	300
29/01				20	12	240	5	12	60
30/01	15	8	120				20	9 $\left(\frac{180}{20}\right)$	180

iv. Stores Ledger Account (Issue at Weighted Average Price at month end)

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
09/01	10	17	170				10	17	170
19/01	25	10	250				35	12 $\left(\frac{420}{35}\right)$	420

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
30/01	15	8	120				50	10.80 $\left(\frac{540}{50}\right)$	540
January Issue				30	10.80	324	20	10.80	216
13/02	20	12	240				40	11.40 $\left(\frac{456}{40}\right)$	456
27/02	10	16.90	169				50	12.50 $\left(\frac{625}{50}\right)$	625
February Issue				40	12.50	500	10	12.50	125
30/03	20	20	400				30	17.50 $\left(\frac{525}{30}\right)$	525
March Issue				20	17.50	350	10	17.50	175

Illustration 12

Two components A and B are used as follows:

Normal usage = 50 per week each

Re-order quantity = A – 300; B – 500

Maximum usage = 75 per week each

Minimum usage = 25 per week each

Re-order period = A – 4 to 6 weeks; B – 2 to 4 weeks

Calculate for each component

a. Re-order Level

b. Minimum Level

c. Maximum Level

d. Average Stock Level

Solution:

	Particulars	Component A	Component B
a)	Re-order Level = Maximum Usage × Maximum Re-order period	75 × 6 = 450 units	75 × 4 = 300 units
b)	Minimum Level = Re-order Level – (Normal Usage × Normal Re-order period)	450 – (50 × 5) = 200 units	300 – (50 × 3) = 150 units
c)	Maximum Level = Re-order Level + Re-order Quantity – (Minimum Usage × Minimum Re-order period)	= 450 + 300 – (25 × 4) = 650 units	= 300 + 500 – (25 × 2) = 750 units
d)	Average Stock Level = $\frac{\text{Minimum Level+Maximum Level}}{2}$	= $\frac{200 + 650}{2}$ = 425 units	= $\frac{150 + 750}{2}$ = 450 units

Illustration 13

Anil Ltd. buys its annual requirement of 36,000 units in six installments. 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. How much money can be saved by using EOQ?

Solution:

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

A = Annual requirement = 36,000 units

O = Ordering Cost per order = ₹ 25

C = Carrying cost per unit per annum = 1 × 20% = ₹ 0.20

$EOQ = \sqrt{\frac{2 \times 36,000 \times 25}{0.20}}$ = 3,000 units

Comparative Cost Statement of Existing Purchase Policy with proposed EOQ Purchase Policy

	Existing Purchase Policy **Ordering Quantity = $\frac{36000}{6}$ = 6,000 units**		**Proposed EOQ Purchase Policy** **Ordering Quantity = 3,000 units**	
		₹		₹
Purchase Cost	36,000 × 1	36,000	36,000 × 1	36,000
Ordering Cost	6 × 25	150	12 × 25	300
Carrying Cost		600		300
Total Cost		36,750		36,600

Net Savings = ₹ 36,750 – ₹ 36,600 = ₹ 150

Illustration 14

The annual demand for an item is 3,200 units. The unit cost is ₹ 6 and inventory carrying charges is 25% p.a. If the cost of one procurement is ₹ 150, determine:

a. EOQ

b. No. of orders per year

c. Time between two consecutive orders

Solution:

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

A = Annual requirement = 3,200 units

O = Ordering Cost per order = ₹ 150

C = Carrying cost per unit per annum = 6 × 25% = ₹ 1.50

EOQ = $\sqrt{\frac{2 \times 3,200 \times 150}{1.50}}$ = 800 units

b. Number of orders per year = $\frac{3,200}{800}$ = 4

c. Time between two consecutive orders = $\frac{12 \text{ months}}{\text{No.of orders}} = \frac{12 \text{ months}}{4}$ = 3

Illustration 15

A company manufactures a special product which requires a component 'Alpha'. The following particulars are collected for the year 2021:

1.	Annual demand for Alpha	8,000 units
2.	Cost of placing an order	₹ 200 per order
3.	Cost per unit of Alpha	₹ 400
4.	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:

a. Compute the economic order quantity

b. Advise whether the quantity offer can be accepted.

Solution:

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

A = Annual requirement = 8,000 units

O = Ordering Cost per order = ₹ 200

C = Carrying cost per unit per annum = 400 × 20% = ₹ 80

EOQ = $\sqrt{\frac{2 \times 8,000 \times 200}{80}}$ = 200 units

b. **Evaluation of Profitability of Different Options of Order Quantity**

	When EOQ is order No. of Orders = $\frac{8,000}{200}$ = 40		When Quantity Discount is offered No. of Orders = $\frac{8,000}{4,000}$ = 2	
		(₹)		(₹)
Purchase Cost	8,000 × 400	32,00,000	8,000 × 400 × 96%	30,72,000
Ordering Cost	40 × 200	8,000	2 × 200	400
Carrying Cost	$\frac{1}{2}$ × 200 × 400 × 20%	8,000	$\frac{1}{2}$ × 4000 × 400 × 96% × 20%	1,53,600
Total Cost		32,16,000		32,26,000

Advise:

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

Illustration 16

From the following particulars with respect to a particular item of materials of a manufacturing company, calculate the best quantity to order:

Ordering quantities (tonnes)	Price per tonne Amount (₹)
Less than 250	6.00
250 but less than 800	5.90
800 but less than 2,000	5.80
2,000 but less than 4,000	5.70
4,000 and above	5.60

The annual demand for the material is 4,000 tonnes. Stock holding costs are 20% of material cost p.a. The delivery cost per order is ₹ 6.00

Solution:

Computation of Total Inventory Cost for different Ordering Quantities

Particulars	Ordering Quantities (tonne)				
	200	250	800	2,000	4000
1. Annual Demand (tonne)	4,000	4,000	4,000	4,000	4,000
2. No. of Orders [(1)/ordering quantity]	20	16	5	2	1
3. Price per tonne (₹)	6.00	5.90	5.80	5.70	5.60
4. Average Quantity (tonne) $\frac{\text{Ordering Quantities}}{2}$	100	125	400	1,000	2,000
5. Cost per Order (₹)	6.00	6.00	6.00	6.00	6.00

6. Rate of Interest	20%	20%	20%	20%	20%
Purchase Cost (1) × (3) (₹)	24,000	23,600	23,200	22,800	22,400
Ordering Cost (2) × (5) (₹)	120	96	30	12	6
Carrying Cost (₹) (4) × (3) × (6)	120	147.50	464	1,140	2,240
Total Inventory Cost (₹)	**24,240**	**23,843.50**	**23,694**	**23,952**	**24,646**

From the above computations the best quantity to order is 800 units.

Illustration 17

The particulars relating to 1,200 kgs of a certain raw material purchased by a company during June, were as follows:

Lot prices quoted by supplier and accepted by the company for placing the purchase order:

Lot size upto 1,000 kgs @ ₹ 22 per kg

Between 1,000 – 1,500 kgs @ ₹ 20 per kg

Between 1,500 – 2,000 kgs @ ₹ 18 per kg

Trade discount – 20%

Additional charge for containers @ ₹ 10 per drum of 25 kgs

Credit allowed on return of containers @ ₹ 8 per drum

GST @ 12% on raw material and 5% on drums

Total freight paid by the purchaser ₹ 240.

Insurance @ 2.5% (on net invoice value) paid by the purchaser

Stores overheads applied @ 5% on total purchase cost of material

The entire quantity was received and issued to production

The containers are returned in due course. Draw up a suitable statement to show:

a. Total cost of material purchased and

b. Unit cost of material issued to production

Solution:

Statement showing computation of total cost of material purchased and unit cost of material issued for production.

Particulars	Unit Cost		Total Cost (1,200 kg)	
		₹		₹
Basic price of raw material		20.00	20 × 1,200	24,000.00
Less: Trade Discount @20%	20 × 20%	4.00	24,000 × 20%	4,800.00
		16.00		19,200.00
Add: Drum Charges (No. of Drums = 1200 ÷ 25 = 48)	₹ 10 / 25 kg	0.40	48 × 10	480.00
		16.40		19,680.00

Add: GST	(16 × 12% + 0.40 × 5%)	1.94	(19,200 × 12% + 480 × 5%)	2,328.00
Net Invoice Price		18.34		22,008.00
Add: Insurance	18.34 × 2.5%	0.4585	22,008 × 2.5%	550.20
Add: Freight	₹ 240 / 1,200 kg	0.20		240.00
		18.9985		22,798.20
Less: Credit for drums returned	₹ 8 / 25 kg	0.32	48 × 8	384.00
Total Cost of Material Purchased		18.6785		22,414.20
Add: Stores Overheads	18.6785 × 5%	0.9339	22,414.20 × 5%	1,120.71
Material Cost issued to production		**19.6124**		**23,534.91**

Illustration 18

From the following data for the year ended 31st December, 2021, calculate the inventory turnover ratio of the two items, and put forward your comments on them.

	Material A Amount (₹)	Material B Amount (₹)
Opening stock on 1-1-2021	10,000	9,000
Purchase during the year 2021	52,000	27,000
Closing stock on 31-12-2021	6,000	11,000

Solution:

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of Material Used}}{\text{Average Stock}}$$

Cost of Material Used = Opening Stock + Purchase – Closing Stock

	Material A Amount (₹)	Material B Amount (₹)
Opening stock on 1-1-2021	10,000	9,000
Add: Purchase during the year 2021	52,000	27,000
	62,000	36,000
Less: Closing stock on 31-12-2021	6,000	11,000
Raw Material Consumed	56,000	25,000
Average Stock	$\frac{10,000 + 6,000}{2}$ = 8,000	$\frac{9,000+11,000}{2}$ = 10,000
Inventory Turnover Ratio	$\frac{56,000}{8,000}$ = 7 times	$\frac{25,000}{10,000}$ = 2.5 times

Material inventory turnover ratio indicates the efficiency of the management with which they are able to utilize their inventory. It indicates the existence or non-existence of non-moving items, dormant items, slow moving items etc in inventory. If the ratio is high, the efficiency is said to be high and on the other hand if the ratio is low, the efficiency is said to be low.

In view of above, in the instant case, the usage of Material A is better than Material B.

Illustration 19

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:

a. Cost of placing a purchase order is ₹ 20

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

c. Purchase price per unit inclusive of transportation cost is ₹ 50

d. Annual cost of storage per unit is ₹ 5

e. Details of lead time: Average 10 days, Maximum 15 days, Minimum 6 days. For emergency purchases 4 days

f. Rate of consumption: Average: 15 units per day

Maximum: 20 units per day

Solution:

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

A = Annual Consumption = 5,000 units

O = Ordering Cost = ₹ 20

C = Carrying Cost per unit per annum = ₹ 5

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

Reordering Quantity = EOQ = 200 units

i. Re-order Level = Maximum Usage × Maximum Re-order period

= 20 × 15 = 300 units

ii. Maximum Level = Re-order Level + Re-order Quantity – (Min. Usage × Min. Re-order period)

= 300 + 200 – (10 × 6) = 440 units

(Average Usage = $\frac{\text{Minimum Usage + Maximum Usage}}{2}$)

(or, $15 = \frac{\text{Minimum Usage + 20}}{2}$)

(or, Minimum Usage = (15 × 2) - 20 = 10 units)

iii. Minimum Level = Re-order Level – (Average Usage × Average Re-order period)

= 300 – (15 × 10) = 150 units

iv. Danger Level = Average Usage × Lead Time for Emergency Purchase

= 15 × 4 = 60 units

Illustration 20

M/s. Tubes Ltd are the manufacturers of picture tubes for TV. The following are the details of their operation during the year 2021:

Average monthly market demand	2,000 Tubes
Ordering cost	₹ 100 per order
Inventory carrying cost	2% per annum
Cost of tubes	₹ 500 per tube
Normal usage	100 tubes per week
Minimum usage	50 tubes per week
Maximum usage	200 tubes per week
Lead time to supply	2 – 6 weeks

Compute from the above:

i. Economic order quantity. If the supplier is willing to supply quarterly 1,500 units at a discount of 5%, is it worth accepting?

ii. Re-order Level

iii. Minimum level of stock

iv. Maximum level of stock

Solution:

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

A = Annual usage of tubes = Normal usage per week × 52 weeks

or, A = 100 × 52 = 5,200 tubes

O = Ordering Cost per order = ₹ 100

C = Carrying Cost per unit per annum = 500 × 2% = ₹ 10

(i) $EOQ = \sqrt{\frac{2 \times 5{,}200 \times 100}{10}} = 322$ tubes

Calculation of Total Inventory Cost

	EOQ Purchase Policy	Discount given by Supplier
Ordering Quantity	102 tubes	1,500 tubes
No. of Order per annum	$\frac{5{,}200}{102} \approx 51$	$\frac{5{,}200}{1{,}500} \approx 4$

Purchase Cost (₹)	5,200 × 500	26,00,000	5,200 × 500 × 95%	24,70,000
Add: Ordering Cost (₹)	51 × 100	5,100	4 × 100	400
Add: Carrying Cost (₹)	$\frac{1}{2}$ × 102 × 500 × 20%	5,100	$\frac{1}{2}$ × 1500 × 500 × 20% × 95%	71,250
Total (₹)		**26,10,200**		**25,41,650**

Since the total cost under quarterly supply of 1,500 units with 5% discount is lower than that when order size is 102 units, the offer should be accepted. While accepting this offer capital blocked on order size of 1,500 units per quarter has been ignored.

ii. Re-order Level = Maximum Usage × Maximum Re-order period

= 200 × 6 =1,200 tubes

iii. Minimum Level of Stock

= Re-order Level – (Average Usage × Average Re-order period)

= 1,200 – (100 × 4) = 800 tubes

iv. Maximum Level of Stock

= Re-order Level + Re-order Quantity – (Minimum Usage × Minimum Re-order period)

= 1,200 + 322 – (50 × 2) = 1,422 tubes

Employee Cost

2.2

Introduction

As such, the expenditure associated with compensating workers is commonly referred as labour cost, reflecting the effort they contribute to the production of goods or the delivery of services. Whereas employee cost is a broader term that encompasses various forms of compensation such as wages, salary, bonuses, incentives, etc., disbursed to an employee and recorded as labour cost against a specific cost object. Employee cost[10] occupies a significant portion of the total cost of a product manufactured or services rendered.

Paragraph 4.7 of CAS 7 defines employee cost as benefits paid or payable for the services rendered by employees (including temporary, part time and contract employees) of an entity.

Employee cost includes payment made in cash or kind.

For example

Salaries, wages, allowances and bonus / incentives, Contribution to provident and other funds, Employee welfare and other benefits

Classification of Employee (labour) Cost

Employee (labour) cost is classified into direct cost and indirect cost. The main difference between them lies in their traceability to the production process and the nature of the work performed by the employees. Direct employee (labour) costs are related to employees who are directly involved in the production process, while indirect employee (labour) costs are related to employees who support the production process but are not directly involved in it. Direct labour costs fluctuate with production, whereas indirect labour costs can be fixed or variable depending on the employee and the organization's size and process level

A contrast of the two types of cost is presented below;

- Direct Employee (Labour) Cost:
    - Direct labour costs are associated with employees who are directly involved in the production process or core manufacturing operations
    - These costs are also classified as production costs
    - Examples of direct labour costs include the wages paid to workers in manufacturing, construction, or retail sales.

10 In this study note the terms, 'labour cost' and 'employee cost' are used synonymously as Cost Accounting Standard (CAS) - 7 issued by the Council of the Institute of Cost Accountants of India deals with 'Employee cost' while the term 'Labour cost' is used in various books on cost accounting to mean the same.

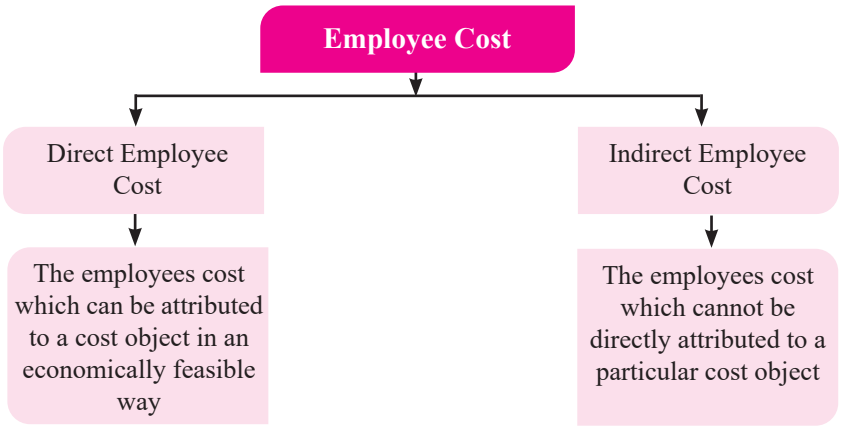
- Indirect Employee (Labour) Cost:
  - Indirect labour costs are associated with employees who perform duties that aid others in producing goods and performing services, but are not directly involved in the core activities of the entity
  - These costs are also classified as non-production costs
  - Indirect labour costs can be fixed or variable, depending on the employee
  - Examples of indirect labour costs include the salaries of supervisors, repairmen, inspectors, maintenance employees, and employees in purchasing, retail, manufacturing offices, timekeeping, and canteens

Paragraph 4.5 of CAS 7 defines direct employee cost as costs, which can be attributed to a Cost object in an economically feasible way.

Indirect labour, on the other, includes all other labour costs related to production (e.g., salary of plant supervisor). Like indirect materials, this is considered a factory overheads cost.

Paragraph 4.10 of CAS 7 defines indirect employee cost as employee cost, which cannot be directly attributed to a particular cost object

This is pictorially represented as follows;



Principles for Measuring Employee Costs (CAS – 7)

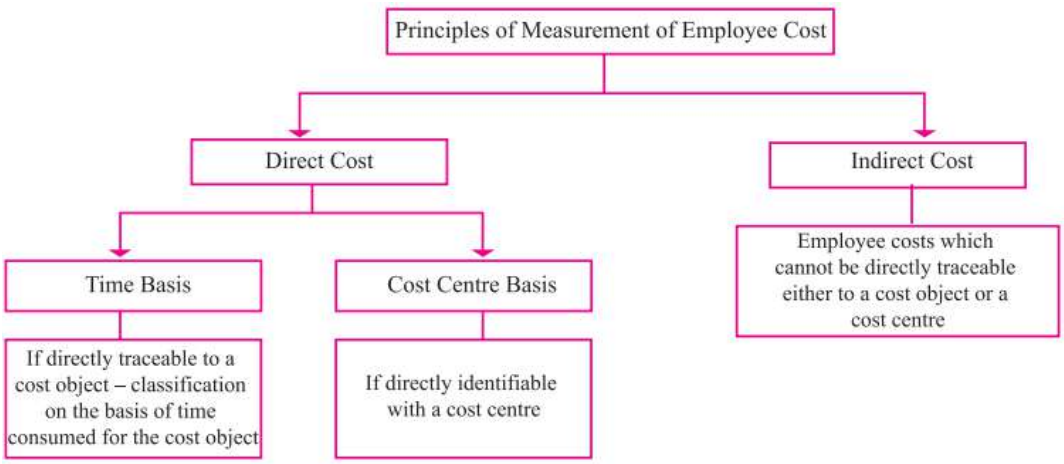
Para 5 of CAS – 7 (Cost Accounting Standard on Employee Cost) provides the guideline criteria for determining labour cost or employee cost which are outlined as follows:

1. Employee cost is computed by considering gross pay, including all allowances, and factoring in the employer's cost of providing benefits.
2. Bonus payments, whether mandated by statutory regulations or profit-sharing arrangements, are treated as components of employee cost. Ex-gratia payments made in lieu of or in addition to bonuses are also considered part of employee cost.
3. Remuneration for managerial personnel, including executive directors on the board and other officers as per statutory regulations, is regarded as part of the employee cost for the relevant year. This applies whether the remuneration is determined as a percentage of profits, wholly or partially.

   Note: Remuneration for non-executive directors is excluded from employee cost but is included in administrative overheads.

4. Costs associated with voluntary retirement, retrenchment, termination, etc., are amortized over the period benefiting from such costs.
5. Employee cost excludes any imputed costs.
6. The cost of idle time is calculated by multiplying idle hours by the applicable hourly rate for the idle employee or group of employees.
7. When accounting for employee cost at standard cost, variances resulting from normal reasons related to employee cost are considered part of employee cost. Variances arising from abnormal reasons are treated as abnormal costs.
8. Any subsidies, grants, incentives, or similar payments received or receivable related to employee cost are subtracted from the determination of the cost of the associated cost object.
9. Material and quantifiable abnormal costs do not constitute part of employee cost.
10. Penalties and damages paid to statutory authorities or other third parties are not included in employee cost.
11. The cost of providing benefits such as free housing and conveyance to an employee is calculated based on the total cost of all resources consumed in offering such benefits.
12. Any recoveries from employees for benefits provided, e.g., housing, are deducted from the employee cost.
13. Changes in cost accounting principles for determining employee cost should only occur if required by law, for compliance with cost accounting standards, or if the change results in a more appropriate preparation or presentation of an enterprise's cost statements.

The above-mentioned issues are represented pictorially as follows;



Labour Cost Management

Effective labour cost management is crucial for optimizing business expenses and maintaining profitability. By strategically analyzing and controlling wages, benefits, and productivity, organizations can enhance efficiency while ensuring fair compensation for employees. The following are the steps in effectively managing labour cost.

1. **Production Planning:** Effective control over the labour cost can be achieved through proper production planning. Production planning includes activities like planning, scheduling, routing, machine loading, product and process engineering, work study etc.

2. **Labour Budget:** Budget and budgetary control are effective tools for cost control and cost reduction. A labour budget can be prepared which will set the target for the labour cost which will again facilitate comparing between the budgeted labour cost and the actual labour cost.
3. **Labour Standards:** Standards can be set for labour cost against which the actual labour cost can be compared. Standard labour cost is the cost, which should have been incurred for producing a particular quantity of production.
4. **Labour Performance Report:** There should be a system of periodic labour efficiency and utilization reports. These reports will give awareness about the efficiency and productivity of the labour.
5. **Incentive Schemes:** Improving the labour productivity is one of the important ways to reduce the labour cost per unit. Productivity can be improved by motivating the workers offering monetary and nonmonetary incentives can help to improve the productivity substantially.
6. **Labour Cost Accounting:** There should be a proper cost accounting system, which will identify the direct and indirect labour cost. Similarly, the cost accounting department should be able to generate and maintain records for time keeping, time booking, idle and overtime, impact of incentive schemes, per unit of labour, cost due to labour turnover and other relevant records.

Labour cost control which is the focus area of labour cost management is referred to as one of the most significant aspects of cost accounting. Labour cost management is a complex process because it represents a sensitive area involving human behavior. The proportion of labour cost within the overall cost of a product or service can be a crucial factor in pricing decisions and profitability analysis at times. Thus, economic utilization of labour is a dire need of any industry. Management is interested in the accumulation and analysis of labour cost because they serve as a basis for:

1. Control over labour cost;
2. Managerial decisions; and
3. Inventory costing, fixation of selling price and profit determination which requires that the cost of product be ascertained by assigning direct labour and an equitable portion of indirect labour costs to products.

Conclusively, it may be said that labour is the physical and/or mental effort expended to manufacture products. And labour cost is the price paid for using human resources. Labour cost management is the mainly focused on the control aspect of the cost of labour such that the cost of production remains within control limits.

The comprehensive landscape (see chart below) of labour cost management involves the coordinated efforts of several organizational departments. The personnel department, engineering department, time-keeping department, payroll department, and the cost accounting department collectively contribute to the effective management of labour costs.

The roles played by each department can be briefly conceptualized as follows:

1. Personnel Department: The personnel department is involved in hiring, training, and managing the workforce. It plays a critical role in determining staffing levels, workforce planning, and implementing policies related to employee compensation and benefits. Effective collaboration with this department ensures alignment between organizational goals and human resource strategies.
2. Engineering Department: The engineering department is responsible for optimizing processes and workflows to enhance productivity. By improving efficiency and reducing waste, the engineering department indirectly influences labour costs. It may be involved in designing workflows that minimize labour-intensive tasks or implementing technology to automate certain processes, ultimately impacting the overall cost of labour.

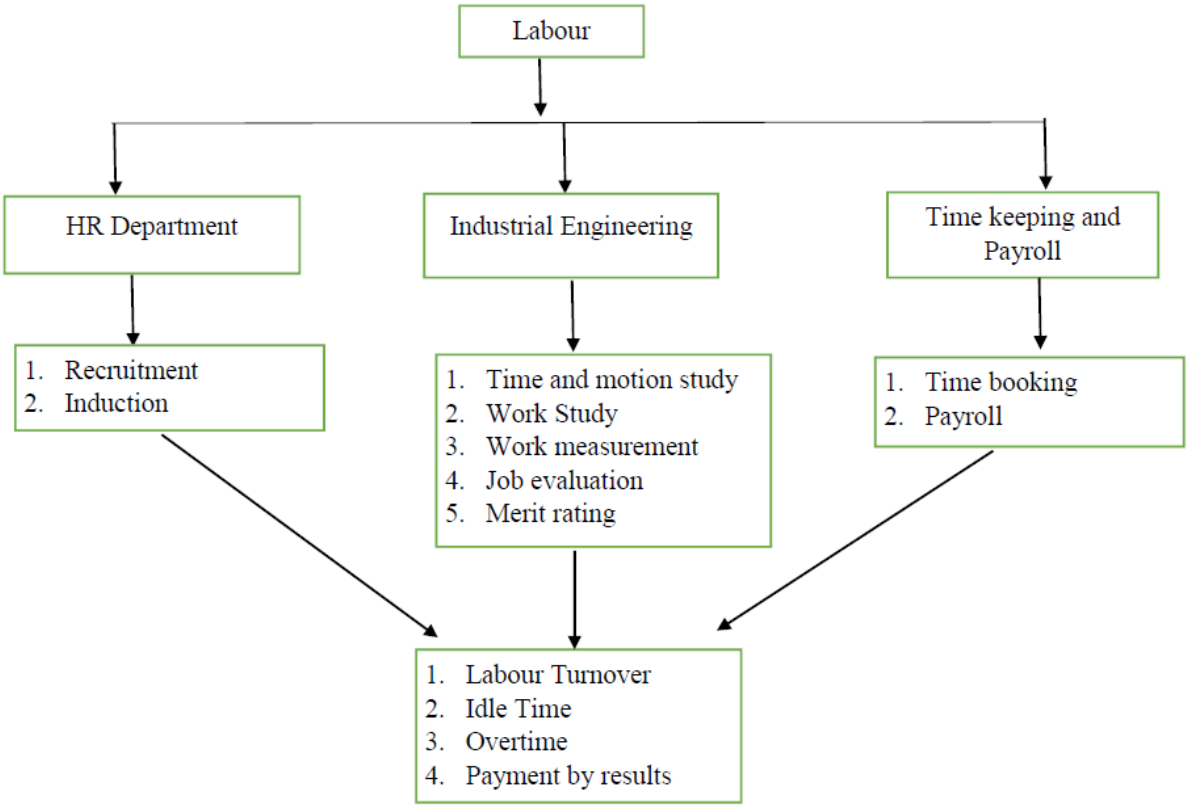
3. Time-Keeping Department: The time-keeping department is tasked with accurately recording and tracking employee work hours. Precise timekeeping is essential for calculating wages, salaries, and overtime accurately. It provides the necessary data for labour cost calculations, ensuring that the organization pays employees for the actual time worked.
4. Payroll Department: The payroll department is directly responsible for disbursing employee compensation. It processes wages, bonuses, incentives, and deductions in accordance with labour contracts and regulations. Collaboration with the payroll department is crucial for ensuring accurate and timely payment of labour costs.
5. Cost Accounting Department: The cost accounting department is at the core of labour cost management. It classifies, analyzes, and monitors various components of labour costs, such as wages, benefits, and overtime. It establishes standard costs, conducts variance analysis, and provides insights into the financial implications of labour-related decisions. The cost accounting department plays a central role in budgeting, forecasting, and reporting on labour costs.

Factors for Controlling Employee Cost

By focusing on the factors mentioned below, businesses can effectively manage employee costs, maintain profitability, and ensure efficient operations.

1. **Assessment of manpower requirements:** Accurately estimating the number of employees needed for a specific task or role, helps in optimizing workforce planning and avoiding overstaffing or understaffing
2. **Control over time-keeping and time-booking:** Efficient time management systems help in tracking employee attendance, identifying idle time, and ensuring that employees are accountable for their time
3. **Time and Motion Study:** This study helps in understanding the time taken for specific tasks and identifying areas for improvement in work processes
4. **Control over idle time and overtime:** Monitoring employee attendance and ensuring that employees are productively engaged helps in reducing idle time and overtime costs
5. **Control over employee turnover:** Retaining employees by offering competitive benefits, providing opportunities for professional development, and creating a positive work environment helps in reducing turnover costs
6. **Streamlining workforce planning:** Efficient planning and resource allocation help in balancing the need for skilled workers with the available budget
7. **Implementing time and attendance systems:** Automated systems help in tracking employee attendance, identifying absenteeism, and ensuring that employees are paid accurately for their work
8. **Enhancing workforce productivity:** Investing in productivity-boosting software, training, and development programs helps in improving employee performance and efficiency
9. **Automation and technology solutions:** Utilizing automation and technology to streamline processes and reduce manual work helps in reducing labour costs
10. **Employee training and skill development:** Providing employees with opportunities for skill development and training helps in improving their performance, efficiency, and job satisfaction, ultimately reducing employee costs

As discussed above labour cost management, as such, is an arena where specifically three departments have to put in their efforts. The whole gamut of labour cost and its management is covered by the role and function of the Human Resource department, Industrial engineering department and the Time keeping and Payroll department. This may be pictorially represented below:



The Human Resource (HR) Department

This department plays a crucial role in labour cost management. It is responsible for forecasting and analyzing personnel expenses, preparing different cost scenarios, and cooperating with the finance function to make informed decisions based on forecasts. HR is also tasked with reporting personnel expenses and ensuring that they are managed strategically, keeping in line with approved targets and allowing managers to grow the business. Additionally, HR can help maximize the return on investment (ROI) on labour costs by analyzing positions, labour trends, and overtime spend, thus adding a significant financial benefit to the company. By leveraging labour cost data, HR can understand the impact of labour costs on the business and facilitate productive conversations about workforce planning and the impact of increased employee count on the business. One of the most important functions of HR is recruitment. HR can leverage labour cost data to make informed decisions about recruitment, such as forecasting and analyzing personnel expenses, preparing different cost scenarios, and reporting personnel expenses.

Industrial Engineering Department

The Industrial Engineering department plays a pivotal role in labour cost management by applying systematic approaches to enhance productivity, streamline processes, and optimize resource allocation. Through time and motion studies, process analysis, and efficiency improvements, Industrial Engineers contribute to minimizing labour costs while maintaining or improving output quality. Their expertise in process optimization helps organizations strike a balance between workforce efficiency and cost-effectiveness, ultimately supporting sustainable labor cost management strategies. The Industrial Engineering (IE) department plays a crucial role in labor cost management through several key functions. Of the many functions the following three require special mention.

1. **Workforce planning and Allocation:** Industrial Engineers analyze production requirements and determine the optimal allocation of manpower to meet production targets. This involves assessing skill levels, workload distribution, and ensuring the right number of workers is assigned to each task, contributing to efficient labor utilization.
2. **Time and Motion Studies:** IE professionals conduct time and motion studies to analyze the efficiency of work processes. By identifying and eliminating inefficiencies, bottlenecks, and unnecessary movements, Industrial Engineers contribute to increased productivity and reduced labor costs per unit of output.
3. **Process Optimization:** The IE department is responsible for optimizing production processes, incorporating lean principles and minimizing waste. Streamlining workflows and improving overall process efficiency led to reduced labor input, contributing to cost savings.

In the following lines some specific issues related to this particular department are discussed.

- **Work study**

  Work study is a systematic and scientific approach to the analysis and improvement of work processes within an organization. It is a set of techniques and methodologies aimed at optimizing the utilization of resources, enhancing productivity, and minimizing waste. Work study involves the examination of various factors, including time, motion, methods, and manpower, to achieve greater efficiency and effectiveness in the workplace. The primary objectives of work study include improving the utilization of resources (such as time, manpower, and equipment), minimizing waste, and optimizing work methods. The key components of work study include:

  - **Time Study:** Involves the measurement and analysis of the time required to perform specific tasks or activities at a predetermined level of performance
  - **Motion Study:** Focuses on the analysis and improvement of the movements involved in performing a task. Aims to eliminate unnecessary motions, reduce fatigue, and optimize work methods to increase overall efficiency.
  - **Method Study:** Examines and evaluates existing work methods to identify opportunities for improvement.
  - **Work Measurement:** Encompasses both time study and motion study, providing a quantitative basis for evaluating and establishing standard times for work activities.

- **Time Study:**

  - Time study is a method used to determine the amount of time a worker should ideally take to perform a specific task at a defined level of performance.
  - It involves breaking down the job into elements, measuring the time required to complete each element, and establishing a standard time for the entire task.
  - The goal of time study is to set realistic and achievable production standards, which can be used for planning, scheduling, and performance evaluation.

- **Motion Study:**

  - Motion study focuses on the analysis and improvement of the movements required to perform a task. It aims to eliminate unnecessary motions and streamline the sequence of actions.
  - By studying the motions involved in a job, motion study seeks to design more efficient work methods, reduce fatigue, and enhance overall productivity.

- The principles of motion economy, developed by Frank B. Gilbreth[11], are often applied in motion study to simplify tasks and optimize movements.

It is important to note that time study and motion study are interrelated components of work study. Time study provides quantitative data on the duration of tasks, while motion study focuses on the qualitative aspects of work, specifically the movements involved. Combining time and motion studies allows for a more holistic approach to optimizing work processes. Efficient movements can contribute to shorter task times, and shorter task times can improve overall efficiency. The synergy between time study and motion study within the framework of work study enables organizations to achieve higher productivity, reduce costs, and enhance the quality of output.

- **Work Measurement**

Work measurement is a systematic and scientific method used in industrial engineering to analyze, quantify, and optimize the time required to perform a specific task or job. The primary goal is to establish standardized time norms for various work activities, providing a basis for efficient resource allocation, production planning, and performance evaluation. Work measurement is an essential tool for organizations aiming to enhance operational efficiency, reduce costs, and maintain consistent and high-quality output. It forms the foundation for informed decision-making in various industries, supporting the ongoing pursuit of productivity and performance improvements. It involves the application of predetermined motion and time standards to measure and evaluate work performance.

The effective time so established in work measurement can be used for the following purposes:

a) Incentive wage schemes which require data about the time allowed and time taken for a particular job.

b) Improving utilization of men, machines and materials.

c) Assisting in production control.

d) Assisting in setting labour standards.

e) Cost control and reduction.

- **Job Evaluation**

It is necessary for the management of any organisation to establish proper wage and salary structure for various jobs. For doing this in a scientific manner, it is necessary to determine the relative value of jobs and hence a job evaluation is done. It is a technique of analysis and assessment of jobs to determine their relative value within the firm. Job evaluation is a systematic process used by organizations to assess and determine the relative value or worth of different jobs within the company. The purpose is to establish a fair and equitable structure for compensation and create an organized hierarchy of jobs based on their inherent characteristics.

Methods of Job Evaluation

Three of the more important methods of job evaluation are discussed below:

i. **Point Ranking Method:** In this method each job is analysed in terms of various job factors or characteristics. The characteristics are skills required, effort involved, working conditions, hazards, responsibility and so on. In other words, the job factors are the requirements needed for performing the job effectively. Each job factor is given weightage or points depending upon its value for the job. For example, for certain jobs, maximum value is assigned to experience while for some jobs, education may be the most crucial factor. Finally, each job is ranked in the order of points or weights secured by them. The wage structure can be suitably designed according to the points assigned to each job. The method is quite sound in principle but difficulties may be faced assigning the weights to each job.

11. Motion Study: A Method for Increasing the Efficiency of the Workman by Frank B. Gilbreth, 1911.

ii. **Ranking Method:** In this method, jobs are ranked in order of importance on the basis of skills required, experience requirements, working conditions etc. Jobs are rearranged in an order, which can be either from the lowest to the highest or in the reverse. Wage scales are determined in terms of ranks. Though this method is quite simple to operate and less costly as well as easy for understanding, it is suitable when the size of the organisation is small and jobs are few and well defined. In a large organisation, where jobs are quite complex, this method is not beneficial.

iii. **Grading Method:** This method is an improvement over the ranking method. Under this method, each job is analysed in terms of a predetermined grade and then assigned a grade or class. Grades are established after making an investigation of job factors, such as complexity in the job, supervision, responsibility, education etc.

- **Merit Rating**

Job evaluation is the rating of the job in order to bring rationality in the wage and salary structure in the organisation. On the other hand, merit rating is the comparative evaluation and analysis of individual merits of the employees. The merit rating aims at evaluation and ranking the individual employees in order to plan and implement rational promotional policies in the organisation. Merit rating has the following objectives:

a) To evaluate the merit of an employee for the purpose of promotion, increment, reward and other benefits.

b) To establish and develop a wage system and incentive scheme.

c) To determine the suitability of an employee for a particular job.

d) To analyze the merits or limitations of a worker and help him to develop his capability and competence for a job.

e) To examine characteristics like cooperation, quality of work done, attendance and regularity, education, skill, experience, character and integrity and initiative.

Thus, it can be understood that merit rating is extremely useful for organisations for evaluating the employees. However, the main limitations are that the rating can be subjective which will give rise to the disputes and there is a possibility that past performance of an employee may be given too much importance.

Time Keeping, Time Booking and Payroll

Timekeeping, time booking, and payroll management, akin to the personnel department, significantly contribute to labour cost control by meticulously recording each worker's clock-in and clock-out times during regular working hours. This department plays a crucial role in reporting individual workers' time for specific departments, operations, or production orders. Accurate attendance records not only uphold punctuality and discipline within the company but also positively impact employee morale. Timekeeping is not just a statutory requirement; it is essential for precise record-keeping.

The key functions and benefits of timekeeping for labour costing and control can be summarized as follows:

a) Facilitates the calculation of wages for workers paid on a time-rate basis by showing the total hours worked by each individual.

b) Promotes punctuality and discipline among workers, preventing potential indiscipline and frustration in the absence of a reliable timekeeping system.

c) Supports the computation of benefits like pension, gratuity, leave with pay, provident fund, promotion, and salary scale linked to the continuity of service through accurate attendance records.

d) Enables the calculation of labour hours, aiding in overheads apportionment and absorption based on labour hours.

e) Satisfies statutory requirements under labour laws.

f) Provides data for additional analysis, such as establishing standard time, identifying idle time, and assessing labour efficiency. Researchers and government authorities can use timekeeping records for various purposes.

Time keeping and time booking – a contrast

Time Keeping and Time Booking are essential processes in organizations for managing employee attendance, wage calculations, and labour costs. While Time Keeping is concerned with attendance and wage calculations, Time Booking focuses on recording the time spent by employees on various jobs, processes, or operations. Both processes help organizations effectively manage their workforce and maintain accurate records for payroll and cost control purposes.

In the following table the distinguishing features of time keeping and time booking are presented

Time Keeping	Time Booking
Concerned with attendance and wage calculations of employees	Focuses on recording the time actually spent by a worker on various jobs, processes, or operations
Aimed at ensuring effective utilization of labour time and computing total wages payable to workers	Necessary for ascertaining labour cost of every job, providing time basis for apportionment of overheads expenses, and controlling idle time.
Involves marking the start and end times of a worker's shift Requires a separate time keeper	Involves recording the time when a job was started and finished by the worker Helps in computing the labour cost of each job or operation
Focuses on regular punctuality and discipline in the factory	Facilitates the fixation of differential piece rates and meeting statutory requirements

Thus, time keeping is simply maintaining attendance of the workers i.e., the time of arrival and the time of departure and thereby the time spent by the worker in the organisation is measured, whereas time booking is not only maintaining the time spent by the workers in the organisation, but also the time spent on each and every job including the idle time with reasons are recorded

Requirements for an effective time-keeping system

1. The timekeeping system must prevent any possibility of one employee acting as a proxy for another under any circumstances.
2. It should include a provision for recording the time of piece employees, ensuring the maintenance of regular attendance and discipline.
3. Both the arrival and departure times of employees should be recorded to accurately capture their total working hours, facilitating the calculation of wages.
4. The method of time recording should be primarily mechanical to minimize the likelihood of disputes between employees and the timekeeper.
5. Late arrivals should be documented, and the timekeeper should rigorously enforce this discipline.

6. The system should prioritize simplicity, smooth operation, and efficiency, eliminating unnecessary queues for attendance marking.
7. Regular reviews of the system should be conducted to identify and rectify any errors or loopholes, ensuring its continued effectiveness.

Methods of Time Keeping

The methods of time keeping are as follows:

1. **Attendance Records:** This is the simplest method of marking attendance of workers. In this method, every worker signs in an attendance register against his name. Leaves taken by workers as well as late reporting is marked on the attendance register itself. The main limitation of this system is that in case there is a large number of workers, there may be large queues for signing the muster.
2. **Disc Method:** In this approach, every employee is assigned a metal disc or token marked with a hole containing their identification number. The employee submits or the timekeeper receives the token, and the timekeeper then notes the corresponding identification number in the register. Similar to the attendance register method, this approach has drawbacks such as recording errors and the potential for proxy attendance. The main limitation of this method is that there is a possibility of marking the attendance of a worker by a proxy. Secondly, if the number of workers is large, there will be a delay in recording time due to manual operation of this system.
3. **Time Recording Clocks or Clock Cards:** This is an automated method of timekeeping where each worker uses a card to clock in and out. The card automatically records the time and date. A new card is issued each week (or month for monthly wage payments) to enable weekly or monthly wage calculations. There's no need to issue a new card monthly; the same card can be used until the worker leaves or retires. However, a limitation common to all timekeeping methods is that while they record time in and out, they don't provide details on how the worker spends their time during the workday. To capture productive time, separate time booking records must be maintained. These records can also be integrated with timekeeping records to eliminate the need for dual record-keeping.
4. **Bio-metric Attendance System:** According to Bio-metric attendance system, attendance of the employees is marked by recognizing an employee based on physical and behavioural traits. An employee's unique identity like finger print, face and retina image etc., is 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 finger print 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 possible for small organisations due to cost associated with set-up and maintenance of this system.

Time Booking

In time keeping we have seen that the basic objective of time keeping is to mark the attendance time, i.e., time-in and time-out. Time keeping aims at keeping a check on the number of hours spent by a worker in the factory. However, it does not record the productive time of the workers. It means the time keeping methods do not provide information about how the time is spent by the workers in the factory. For example, the time keeping record will show that the worker has reported for duty at 8 am and left at 6 pm, thus, he has spent 10 hours in the company. But the analysis of these 10 hours is not provided by the time keeping. In view of this there is a need to have a system, which will tell about the productive time spent by the workers in the factory. The method, which supplies this information, is known as 'Time Booking Methods' and the recording the time spent by a worker in each job, process or operation is known as 'Time Booking'.

The objective of time booking is as follows:

i. To determine the productive time spent by the worker on the job or operation. This help in finding out the idle time and controls the same.

ii. To determine the quantity and value of work done.

iii. To determine earnings like wages and bonus.

iv. To determine the efficiency of workers.

Methods of Time Booking

The following methods are used for time booking:

1. **Daily Time Sheet:** In this method, each worker records the time spent by him on the work during the day, for which a sheet is provided to each worker. The time is recorded daily and hence accuracy is maintained. However, the main limitation of this method is lot of paper work is involved as daily sheets are maintained on daily basis by each worker.

2. **Weekly Time Sheets:** The only difference between the daily time sheet and weekly time sheet is that these time sheets are maintained on weekly basis. This means that each worker prepares these sheets weekly rather than daily. This helps in reducing the paper work to a great extent.

   The only care to be taken is that since the information is filled up on daily basis, there may be inaccuracies and hence filling the information should be done on daily basis only.

3. **Job Ticket:** Job tickets are given to all workers where time for commencing the job is recorded as well as the time when the job is completed. The job tickets are given for each job and the recording of the time as mentioned above helps to ascertain the time taken for each job. After completing one job, the worker is given another job.

4. **Labour Cost Card:** This card is meant for a job, which involves several operations or stages of completion. Instead of giving one card to each worker, only one card is passed on to all workers and time taken on the job is recorded by each one of them. This card shows the aggregate labour cost of the job or the product.

5. **Time and Job Card:** This card is a combined record, which shows both, the time taken for completion of the job as well as the attendance time. Therefore, there is no need to keep separate record of both, time taken and attendance time.

Payroll Department

The role of the payroll department is crucial in the overall calculation and control of labour costs. This department is responsible for preparing the payroll based on clock cards, job or time tickets, or time sheets. The payroll provides details on each worker's wages, including gross wages, deductions, and net wages. Collaboration with the time office, personnel department, cost accounting department, and the relevant work department is essential for accurate calculations. The key functions of the payroll department include:

a. Computing employee wages.

b. Creating detailed wage sheets showing gross wages, various deductions, and other payroll liabilities.

c. Maintaining individual employee payroll records.

d. Preparing department-wise summaries of wages.

e. Compiling labour statistics for management.

f. Establishing an effective internal check system to prevent fraud and irregularities in wage payments.

g. Deducting and preventing ghost workers.

The cost accounting department is responsible for analyzing labour costs for computation and control purposes. It accumulates and classifies all cost data, with labour cost being a significant component. This department categorizes labour costs into direct and indirect, compares actual labour costs with budgeted costs, computes unit labour costs, and compiles data for further analysis. The generated data aids management in decision-making.

The activities related to payroll and their corresponding responsibilities are outlined as follows:

Activities	Responsibilities
Attendance and time details.	Time-keeping department.
Preparation of list of employees and other details.	Personnel / HR department.
Computation of wages and other incentives.	Payroll department.
Payment to employees.	Cost Accounting Department.
Discharge of statutory liabilities.	Cost Accounting Department.

In summary, the payroll department plays a vital role in ensuring accurate and compliant wage payments, while the cost accounting department focuses on analyzing labour costs for effective management decision-making. The outlined payroll procedure delineates the activities and their corresponding responsibilities in the payroll process.

Labour Turnover, Overtime and Idle Time

Labour Turnover

Labour turnover refers to the net departure of employees over a defined period of time. In every organization, employees leave and new ones are recruited, creating the phenomenon of labour turnover. It is the change in the composition of the labour force in an organisation. It can be divided into voluntary vs. involuntary and avoidable vs. unavoidable labour turnover. It can be measured by relating the engagements and losses in the labour force to the total number employed at the beginning of the period. All the losses must be taken into account regardless of the cause for leaving.

High labour turnover, occurring frequently, leads to decreased productivity, disrupted workflow, and increased labour costs. The causes of high turnover fall into three categories:

1. **Personnel Causes:** Employees leaving for personal reasons, such as job dissatisfaction, dislike for the environment, family responsibilities, career changes, retirement, or death.
2. **Unavoidable Causes:** Circumstances that necessitate management to ask some workers to leave, including retrenchment due to seasonal trade, material shortages, or disciplinary reasons.
3. **Avoidable Causes:** Reasons requiring management attention for effective remedial measures to keep turnover low, such as job unsuitability, low pay, unsatisfactory working conditions, poor relations with co-workers or superiors, disputes between trade unions, lack of amenities, and other social and economic factors.

These causes can also be grouped into financial, social and economic, and psychological factors related to human relationships. Managing and addressing these factors can contribute to minimizing labour turnover.

Measurement of Labour Turnover

It is essential for any organisation to measure the Labour Turnover. This is necessary for having an idea about the turnover in the organisation and also to compare the labour turnover of the previous period with the current one. The following methods are available for measurement of the labour turnover:

1. **Additions Method:** Under this method, number of employees added during a particular period is taken into consideration for computing the Labour Turnover. The method of computing is as follows:

$$\text{Labour Turnover} = \frac{\text{Number of Additions}}{\text{Average Number of Workers during the period}} \times 100$$

2. **Separation Method:** In this method, instead of taking the number of employees added, number of employees left during the period is taken into consideration. The method of computation is as follows:

$$\text{Labour Turnover} = \frac{\text{Number of Separation}}{\text{Average Number of Workers during the period}} \times 100$$

3. **Replacement Method:** In this method neither the additions nor the separations are taken into consideration. The number of employees replaced is taken into consideration for computing the labour turnover.

$$\text{Labour Turnover} = \frac{\text{Number of Replacement}}{\text{Average Number of Workers during the period}} \times 100$$

4. **Flux Method:** Under this method Labour Turnover is computed by taking into consideration the additions as well as separations. The turnover can also be computed by taking replacements and separations also. Computation is done as per the following methods:

$$\text{Labour Turnover} = \frac{\frac{1}{2} \times (\text{Number of Additions} + \text{Number of Separations})}{\text{Average Number of Workers during the period}} \times 100$$

Cost of labour turnover

The rising labour turnover presents a dual challenge, adversely affecting both workforce productivity and leading to increased costs. The costs associated with labour turnover can be categorized into two main groups:

- **Preventive Costs** – Preventive Costs refer to the expenditures incurred by an organization with the primary objective of maintaining worker satisfaction and discouraging employees from leaving their employment. These costs are essentially investments made to create a positive work environment, foster employee engagement, and address factors that might contribute to high turnover. Examples of preventive costs include:

  a. **Employee Benefits:** Offering attractive benefits such as health insurance, retirement plans, and wellness programs to enhance job satisfaction and loyalty.

  b. **Training and Development:** Providing ongoing training and development opportunities to enhance employee skills, job satisfaction, and career growth, making them more likely to stay with the organization.

  c. **Workplace Wellness Programs:** Implementing initiatives to support the well-being of employees, both physically and mentally, contributing to overall job satisfaction and reducing the likelihood of turnover.

  d. **Competitive Compensation:** Ensuring that salaries and other forms of compensation are competitive within the industry, preventing employees from seeking better-paying opportunities elsewhere.

  e. **Employee Recognition Programs:** Acknowledging and rewarding employees for their contributions, fostering a positive work culture and reinforcing their sense of value within the organization.

  By investing in these preventive measures, organizations aim to create a workplace that employees find fulfilling and satisfying, reducing the inclination to leave for better opportunities.

- **Replacement Costs –** Replacement Costs encompass the financial outlays associated with the recruitment and training of new employees, as well as the subsequent impacts on productivity and efficiency resulting from the inexperience of the newly acquired workforce. These costs are incurred when turnover occurs and a vacant position needs to be filled. Examples of replacement costs include:

  a. **Recruitment Expenses:** Costs related to advertising job openings, conducting interviews, and screening candidates during the hiring process.

  b. **Training and orientation:** Expenses associated with training new hires to ensure they are equipped with the necessary skills and knowledge to perform their roles effectively.

  c. **Productivity loss:** The decrease in overall productivity and efficiency as new employees acclimate to their roles, resulting in potential disruptions to workflow.

  d. **Wastage:** Resources wasted during the transition period, including any work left incomplete by departing employees and potential errors made by the inexperienced new hires.

  By understanding and quantifying these replacement costs, organizations can better appreciate the financial impact of high turnover and develop strategies to minimize these expenditures through effective retention efforts.

Treatment of Labour Turnover

The following are the two ways in which labour turnover is treated in cost accounting

- Preventive costs are treated as overheads expenses and apportioned to departments on the basis of number of persons employed in each department.
- Replacement costs may arise either due to faults of departments or due to faulty management policy. In the first case the cost is charged as overheads to the concerned department. In the latter case, the overheads cost is apportioned to different departments, on the basis of number of persons employed in each department

Illustration 21

During October 2022, the following information is obtained from the Personnel Department of a manufacturing company. Labour force at the beginning of the month 1,900 and at the end of the month 2,100. During the month 25 people left while 40 persons were discharged. 280 workers were engaged out of which only 30 were appointed in the vacancy created by the number of workers separated and the rest on account of expansion scheme. Calculate the Labour Turnover by different methods.

Solution:

Computation of Labour Turnover

(a) Additions Method $= \frac{\text{Number of Additions}}{\text{Average Number of Workers during the period}} \times 100 = \frac{280}{2{,}000} \times 100 = 14\%$

(b) Separation Method $= \frac{\text{Number of Separation}}{\text{Average Number of Workers during the period}} \times 100 = \frac{(25+40)}{2{,}000} \times 100 = \frac{65}{2{,}000} \times 100$
$= 3.25\%$

(c) Replacement Method $= \frac{\text{Number of Replacements}}{\text{Average Number of Workers during the period}} \times 100 = \frac{30}{2{,}000} \times 100 = 1.5\%$

(d) Flux Method = $\frac{½ \times (\text{Number of Additions} + \text{Number of Separations})}{\text{Average Number of Workers during the period}} \times 100 = \frac{½ \times (280 + 65)}{2,000} \times 100 = 8.63\%$

$$\text{Average Number of Workers during the period} = \frac{\text{Opening Number of Workers} + \text{Closing Number of Workers}}{2}$$

$$= \frac{1,900 + 2,100}{2} = 2,000$$

Illustration 22

The extracts from the payroll of M/s. Maheswari Bros. are as follows:

Number of employees at the beginning of 2022	150
Number of employees at the end of 2022	200
Number of employees resigned	20
Number of employees discharged	5
Number of employees replaced due to resignation and discharges	20

Calculate the Labour Turnover rate for the factory by different methods.

Solution:

1. Separation Method $= \frac{25}{\frac{150 + 200}{2}} \times 100 = 14.29\%$
2. Replacement Method $= \frac{20}{\frac{150 + 200}{2}} \times 100 = 11.43\%$
3. Flux Method $= \frac{25+20}{\frac{150 + 200}{2}} \times 100 = 25.71\%$

Illustration 23

The management of XYZ Ltd is worried about the increasing Labour Turnover in the factory and before analyzing the causes and taking remedial steps; they want to have an idea of the profit foregone as a result of Labour Turnover during the last year. Last year's sales amounted to ₹ 83,03,300 and the profit / volume ratio was 20%. The total number of actual hours worked by the direct labour force was 4.45 lakhs. As a result of the delays by the personnel department in filling vacancies due to Labour Turnover, 1,00,000 potentially productive hours were lost. The actual direct labour hours included 30,000 hours attributable to training new recruits, out of which, half of the hours were unproductive. The cost incurred consequent on labour turnover revealed, on analysis the following. Settlement cost due to leaving: ₹ 43,820 and recruitment costs: ₹ 26,740. Selection costs: ₹ 12,750 and training costs: ₹ 30,490.

Assuming that the potential production lost as a consequence of Labour Turnover could have been sold at prevailing prices, find out the profit foregone last year on account of Labour Turnover.

Solution:

Profit foregone = Loss in Contribution + Additional Cost incurred as a result of labour turnover

i. Actual Productive Hours during last year = 4,45,000 – 15,000 [i.e. 50% × 30,000 hours] = 4,30,000 hours

ii. Sales during last year = ₹ 83,03,300

iii. Productive Hours Lost in Current Year = 1,00,000 hours

$\therefore$ Loss in Sales during the current year = $\frac{₹\ 83,03,300}{4,30,000} \times 1,00,000 = ₹\ 19,31,000$

And Loss in Contribution = 20% x ₹ 19,31,000 = ₹ 3,86,200

Computation of Profit Foregone during the current year

	Amount (₹)
Contribution Lost	3,86,200
Settlement Cost due to leaving	43,820
Recruitment Cost	26,740
Selection Cost	12,750
Training Cost	30,490
Profit Foregone	**5,00,000**

Overtime

Overtime refers to the scenario in which an employee works beyond their regular working hours. The overtime rate is consistently higher than the standard rate and is typically set at double the normal rate. The Factories Act and Shops and Establishments Act establish the standard working hours, define overtime, specify the overtime rate, and set limits on the maximum hours of overtime permissible. The causes of overtime are discussed in the next few lines.

- Causes of Overtime
- Increased workload or production demands.
- Tight project deadlines.
- Staff shortages or absences.
- Seasonal fluctuations in business activity.
- Urgent customer orders or projects.
- Unforeseen emergencies or unexpected demand spikes.

Overtime wage is the total additional compensation for extra hours worked, while the overtime premium specifically denotes the extra amount paid as an incentive for working beyond regular hours. But for the purpose of this study note the terms are used to mean the same thing and also CAS 7 does not make any distinction between the two terms.

As per CAS – 7, overtime premium is defined as "The extra amount payable beyond the normal wages and salaries for beyond the normal working hours".

Overtime premium comprises two components: the standard cost and an additional payment or premium, known as overtime cost. The standard cost is assigned to the Production Order or cost center/unit where the employee is engaged. The handling of overtime cost is contingent on the specific circumstances.

Managing overtime effectively involves balancing operational needs with employee well-being and addressing the potential drawbacks associated with extended working hours.

The disadvantages of overtime are as follows:

- Cost Increase: Higher labour costs due to increased overtime rates.
- Health and Safety Concerns: Increased likelihood of accidents or errors due to tiredness.
- Quality Issues: Diminished work quality as fatigue sets in.
- Impact on Work-Life Balance: Strain on employees' personal lives and time commitments.
- Employee Turnover: Overtime can contribute to dissatisfaction and higher turnover rates.
- Impact on Regular Operations: Regular work schedules may be disrupted, affecting routine operations.
- Reduced Innovation and Creativity: Fatigue may hinder creative thinking and problem-solving.
- Training and Orientation Costs: Increased turnover may lead to additional recruitment and training expenses.

Treatment of Overheads Premium

Para 6.6 of CAS 7 states that 'Overtime premium shall be assigned directly to the cost object or treated as overheads depending on the economic feasibility and the specific circumstance requiring such overtime'.

Overtime premium is the time spent beyond the normal working hours which is usually paid at a higher rate than the normal time rate. The overtime premium is to be assigned in one of the following ways:

- Where the overtime working is caused by a "rush order" of the customer or other special requirement of a job, the overtime premium is assigned to the job or product.
- In all other cases, it is usual to treat the overtime premium as overheads and absorb the same as part of overheads.

As such, the general rule for the treatment of Overheads premium in cost accounting is

1. If the overtime is resorted to at the desire of the customer, then the entire amount of overtime including overtime premium should be charged to the job directly.
2. If it is due to a general pressure of work to increase the output, the premium as well as overtime wages may be charged to general overheads.
3. If it is due to the negligence or delay of workers of a particular department, it may be charged to the concerned department.
4. If it is due to circumstances beyond control, it may be charged to Costing Profit & Loss Account.

Idle Time

Idle time refers to the period during which employees or machinery are not actively engaged in productive work but are still being paid. It represents unproductive time that does not contribute to the completion of tasks or the overall output of an organization. Idle time refers to the period of time when an asset, such as a machine or an employee, is available for use but remains unproductive. The following are some important aspects of idle time.

- Idle time has a cost because employees will still be paid their basic wage or salary for these unproductive hours and so there should be a record of idle time. It can be classified as normal or abnormal, depending on whether it is expected or unexpected

- Idle time can be caused by factors that are either controlled or uncontrolled by management, such as machine breakdowns, lack of work, or inefficient scheduling.
- It is important to comprehend the causes of idle time as it indicates gaps in productivity and efficiency.
- While some level of idle time is inevitable, managers should aim to minimize it rather than eliminate it.

Para 4.8 of CAS – 7 (Cost Accounting Standard on 'Employee Cost') defines idle time as 'the difference between the time for which employees are paid / payable to employees and the employees' time booked against cost objects'.

Para 5.6 of the CAS – 7 states the principle of measurement of idle time and states that 'cost of Idle time is ascertained by the idle hours multiplied by the hourly rate applicable to the idle employee or a group of employees'.

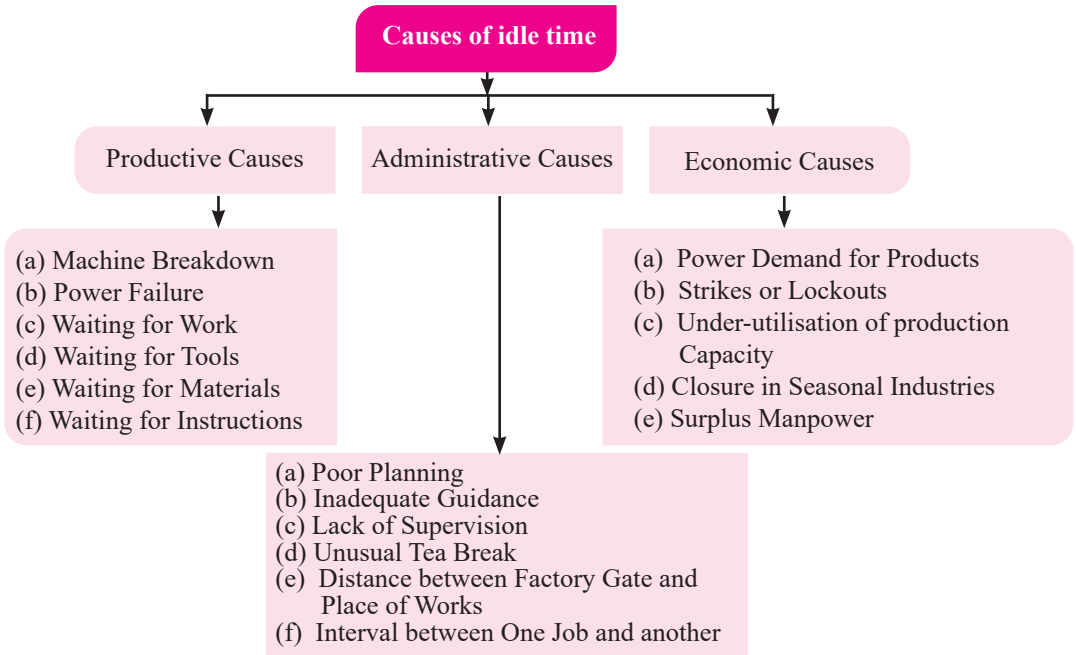
Thus,

$$\text{Cost of Idle Time} = \text{Idle Hours} \times \text{Hourly Rate}$$

The idle time cost can also be represented as a ratio. The idle time ratio is useful because it shows the proportion of available hours which were lost as a result of idle time.

$$\text{Idle Time Ratio} = \frac{\text{Idle Hours}}{\text{Total Hours}} \times 100$$

The causes of idle time may be classified under three broad heads as depicted in the following figure;



Treatment of normal and abnormal idle time

Normal idle time is a routine and expected part of the production process, included in standard costs, and absorbed into the overall cost of production. Normal idle time is t is considered inherent and unavoidable in any production setting. Employees may need breaks, and machinery may require maintenance, resulting in normal idle time. The treatment of abnormal idle time can be summarized as follows;

- Included in the standard cost calculations as it is part of the planned production time.
- Spread across the production units to determine the standard cost per unit.
- Usually absorbed into the cost of production as it is deemed a regular and unavoidable occurrence.

On the other hand, abnormal idle time is an unexpected and non-routine occurrence, treated separately, and charged as a direct cost to the specific cause or job affected by the idle time. It is considered unusual and non-routine, stemming from unforeseen disruptions in the production process. Treatment of abnormal idle time may be summed up as follows;

- Treated as a separate cost item rather than being absorbed into the standard cost.
- Typically charged as a direct cost to the specific job or production unit affected by the abnormal idle time.
- The cause of abnormal idle time is investigated to identify opportunities for preventive measures in the future.

As per CAS – 7, Idle time cost shall be assigned direct to the cost object or treated as overheads depending on the economic feasibility and specific circumstances causing such idle time. Treatment of different categories of idle time, as specified in CAS -7, are as follows:

- Unavoidable idle time above would be for significant periods. In cost accounts, this is allowed to remain merged in the production order or standing order number on which, the worker was otherwise employed.
- Normal idle time is booked to factory or works overheads. For the purpose of effective control, each type of idle time, i.e., idle time classified according to the causes is allocated to a separate standing order number.
- Abnormal idle time would usually be heavy in amount involves longer periods and would mostly be beyond the control of the management. Payment for such idle time is not included in cost and is adjusted through costing profit and loss account or included in profit and loss account, when the accounts are integrated.

The above issues may be summed up in the following table

Item	Charged to
1) Cost of Normal and Controllable Idle Time	Factory Overheads
2) Cost of Normal but Uncontrollable Idle Time	JOBS (by inflating the rates of wages)
3) Cost of Abnormal and Uncontrollable or Unavoidable Idle Time	Costing Profit and Loss Account

Remuneration Plans

General principles in designing the system of remuneration to employee

Remuneration is the reward for labour under normal circumstances and is generally based on either time spent or on the result produced. The former is called "time-related" remuneration and the latter is known as "Piece-related" remuneration. The fixation of method of remuneration in a proper manner is vitally important for any organisation because it deals with the most sensitive item of the input, i.e., Labour.

The general principles which should be considered in designing a proper method of labour remuneration is summarised below:

a) The basis should be simple to understand and the various segments of the system, should clearly mention in detail.

b) The employees should be able to accept the method without any doubts or hesitation in their mind.

c) The method should be flexible enough to adopt any changes or variation which may become inevitable at a later stage.

d) The method should be able to cut down / stabilize the labour turnover which is often caused by unsatisfactory or unacceptable method of remuneration.

e) The method should assure fair wages to the employees so that both the employers and the employees can gain by such methods, the former by way of higher productivity and the latter by way of higher earnings.

f) Incentive payments should be a part of the method of remuneration with a view to increase the labour productivity.

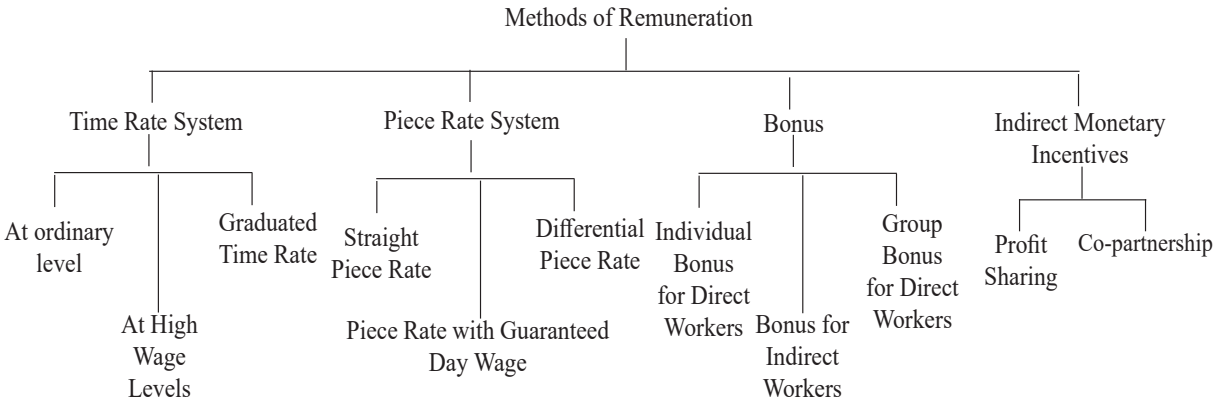
g) The method should be able to minimize the level of absentees so that avoidable wastages in labour cost can be reduced.

h) The method should ultimately result into higher production and improved quality of the output.

Methods of Wage Payment

One of the important components of labour cost control is the wages system. A system of wage payment, which takes care of both, i.e., providing guarantee of minimum wages as well as offering incentive to efficient workers helps to motivate the workers to a great extent. It should also be remembered that high wages do not necessarily mean high labour cost because it may be observed that due to high wages the productivity of workers is also high and hence the per unit cost of production is actually decreased. On the other hand, if low wages are paid, it may result in lower productivity and hence higher wages do not necessarily mean high cost.

The following is a schematic presentation of the various methods of remuneration.



** There are also some non-monetary incentives like job security, social and general welfare, sports, medical facilities etc which are also considered as important incentive schemes but are not considered in cost accounting

The methods are detailed in the following lines:

A. Time Rate Method

a) Time Rate at Ordinary Levels

Under this method, rate of payment of wages per hour is fixed and payment is made accordingly on the basis of time worked irrespective of the output produced. However, overtime is paid as per the statutory

provisions. The main benefit of this method for the workers is that they get guarantee of minimum income irrespective of the output produced by them. If a worker is not able to work due to genuine reasons like illness or physical disability, he will continue to get the wages on the basis of time taken for a particular job. This method is used in the following situation:

i) Where the work requires high skill and quality is more important than the quantity.

ii) Where the output / service is not quantifiable. i.e., where output / service cannot be measured.

iii) Where the work done by one person is dependent upon other person, in other words where a individual worker has no control over the work.

iv) Where the speed of production is governed by time in process or speed of a machine.

v) Where the workers are learner or inexperienced.

vi) Where continuous supervision is not possible.

The main advantage of this method is that the worker is assured of minimum income irrespective of the output produced. He can focus on quality as there is no monetary incentive for producing more output. However, the main limitation of this method is that it does not offer any incentive to the efficient workers. Efficient and inefficient workers are paid at the same rate of wages and hence there is possibility that even an efficient worker may become inefficient due to lack of incentive.

b) Time Rate at High Wage Levels

This system is a variation of time rate at ordinary levels in the sense that in this system, workers are paid at time rate but the rate is much higher than that is normally paid in the industry or area. In this method, the workers are paid according to the time taken and overtime is nor normally allowed. This method offers a very strong incentive to workers and it can attract talented workers in the industry. However, care should be taken that productivity also increases; otherwise, the cost will go on increasing.

c) Graduated Time Rate

Under this method payment is made at time rate, which varies according to personal qualities of the workers. The rate also changes with the official cost of living index. Thus, this method is suitable for both employer and employees.

B. Piece Rate Method

It's important to note that the effectiveness of a piece rate system depends on the nature of the work, the industry, and the way in which the system is implemented and managed. Employers need to carefully consider these factors and strike a balance between providing incentives for productivity and ensuring fair and equitable compensation for workers

This method is also called as payment by results where the workers are paid as per the production achieved by them. Thus, if a worker produces higher output, he can earn higher wages.

Under the piece rate system of wage payment, the workers receive a flat rate of wages either for time worked or for units manufactured.

The advantages of the piece rate system are as follows;

Advantages and disadvantages of Piece Rate System

Advantages of Piece Rate System

- Incentive for Productivity: Encourages higher productivity as employees are motivated to produce more to earn more.
- Individual Performance Recognition: Recognizes and rewards individual efforts, making it easier to identify and reward high performers.
- Direct Link Between Effort and Earnings: Establishes a clear link between employee effort and earnings, promoting a sense of fairness.
- Simple and Transparent: Simple to administer and transparent, as payment is directly tied to output.
- Cost Control for Employers: Helps employers control labour costs, as payment is based on actual production.

Disadvantages of Piece Rate System:

- Quality Sacrifice: Workers may prioritize quantity over quality to maximize output, potentially leading to lower product or service quality.
- Stress and Fatigue: Encourages overexertion and stress, as workers may push themselves to achieve higher output levels.
- Difficulty in Setting Fair Rates: Determining fair piece rates can be challenging, as it needs to balance the interests of both employees and employers.
- Lack of Teamwork: May discourage teamwork, as employees may focus on individual output rather than collaborative efforts.
- Potential for Exploitation: In some cases, piece rate systems may be exploited by employers to pay lower rates or set unrealistic production targets.
- Resistance from Workers: Workers may resist piece rate systems if they feel that the rates are unfair or if they are concerned about job security.

a) Straight Piece Rate

In this method, rate per unit is fixed and the worker is paid according to this rate. For example, if the rate per unit is fixed at ₹ 10, and the output produced is 300 units, the remuneration to the worker will be ₹ 10 × 300 units = ₹ 3,000. This method thus offers a very strong incentive to the workers and is particularly suitable where the work is repetitive. The benefits of this method are as follows:

i) The method is simple and provides a very strong incentive to the workers by linking the monetary reward directly to the results.

ii) Productivity can be increased substantially if the rate of pay includes a really adequate incentive.

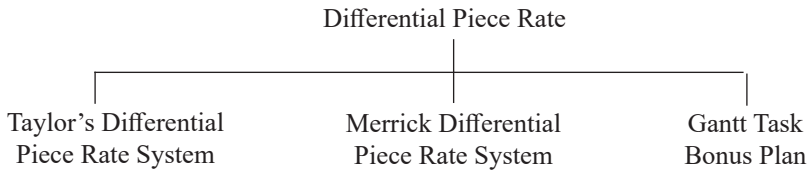
iii) Higher productivity will result in lowering the cost per unit.

However, the main limitation of this method is that if a worker is not able to work efficiently due to reasons beyond his control, he will be penalized in the form of lower wages.

b) Differential Piece Rate

Differential Piece Rate System is a compensation approach that rewards workers with higher rates per

standard hour as they achieve higher levels of productivity. The system is effective when production processes are repetitive, methods are standardized, and individual worker output can be clearly identified. The efficiency of workers is evaluated by comparing their actual production with established standards, and those exceeding the standards qualify for higher wages. The following are the major systems of differential piece rate system:



- **Taylor's Differential Piece Rate System**

  F.W. Taylor suggested that efficient workers should be encouraged to the maximum possible extent, the inefficient workers should be penalized. In order to do this, he has suggested two rates for the two classes of workers. Thus, according to Taylor, if the workers are efficient, they should be paid @ 120% of the normal piece rate and if they are inefficient, they should be paid @ 80% of the normal piece rate. For measuring efficiency, each worker will be given a standard production quantity to be produced in the time allowed and the actual production should be compared with the same. If a worker exceeds the standard, he will be regarded as efficient while if he fails to do so, he will be regarded as inefficient. The merits and Limitations of the system are as follows:

  Merits

  i) There is a very strong incentive to the workers, which helps to achieve higher productivity.

  ii) Due to the incentive, best workers are attracted to the company.

  iii) This method is quite simple and hence easy to understand.

  Limitations

  i) Slow workers and beginners are penalized severely. Similarly, workers get penalized for reasons beyond their control, e.g., medical reasons, accidents etc. Therefore, it is said that there is no human element in this system.

  ii) In an anxiety to produce more, quality may be neglected in order to achieve higher quantity of production.

Illustration 24

From the following particulars, calculate the earnings of workers X and Y and also comment on the labour cost.

Standard time allowed: 20 units per hour

Normal time rate: ₹ 30 per hour

Differential rate to be applied:

80% of piece rate when below standard

120% of piece rate at or above standard

In a particular day of 8 hours, X produces 140 units while Y produces 165 units.

Solution:

Particulars	Worker X	Worker Y
Standard Production in 8 Hours	20 × 8 = 160 units	20 × 8 = 160 units
Actual Production	140 units	165 units
	Below Standard = 80% of Normal Piece Rate	Above Standard = 120% of Normal Piece Rate
Piece Rate = $\frac{\text{Rate per hour}}{\text{Production per hour}}$	$\frac{₹\ 30}{20\ \text{units}}$ = ₹ 1.50 per unit	$\frac{₹\ 30}{20\ \text{units}}$ = ₹ 1.50 per unit
Earnings	= 140 × 1.50 × 80% = ₹ 168	165 × 1.50 × 120% = ₹ 297
Labour Cost per unit	$\frac{₹\ 168}{140\ \text{units}}$ = ₹ 1.20	$\frac{₹\ 297}{165\ \text{units}}$ = ₹ 1.80

Comment: Labour cost increase from ₹ 1.20 per unit to ₹ 1.80 per unit. Taylor's system is resisted on this ground as well as on the ground that it is very harsh on the workers.

- **Merrick Differential Piece Rate System**

  Merrick's system is modification of Taylor's system and is comparatively less harsh on the workers. The scale of remunerations is as follows:

  Production Rates of Payment

  Upto 83% of production - Normal piece rate

  83% to 100% of production - 110% of ordinary piece rate

  Above 100% of production - 120% of ordinary piece rate

- **Gantt Task Bonus Plan**

  In this method, there is a combination of time rate, bonus and piece rate plan. The remuneration is computed as shown below:

  Production below standard - Guaranteed time rate

  Production at standard - Bonus of 20% (normally) of time rate

  Production above standard - High piece rate for the entire output

This method assures minimum wages for even too less efficient workers and hence is a preferred method of payment of wages. It also offers reasonably good incentive to efficient workers. However, the main limitation is that the method is complicated to understand by the workers and hence may create confusion amongst them.

Illustration 25

X, Y and Z are three workers in a manufacturing company and their output during a particular 40 hours week was 96, 111 and 126 units respectively. The guaranteed rate per hour is ₹ 10 per hour, low piece rate is ₹4 per unit, and high piece rate is ₹ 6 per unit. High task (standard) is 100 units per week. Normal Piece Rate to be taken at ₹6 per unit. Compute the total earnings and labour cost per unit under Taylor, Merrick and Gantt Task Bonus Plan.

Solution:

(a) Earnings under Taylor Plan

Particulars	X	Y	Z
Standard Production in 40 hours	100 units	100 units	100 units
Actual Production	96 units	111 units	126 units
	Below Standard = 80% of Normal Piece Rate	Above Standard = 120% of Normal Piece Rate	Above Standard = 120% of Normal Piece Rate
Earnings	= 96 × 6 × 80% = ₹ 460.80	= 111 × 6 × 120% = ₹ 799.20	= 126 × 6 × 120% = ₹ 907.20
Labour Cost per unit	$\frac{₹\ 460.80}{96\ units}$ = ₹ 4.80	$\frac{₹\ 799.20}{111\ units}$ = ₹ 7.20	$\frac{₹\ 907.20}{126\ units}$ = ₹ 7.20

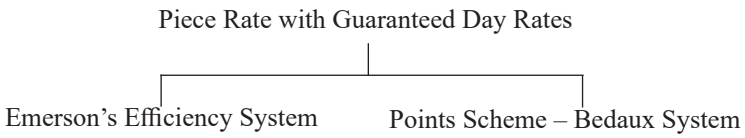
(b) Earnings under Merrick Plan

Particulars	X	Y	Z
Standard Production in 40 hours	100 units	100 units	100 units
Actual Production	96 units	111 units	126 units
Efficiency	$\frac{96}{100}$ × 100 = 96%	$\frac{111}{100}$ × 100 = 111%	$\frac{126}{100}$ × 100 = 126%
	110% of Ordinary Piece Rate	120% of Ordinary Piece Rate	120% of Ordinary Piece Rate
Earnings	= 96 x 6 x 110% = ₹ 633.60	= 111 x 6 x 120% = ₹ 799.20	= 126 x 6 x 120% = ₹ 907.20
Labour Cost per unit	$\frac{₹\ 633.60}{96\ units}$ = ₹ 6.60	$\frac{₹\ 799.20}{111\ units}$ = ₹ 7.20	$\frac{₹\ 907.20}{126\ units}$ = ₹ 7.20

(c) Earnings under Gantt Task Bonus Plan

Particulars	X	Y	Z
Standard Production in 40 hours	100 units	100 units	100 units
Actual Production	96 units	111 units	126 units
	Below Standard = Guaranteed Time Rate	Above Standard = High Piece Rate	Above Standard = High Piece Rate
Earnings	= 40 x 10 = ₹ 400	= 111 x 6 = ₹ 666	= 126 x 6 = ₹ 756
Labour Cost per unit	$\frac{₹\ 400}{96\ units}$ = ₹ 4.17	$\frac{₹\ 666}{111\ units}$ = ₹ 6	$\frac{₹\ 756}{126\ units}$ = ₹ 6

c) Piece Rate with Guaranteed Day Rates



- **Emerson's Efficiency System**

  Under this system minimum time wages are guaranteed. Bonus in addition to minimum day wages is given to the worker beyond a certain efficiency level. A worker who is able to attain efficiency measured by his output which is equal to or above this standard efficiency is deemed to be an efficient worker who deserves encouragement.

  The scheme provides for payment of bonus at various levels of efficiency ranging from 66.67% to 150% in the following manner:

  i) for a performance below 66.67% efficiency, only time rate wages are paid without any bonus.

  ii) for a performance between 66.67% and 100% efficiency, bonus varies between 0.01% and 20%.

  iii) above 100% efficiency level, bonus of 20% of basic wages + 1% for each 1% increase in efficiency is admissible.

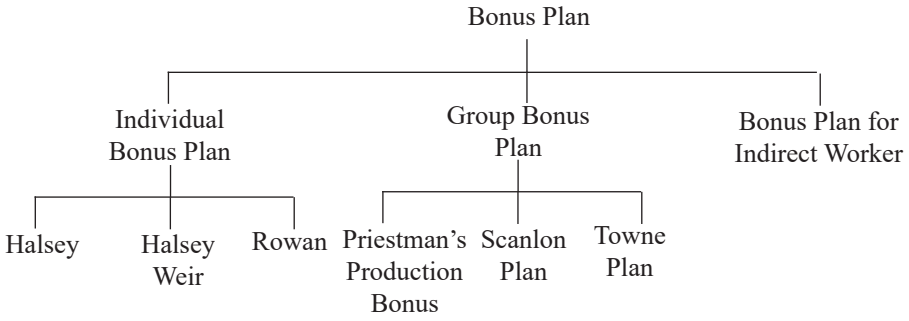
  Emerson's efficiency system is superior to other differential piece rate as it encourages the slow worker to do better than before. It does not presuppose a high degree of average performance.. The wages are guaranteed on time basis.

- **Points Scheme – Bedaux System**

  Under this system the quantum of work that can be performed by a worker is expressed in Bedaux Points or B's. These points represent the standard time expressed in terms of minutes that are necessary to perform a job. The standard numbers of points in terms of minutes are determined after analysing each operation or job in detail. Each such minute consists of the time required to complete a fraction of the operation or the job and also an allowance for rest due to fatigue. The workers who are not able to complete the tasks allotted to them within the standard time are paid only the normal daily rate of wages. Those workers who are able to increase their efficiency rate which is equal to the wages for time saved as indicated by excess of B's earned (i.e., standard time for work done – over actual time) are paid 75% of the time saved.

C. Bonus Systems

A schematic diagram of the various bonus plans is presented below, details of which are given in the next paragraphs.



a) Individual Bonus Plan

We have seen earlier that in the time rate system, the workers are paid according to the time taken while in case of piece rate system, the output produced by the worker decides his wages as rate per unit is fixed rather than rate per hour. In the premium bonus plan, the gain arising out of increased productivity is shared by both, the employer and employee.

The bonus to be paid to the workers is computed on the basis of savings in the hours, i.e., the difference between the time allowed and time taken. The time allowed is the standard time, which is fixed by conducting a time and motion study by the work study engineers. While fixing the standard time, due allowance is given for physical and mental fatigue as well as for normal idle time. The actual time taken is compared with this standard time and bonus is payable to the worker if the time taken is less than the standard time.

Time Allowed (TA), Time Taken (T)

Time Saved (TS = TA – T), Rate per hour (R)

The individual bonus schemes commonly used are as follows.

- **Halsey Premium Plan**

  This plan was introduced by F.A. Halsey, an American engineer. In this plan, bonus is paid on the basis of time saved. Standard time is fixed for a job and if the actual time taken is less than the same, the worker becomes eligible for bonus. However, bonus is paid equal to wages of 50% of the time saved. A worker is assured of time wages if he takes longer time than the allowed time. The formula for computing the total wages is as follows.

  Total Earnings = $T \times R + \frac{50}{100} \times TS \times R$

- **Halsey – Weir Plan**

  Under this method, there is only one difference as compared to the Halsey Plan and that is instead of 50% bonus for the time saved, it is $33^{1}/_{3}\%$ of the time saved. Accordingly, the formula for this method is modified as follows:

  Total Earnings = $T \times R + 33^{1}/_{3}\% \times TS \times R$

- **Rowan Plan**

  This premium bonus plan was introduced by Mr. James Rowan. It is similar to that of Halsey Plan in respect of time saved, but bonus hours are calculated as the proportion of the time taken which the time saved bears to the time allowed and they are paid for at time rate. The formula for computation of total earnings is as follows:

  Total Earnings = $T \times R + \frac{TS}{TA} \times T \times R$

- **Barth Variable Sharing Plan**

  In this system, the total earnings are calculated as follows:

  Total Earnings = $R \times \sqrt{TA \times T}$

b) Group Bonus Plan

The plans described above are all individual bonus plans. Many times, output of individuals cannot be measured. Similarly, the output of individual is dependent on the performance of the group. In such cases, rather implementing individual bonus systems, group bonus system is implemented. The total amount of bonus, which is determined according to productivity, can then be shared equally or in agreed proportion between the group members. The main objects of group bonus system are as follows:

i) Creation of team spirit

ii) Elimination of excessive waste of materials and time

iii) Recognition of group efforts

iv) Improving productivity

Some of the group premium plans are described below:

- **Priestman's Production Bonus -** Under this plan, a standard production is fixed for the entire factory for a particular period in consultation with workers. The actual production is compared with the standard production at the end of the period. If the actual production exceeds the standard production, all workers are paid bonus in proportion to the increase in output.

  Workers are assured time wages if actual output does not exceed the standard output. Workers try hard to produce more because they are to get bonus only when actual output is more than the standard output.

- **Scanlon Plan -** Under this plan, a constant proportion (i.e., ratio of wages to sales value) of the added value of output is paid to the workers who are responsible for the addition of the value. The added value is the change in market value (including profit) resulting from an alteration in the form, location or availability of a product or service, excluding the cost of purchased materials or services used in production.

- **Towne Plan -** The objective of this plan is to encourage cost reduction by foremen and workers. However, bonus is paid upon a reduction in labour cost alone. A standard labour cost per unit for a particular period is determined and if actual labour cost per unit is less than the standard labour cost, 50% of the saving in labour cost is distributed among workers and foremen in proportion to their wages.

c) Bonus System for Indirect Workers

Indirect workers do not take part in the production process directly but they play important role in the production process. It is difficult to chalk out a bonus system for indirect workers, as there is a difficulty in measuring their output. However, it is advisable to plan a bonus system for indirect workers in order to motivate them for better productivity. Bonus to indirect workers is paid on the basis of output of the department, saving in time or expenditure against the budgeted, product quality, reduction of waste and scrap and reduction of labour turnover.

D. Indirect Monetary Incentives

These methods aim at giving additional remuneration based on the prosperity of the concern. The following schemes fall in this category:

a) Profit Sharing: In this system, the profits of the organisation are shared by workers in agreed proportion. The payment of Bonus Act, 1965 in India makes it mandatory to pay minimum bonus of 8.33% of salary and maximum bonus of 20% of salary to the workers.

b) Co-partnership: In this system, the workers get an opportunity to participate in the ownership of the organisation and to receive the part of share of profits. The employees are given assistance to purchase shares of the economy. Thus, the employees get dividend and bonus also. These schemes help to boost the morale of workers to a great extent.

E. Non-Monetary Incentives

These incentives are given in addition to monetary incentives for further boosting the moral of the employees. Though these benefits do not result in additional remuneration, they help to improve productivity by boosting the morale of the employees.

Treatment of some of the Employees Cost items in Costing

i) Supervisor's salary / Foreman's salary

The foreman is mainly concerned with the supervision of man and machines in the workshop and so his salary is 'works indirect expenses' and must be charged to works expenses account and included in works overheads. It is apportioned on the basis of degree of supervision required on such machine or men.

If he devotes equal time for all the machines his salary should be equally charged off against all of them. In case he devoted more time to a particular machine or to a particular batch of workers, proportionately higher share of his salary should be borne by that particular machine or batch of workers.

ii) Bonus under Payment of Bonus Act, 1965

The Payment of Bonus Act, 1965 provides that to the eligible employees a minimum bonus @ 8% of gross annual earning will have to be paid irrespective of profits made or losses incurred. If there is adequate profit a higher bonus is paid but upto the maximum limit of 20% of gross earnings. Therefore, it is clear that the minimum bonus is a definite charge against profit because even in case of loss this bonus is payable and according to the classification of labour direct or indirect should be included in direct labour cost or production overheads. The portion of bonus over and above the minimum is based on profit and should be charged off to costing profit and loss account and not taken into the cost at all. However, some accountants argued that this portion of bonus should also be taken into the cost in appropriate heads of Direct Labour or Production Overheads. But the former treatment should be taken as more sensible.

iii) Leave Travel Assistance

Leave Travel Assistance is paid to practically all the employees presently and therefore can be considered as a regular element of labour or staff cost as the case may be. This expenditure is of a fixed nature and can be easily predetermined. Depending on whether the assistance is payable to direct labour, indirect labour or staff the expenditure should be treated as Direct Labour Cost, Production Overheads Cost or Administrative Overheads Cost and should be appropriately charged.

iv) Night Shift Allowance

It is customary practice that the persons working in night shifts are paid some extra and such an allowance is known as night shift allowance. Such additional expenditure caused by general pressure of work in excess of normal capacity are charged to general production overheads because otherwise job performed during days will be cheaper than the jobs completed during night which by no means a fair proposition. If the additional expenditure is incurred extremely as a result of pressing demands from customers such expenditure should directly be charged to the job concerned. On the other hand if the night shifts are run for a fault of the particular department the night shift allowance should be charged as the departmental overheads applicable to the concerned department.

v) Fringe Benefits

Fringe benefits are those expenses which are spent by an employer against the individual employees for their welfare. Normally such expenses do not form part of their pay packer, e.g., ESI contribution made by an employer. Such expenses may be recovered separately as a percentage on labour cost or at an hourly rate. Alternatively, those may be treated as overheads and apportioned to cost centres on the basis of wages/salary cost.

vi) Work on Holidays and Weekly off Days

Usually work on such days is to be paid at a higher rate than the normal days' grace. The extra payment involved is treated in the same manner as in the cases of overtime premium as started before (refer treatment of overtime). Normal wages are charged direct to the work orders / job / process handled during the period.

vii) Attendance Bonus

This is paid to workers based on satisfactory attendance over a stated period and is a fringe benefit. The cost is to be collected under a standing order number and charged as a departmental overheads as the expenses cannot be allocated to cost units directly.

In case the cost is disproportionate from months to months, a proportionate amount may be charged in each period to avoid variation in cost.

When the cost is of a regular nature it may be booked as direct wages and charged by an inflated rate over the Direct Labour Cost. But this is however, not a sound policy.

viii) Employer's contribution to Employees' Provident Fund

This is an obligatory charge under the Employees Provident Fund Act of 1952 and the scheme framed there under. This should be treated as part of direct wages of workers. The direct wages paid should be inflated for the cost involved and the products of jobs charged at an inflated rate. An alternative treatment can be made as such that the contribution for the indirect workers is an item of overheads.

ix) Lost time due to a major overhauling of a machine as result of severe breakdowns

Manufacturing concerns having a number of machines in the factory usually follow a maintenance schedule whereby the entire factory is overhauled once a year. The related cost of such period consisting mainly of fixed cost is estimated and apportioned as a manufacturing / factory overheads over the annual production. But a sudden and severe breakdown may upset the production plan and call for major overhaul of machine. Such an occurrence is certainly abnormal and all costs related to the breakdown and overhaul should be collected through a separate standing order number and transferred to the costing profit and loss account thereby into distorting the normal cost of production.

Employee cost reporting and measurement of efficiency

Employee Cost Reporting

1. **Presentation of Direct Employee Costs:** In the cost statement, direct employee costs will be displayed as a distinct cost category. Direct employees are those directly engaged in product manufacturing, either manually or through machines. Examples include assembly line workers in an automobile factory or textile industry workers operating spindles or looms. Their costs, which are easily traceable to the product, will be presented separately in the cost statement.
2. **Treatment of Indirect Employee Costs:** Indirect employee costs will be incorporated into cost statements as part of overheads associated with specific functions such as manufacturing, administration, or marketing. Indirect employee costs are not directly assignable to a specific product but are essential components of overheads. Employees contributing indirectly to production, like product designers and supervisors, are considered part of production overheads. Salaries of those involved in administrative, personnel, and accounting roles are categorized as administrative overheads. Similarly, salaries of employees engaged in marketing, sales, and distribution activities fall under selling and distribution overheads.
3. **Detailed Breakdown of Resources Consumed:** The cost statement will provide a comprehensive breakdown of resources consumed due to employee costs, categorized by types such as permanent and temporary salaries, part-time and contract employee wages, piece-rate payments, overtime payments, and employee benefits sorted by categories. This breakdown is particularly important when these items significantly contribute to the overall employee cost. Direct employee costs, as outlined by CAS – 7, will be separately highlighted in the cost statement.

Measurement of Efficiency

Labour Efficiency Ratio

The Labour Efficiency Ratio, also known as the productivity ratio, measures the effectiveness of labour utilization in a given period. It is calculated by comparing the actual output or production achieved by a workforce to the standard or expected output. A higher ratio indicates more efficient utilization of labour resources, while a lower ratio may suggest inefficiencies or underperformance.

Monitoring the Labour Efficiency Ratio is crucial for businesses aiming to optimize workforce productivity, enhance operational performance, and identify areas for improvement in their production processes.

$$\text{Labour efficiency ratio} = \frac{\text{Expected time to produce the output (in hours)}}{\text{Actual time to produce the output (in hours)}} \times 100\%$$

When the output is generated within the anticipated time frame, the efficiency ratio stands at 100%. If the output is generated at a faster pace than initially anticipated, the efficiency ratio surpasses 100%.

Example

During July 2022, a factory produced 3,600 units of a product. The expected production time is 3 direct labour hours for each unit. The actual number of direct labour hours worked in the month was 10,000 hours.

$$\text{Efficiency ratio} = \frac{(3{,}600 \times 3 \text{ hours})}{10{,}000 \text{ hours}} \times 100\% = 108\%$$

It is important to note that, when a labour efficiency ratio is calculated, the actual hours worked should exclude any hours recorded as idle time.

Capacity Utilization Ratio

Employees may not be consistently involved in active tasks while at the workplace. Instances of employee "idle" time can occur for various reasons, including waiting for the next assignment or during production interruptions caused by machinery breakdowns.

A capacity utilisation ratio is a ratio that measures the actual hours actively working as a percentage of the actual hours that were available for working

$$\text{Capacity utilisation ratio} = \frac{\text{Hours spent in active working}}{\text{Total hours available for work}} \times 100$$

Example

A production department has 6 employees who each work 40 hours a week. In a particular week, the recorded idle time was 25 hours.

$$\text{Total hours available for work} = 6 \text{ employees} \times 40 \text{ hours} = 240 \text{ hours.}$$

$$\text{Capacity utilisation ratio} = \frac{(240 - 25)}{240} \times 100\% = 89.6\%$$

Production Volume Ratio

Labour activity can also be measured by a production volume ratio which is calculated as follows:

$$\text{Production volume ratio} = \frac{\text{Expected time to produce the output}}{\text{Total hours available for work}} \times 100$$

Otherwise, the production volume ratio can be calculated as follows:

$$\text{Production volume ratio} = \text{Labour efficiency ratio} \times \text{Capacity utilisation ratio}$$

Illustration 26

During May 2023, there were 21 working days of 8 hours per day. The workforce consists of 10 employees, who all do the same work.

Due to problems in the production system and a machine breakdown, 240 hours were recorded as idle time during the month.

During May, the workforce produced 5,400 units of output. The expected time per unit of output is 15 minutes (= 0.25 hours).

Required

For May 2023, Calculate, (a) the efficiency ratio (b) the capacity utilisation ratio (c) the production volume ratio

Solution:

To calculate the efficiency ratio, the hours worked should exclude idle time.

$$\text{Labour efficiency ratio} = \frac{\text{Expected time to produce the output (in hours)}}{\text{Actual time to produce the output (in hours)}} \times 100\%$$

Hours worked = (21 days × 8 hours × 10 employees) – 240 hours idle time = 1,680 – 240 = 1,440 hours

Therefore,

$$\text{Labour efficiency ratio} = \frac{(5400 \text{ units} \times 0.25 \text{ hrs}) = 1350 \text{ hrs}}{1440 \text{ hrs}} \times 100\% = 93.75\%$$

$$\text{Capacity utilisation ratio} = \frac{\text{Active hours worked}}{\text{ours available}} = \frac{1{,}440 \text{ hours}}{1680 \text{ hours}} \times 100\% = 85.71\%$$

$$\text{Production volume ratio} = \frac{\text{Expected time to produce 5,400 units}}{\text{Total hours available}} = \frac{1{,}350 \text{ hours}}{1680 \text{ hours}} \times 100\% = 80.35\%.$$

Check,

Production volume ratio = Efficiency ratio × Capacity utilisation ratio

= Production volume ratio 93.75% × 85.71%

= 80.35%.

Numerical Illustrations

Illustration 27

Time allowed for a job is 48 hours; a worker takes 40 hours to complete the job. Time rate per hour is ₹ 15. Compute the total earnings of the worker under any four methods.

Solution:

Time Allowed (TA) = 48 hours, Time Taken (T) = 40 hours,

Time Saved (TS = TA – T) = 8 hours, Rate per hour (R) = ₹ 15

(a) Halsey Plan

$$\text{Earnings} = T \times R + \frac{50}{100} \times TS \times R$$

$$= 40 \times 15 + \frac{50}{100} \times 8 \times 15$$

$$= 600 + 60 = ₹\ 660$$

(b) Halsey – Weir Plan

$$\text{Earnings} = T \times R + 33\tfrac{1}{3}\% \times TS \times R$$

$$= 40 \times 15 + \tfrac{1}{3} \times 8 \times 15$$

$$= 600 + 40$$

$$= ₹\ 640$$

(c) Rowan Plan

Earnings $= T \times R + \frac{TS}{TA} \times T \times R$

$= 40 \times 15 + \frac{8}{48} \times 40 \times 15$

$= 600 + 100$

$= ₹\ 700$

(d) Barth Variable Sharing Plan

Earnings $= R \times \sqrt{TA \times T} = 15 \times \sqrt{48 \times 40} = 15 \times 43.82 = ₹\ 657.30$

Illustration 28

Calculate the total earnings and effective rate of earnings per hour of three operators under Rowan System and Halsey System from the following particulars.

The standard time fixed for producing 1 dozen articles is 50 hours. The rate of wages is ₹1 per hour. The actual time taken by three are as follows:

A 45 hours

B 40 hours

C 30 hours

Solution:

Particulars	A	B	C
Time Allowed (TA)	50 hours	50 hours	50 hours
Time Taken (T)	45 hours	40 hours	30 hours
Time Saved (TS)	5 hours	10 hours	20 hours
Rate per hour (R)	₹ 1	₹ 1	₹ 1
Earnings under Rowan Plan = $T \times R + \frac{TS}{TA} \times T \times R$			
Earnings	$45 \times 1 + \frac{5}{50} \times 45 \times 1$ = 45 + 4.50 = ₹ 49.50	$40 \times 1 + \frac{10}{50} \times 40 \times 1$ = 40 + 8 = ₹ 48	$30 \times 1 + \frac{20}{50} \times 30 \times 1$ = 30 + 12 = ₹ 42
Effective Rate (i.e., Earnings per hour)	$= \frac{₹49.50}{45 \text{ hours}} = ₹\ 1.10$	$= \frac{₹48}{40 \text{ hours}} = ₹\ 1.20$	$= \frac{₹42}{30 \text{ hours}} = ₹\ 1.40$
Earnings under Halsey Plan = $T \times R + \frac{50}{100} \times TS \times R$			
Earnings	$45 \times 1 + \frac{50}{100} \times 5 \times 1$ = 45 + 2.50 = ₹ 47.50	$40 \times 1 + \frac{50}{100} \times 10 \times 1$ = 40 + 5 = ₹ 45	$30 \times 1 + \frac{50}{100} \times 20 \times 1$ = 30 + 10 = ₹ 40
Effective Rate (i.e., Earnings per hour)	$= \frac{₹47.50}{45 \text{ hours}} = ₹\ 1.06$	$= \frac{₹45}{40 \text{ hours}} = ₹\ 1.125$	$= \frac{₹40}{30 \text{ hours}} = ₹\ 1.33$

Illustration 29

A workman takes 9 hours to complete a job on daily wages and 6 hours on a scheme of payment by results. His hourly rate is 25 paise. The material cost of the product is ₹ 4 and factory overheads are recovered at 150% of the total direct wages. Calculate the factory cost of the product under following methods:

a) Time rate system b) Halsey Plan c) Rowan Plan

Solution:

Computation of Factory Cost under three systems:

Particulars	(a) **Time Rate System**	(b) **Halsey Plan**	(c) **Rowan Plan**
	Amount (₹)	**Amount (₹)**	**Amount (₹)**
Material	4.00	4.00	4.00
Labour (working note)	2.25	1.88	2.00
Prime Cost	6.25	5.88	6.00
Overheads	150% × 2.25 = 3.38	150% × 1.88 = 2.82	150% × 2 = 3
Factory Cost	9.63	8.70	9.00

Working Note

1. Computation of Earnings (i.e., Labour Cost) under three systems

Particulars	(a) **Time Rate System**	(b) **Halsey Plan**	(c) **Rowan Plan**
Earning	**T x R**	$\mathbf{T \times R + \frac{50}{100} \times TS \times R}$	$\mathbf{T \times R + \frac{TS}{TA} \times T \times R}$
Time Taken (T)	9 hours	6 hours	6 hours
Time Allowed (TA)	-	9 hours	9 hours
Time Saved (TS)	-	3 hours	3 hours
Rate (R)	₹ 0.25	₹ 0.25	₹ 0.25
Earnings (i.e., Labour Cost)	9 × 0.25 = ₹ 2.25	$6 \times 0.25 + \frac{50}{100} \times 3 \times 0.25$ = 1.50 + 0.375 = ₹ 1.88	$6 \times 0.25 + \frac{3}{9} \times 6 \times 0.25$ = 1.50 + 0.50 = ₹ 2.00

Illustration 30

A worker under the Halsey method of remuneration has a day rate of ₹ 12 per week of 48 hours, plus a cost-of-living bonus of 10 paise per hour worked. He is given 8 hours task to perform, which he performs in 6 hours, he is allowed 30% of the time saved as premium bonus. What would be his earnings under Halsey Plan and Rowan Plan.

Solution:

Time Allowed (TA) = 8 hours Time Taken (T) = 6 hours

Time Saved (TS = TA – T) = 2 hours Rate per hour = $\frac{₹\ 12}{48 \text{ hours}}$ = ₹ 0.25

Earnings under Halsey Plan = T × R + 30% × TS × R = 6 × 0.25 + 30% × 2 × 0.25 = 1.50 + 0.15 = ₹ 1.65

Add: Cost of Living Bonus (6 hours × 10 paise per hour) = ₹ 0.60

Gross Earnings under Halsey Plan = ₹ 2.25

Earnings under Rowan Plan $= T \times R + \frac{TS}{TA} \times T \times R$

$= 6 \times 0.25 + \frac{2}{8} \times 6 \times 0.25$ = 1.50 + 0.375 = ₹ 1.88

Add: Cost of Living Bonus (6 hours × 10 paise per hour) = ₹ 0.60

Gross Earnings under Rowan Plan = ₹ 2.48

Illustration 31

In a factory guaranteed wages at the rate of ₹ 1.80 per hour are paid in a 48-hour week. By time and motion study it is estimated that to manufacture one unit of a particular product 20 minutes are taken, the time allowed is increase by 25%. During the week A produced 180 units of the product. Calculate his wages under the following methods:

a) Time Rate

b) Piece Rate with a guaranteed weekly wage

c) Halsey Premium Bonus

d) Rowan Premium Bonus

Solution:

Time Taken (T) = 48 hours

Rate per hour (R) = ₹ 1.80 Actual Production = 180 units

(a) Earnings under Time Rate = T × R = 48 × 1.80 = ₹ 86.40

(b) Earnings under Piece Rate with a guaranteed weekly wage

Normal time taken to manufacture one unit = 20 minutes

Add: Allowance @ 25% = 5 minutes

∴ Standard Time (or Time Allowed) for one unit = 25 minutes

∴ Number of Pieces to manufacture per hour $= \frac{60}{25}$

Piece Rate $= \frac{\text{Rate per hour}}{\text{Number of Pieces to manufacture per hour}} = \frac{₹\ 1.80 \text{ per hour}}{60/25 \text{ pieces per hour}}$ = ₹ 0.75 per piece

Earnings under Piece Rate = 180 units × ₹ 0.75 per piece = ₹135

(c) Earnings under Halsey Premium Bonus Plan

Time Allowed (TA) for 180 units = 180 units × $\frac{25}{60}$ = 75 hours

Time Saved (TS = TA – T) = 75 – 48 = 27 hours

Earnings under Halsey Plan $= T \times R + 50\% \times TS \times R$

= 48 x 1.80 + 50% x 27 x 1.80 = 86.40 + 24.30 = ₹ 110.70

(d) Earnings under Rowan Premium Bonus Plan $= T \times R + \frac{TS}{TA} \times T \times R$

$= 48 \times 1.80 + \frac{27}{75} \times 48 \times 1.80$

$= 86.40 + 31.104$

$= ₹ 117.50$

Illustration 32

Calculate the earnings of workers A and B under Straight Piece Rate system and Taylor's Differential Piece Rate system from the following particulars:

Normal rate per hour ₹ 1.80

Standard time per unit 20 seconds

Differentials to be applied are:

80% of the piece rate below the standard;

120% of the piece rate at or above standard.

A produced 1,300 units per day of 8 hours and B 1,500 units per day of 8 hours.

Solution:

Standard time to manufacture one unit = 20 seconds

Number of units to manufacture in one minute = $\frac{60}{20}$ = 3 units

Number of units to manufacture in one hour = 60 × 3 = 180 units

Rate per hour = ₹ 1.80

∴ Rate per piece = $\frac{\text{Rate per hour}}{\text{Number of units to manufacture in one hour}} = \frac{₹ 1.80}{180 \text{ Units}} = ₹ 0.01$

Standard Production in 8 hours = 180 × 8 = 1,440 units

Earnings under Straight Piece Rate:

Earnings of A = 1,300 × 0.01 = ₹ 13.00

Earnings of B = 1,500 × 0.01 = ₹ 15.00

Earnings under Taylor's Differentials Piece Rate

Particulars	A	B
Standard Production	1,440 units	1,440 units
Actual Production	1,300 units	1,500 units
Efficiency	$= \frac{1,300}{1,440} \times 100 = 90.28\%$	$= \frac{1,500}{1,440} \times 100 = 104.17\%$
	Below Standard = 80% of Normal Piece Rate	Above Standard = 120% of Normal Piece Rate

Earnings	= 1,300 × 0.01 × 80% = ₹ 10.40	= 1,500 × 0.01 × 120% = ₹ 18.00

Illustration 33

The following particulars apply to a particular job:

Standard production per hour	6 units
Normal rate per hour	₹ 1.20
Mohan produced	32 units
Ram produced	42 units
Prasad produced	50 units

Calculate the wages of these workers under Merrick Differential Piece Rate system [Assume a day has 8 working hours]

Solution:

Calculation of wages of workers under Merrick Differential Piece Rate System

Particulars	Mohan	Ram	Prasad
Normal Piece Rate	₹ 0.20	₹ 0.20	₹ 0.20
Standard Production per day 6 units x 8 hours	48 units	48 units	48 units
Actual Production	32 units	42 units	50 units
Efficiency	$\frac{32}{48} \times 100 = 66\frac{2}{3}\%$	$\frac{42}{48} \times 100 = 87.50\%$	$\frac{50}{48} \times 100 = 104\frac{1}{6}\%$
Earnings	Normal Piece Rate	110% of Normal Piece Rate	120% of Normal Piece Rate
Earnings	0.20 × 32 = ₹ 6.40	110% × 0.20 × 42 = ₹ 9.24	120% × 0.20 × 50 = ₹ 12

$$\text{Normal Piece Rate} = \frac{\text{Normal Rate per hour}}{\text{Standard Production per hour}} = \frac{₹\ 1.20}{6\ \text{Units}} = ₹\ 0.20$$

$$\text{Efficiency} = \frac{\text{Actual Production}}{\text{Standard Production}} \times 100$$

Illustration 34

In a manufacturing concern the daily wage rate is ₹2.50. The standard output in a 6 day week is 200 units representing 100% efficiency. The daily wage rate is paid without bonus to those workers who show up to $66\frac{2}{3}\%$ of the efficiency standard. Beyond this there is a bonus payable on a graded scale as below:

82% efficiency	5% bonus
90% efficiency	9% bonus
100% efficiency	20% bonus

Further increase of 1% bonus for every 1% further rise in efficiency. In a 6 day week A produced 180 units; B 164 units; C 200 units; D 208 units and E 130 units.

Calculate the earnings of these workers.

Solution:

Particulars	A	B	C	D	E
Standard Output (units)	200	200	200	200	200
Actual Output (units)	180	164	200	208	130
Efficiency	$\frac{180}{200}\times100$ = 90%	$\frac{164}{200}\times100$ = 82%	$\frac{200}{200}\times100$ = 100%	$\frac{208}{200}\times100$ = 104%	$\frac{130}{200}\times100$ = 65%
Bonus %	9%	5%	20%	24%	Nil
Normal daily wage (6 days x ₹ 2.50)	₹ 15	₹ 15	₹ 15	₹ 15	₹ 15
Add: Bonus	15 x 9% = ₹ 1.35	15 x 5% = ₹ 0.75	15 x 20% = ₹ 3	15 x 24% = ₹3.60	Nil
Total Wages	₹ 16.35	₹ 15.75	₹ 18	₹ 18.60	₹ 15

Illustration 35

Workmen of a particular grade working on 8 hour shift duty are guaranteed a wage of ₹ 32. An incentive scheme is in operation according to which production bonus is earned directly proportional to performance but only after 100% performance is reached. Four workmen A, B, C and D produced 48, 60, 75 and 90 units respectively in 6 hours working on a job which has standard time of 6 minutes per unit as measured work content. Remaining 2 hours of the shift are spent in doing unmeasured work for which no incentive bonus can be paid. Find for each workman:

a) The production performance level achieved;

b) Total earnings for the day.

Solution:

Standard working hours per day 6 hours or 360 minutes

Standard Time required per unit 6 minute p.u.

∴ Standard Production / output per day $\frac{360 \text{ minutes}}{6 \text{ minutes p.u.}}$ = 60 units

Hourly wages rate = $\frac{₹\ 32}{8 \text{ hours}}$ = ₹ 4 per hour

Statement Showing computation of performance achieved and total earnings per day of four workers

Particulars	A	B	C	D
Standard output	60 units	60 units	60 units	60 units
Actual output	48 units	60 units	75 units	90 units
a) **Performance Level (efficiency)**	$\frac{48}{60}\times100$ = 80%	$\frac{60}{60}\times100$ = 100%	$\frac{75}{60}\times100$ = 125%	$\frac{90}{60}\times100$ = 150%
Wages of Measured Work	6 hours @ ₹4=₹24	6 hours @ ₹4 = ₹24	6 hours @ ₹4 = ₹24	6 hours @ ₹4 = ₹24
B onus	Nil	Nil	25% x ₹ 24 = ₹ 6	50% x ₹ 24 = ₹ 12

Wages of Unmeasured work	2 hours @ ₹4= ₹8	2 hours @ ₹4= ₹ 8	2 hours @ ₹4= ₹ 8	2 hours @ ₹4= ₹ 8
b) **Total Earnings**	₹ 32	₹ 32	₹ 38	₹ 44

Illustration 36

The following particulars for the first week of September, 2021 relate to X and Y two workers employed in a factory:

Particulars	**X**	**Y**
a) Job Completed (units)	3,600	4,200
b) Out of above output rejected and unsalable	540	420
c) Time allowed	12 Mts / dozen	3 Hrs / 200 units
d) Basic wage rate per hour	₹ 5	₹ 6
e) Hours worked	45	50

The normal working hours per week are fixed at 42 hours. Bonus is paid @ $\frac{2}{3}$ of the basic wage rate for gross time worked and gross output produced without deduction for rejected output. The rate of overtime for first 4 hours is paid at time plus $\frac{1}{3}$ and for next 4 hours is paid at time plus $\frac{1}{2}$.

From the above data calculate for each employed

a) Number of bonus hours and amount of bonus earned;

b) Total wages earned including basic wages overtime premium and bonus;

c) Direct wages cost per 100 saleable units.

Solution:

Sl No.	**Particulars**	**X (₹)**	**Y (₹)**
1.	No. of units produced	3,600	4,200
2.	Rejected units	540	420
3.	Saleable units	3,060,	3,780
4.	Normal Rate per hour	₹ 5	₹ 6
5.	Standard Time	$\frac{12 \text{ minutes}}{12 \text{ Units}} \times \frac{3{,}600 \text{ Units}}{60 \text{ minutes}} = 60$ hours	$\frac{3 \text{ hours}}{200 \text{ Units}} \times 4{,}200$ units = 63 hours
6.	Actual Time worked	45 hours	50 hours
7.	Overtime worked	45 – 42 = 3 hours	50 – 42 = 8 hours
8.	Bonus Hours	60 – 45 = 15 hours	63 – 50 = 13 hours
9.	Amount Bonus	$15 \times 5 \times \frac{2}{3} =$ ₹ 50	$13 \times 6 \times \frac{2}{3} =$ ₹ 52
10.	Overtime Wage	$3 \times 5 \times \frac{4}{3} =$ ₹ 20	$4 \times 6 \times \frac{4}{3} + 4 \times 6 \times \frac{3}{2} =$ ₹ 68
11.	Basic Wage	42 × 5 = ₹ 210	42 × 6 = ₹ 252

12.	Total Wage (9+10+11)	₹ 280	₹ 372
13.	Direct Wage Cost for 100 saleable units	$\frac{₹\ 280}{3,060} \times 100 = ₹\ 9.15$	$\frac{₹\ 372}{3,780} \times 100 = ₹\ 9.84$

Illustration 37

From the following particulars work out the earnings for the week of a worker under

a) Straight Piece Rate

b) Differential Piece Rate

c) Halsey Premium System

d) Rowan System

Number of working hours per week	48
Wages per hour	₹ 3.75
Normal time per piece	24 minute
Normal output per week	120 pieces
Actual output per week	150 pieces
Differential piece rate	80% of the piece rate when output is below standard and 120% at or above standard

Solution:

a) Piece rate $= \frac{\text{Normal Wage (at hourly rate)}}{\text{Normal output per week}} = \frac{48 \text{ hours} \times ₹\ 3.75 \text{ per hour}}{120 \text{ Units}} = ₹\ 1.50$ per piece

or Piece rate $= \frac{24 \text{ minute}}{60 \text{ minute}} \times ₹\ 3.75 = ₹\ 1.50$

Earnings under Straight Piece Rate = ₹ 1.50 × 150 = ₹ 225

b) Efficiency $= \frac{\text{Actual Output}}{\text{Normal Output}} \times 100 = \frac{150}{120} \times 100 = 125\%$

Earnings under Differential Piece Rate = ₹ 1.50 × 150 × 120% = ₹ 270

c) Earning Under Halsey Premium System $= T \times R + \frac{50}{100} \times TS \times R$

T (Time Taken) = 48 hours

R (Rate per hour) = ₹ 3.75

TA (Time Allowed) $= 150 \times \frac{24}{60} \times = 60$ hours

TS (Time Saved) = TA – T = 60 – 48 = 12 hours

∴ Earnings $= 48 \times 3.75 + \frac{50}{100} \times 12 \times 3.75$

$= 180 + 22.50$

= ₹ 202.50

d) Earning Under Rowan System $= T \times R + \frac{TS}{TA} \times T \times R$

$= 48 \times 3.75 + \frac{12}{60} \times 48 \times 3.75 \quad = 180 + 36 \quad = ₹ 216$

Illustration 38

Ten men work as a group. When the weekly production of the group exceeds standard (200 pieces per hour) each man in the group is paid a bonus for the excess production in addition to his wages at hourly rates. The bonus is computed thus:

The percentage of production in excess of the standard amount is found and one-half of this percentage is considered as the men's share. Each man in the group is paid as bonus this percentage of a wage rate of ₹ 3.20 per hour. There is no relationship between the individual workman's hourly rate and the bonus rate. The following is the week's records.

	Hours Worked	Production (units)
Monday	90	22,100
Tuesday	88	22,600
Wednesday	90	24,200
Thursday	84	20,100
Friday	88	20,400
Saturday	40	10,200
Total	**480**	**1,19,600**

a) Compute the rate and amount of bonus for the week;

b) Compute the total pay of Jones who worked $41\frac{1}{2}$ hours and was paid ₹ 2 per hour basic and of Smith who worked $44\frac{1}{2}$ hours and was paid ₹ 2.50 per hour basic.

Solution:

Standard Production in Actual Time = 480 x 200 = 96,000 units

Actual Production = 1,19,600 units

Excess of Actual Production over standard = 1,19,600 – 96,000 = 23,600 units

Percentage of excess over standard $= \frac{23,600}{96,000} \times 100 = 24.58\%$

Percentage of Bonus $= \frac{1}{2} \times 24.58\% = 12.29\%$

Bonus Rate per hour = ₹ 3.20 × 12.29% = ₹ 0.393

Total Bonus for week = 480 × 0.393 = ₹ 188.64

Computation of Total Earnings of Jones & Smith:

Particulars		Jones (₹)		Smith (₹)

Basic Wages	41.50 x 2	83.00	44.50 x 2.50	111.25
Bonus	41.50 x 0.393	16.31	44.50 x 0.393	17.49
Total Earnings		**99.31**		**128.74**

Illustration 39

A manufacturer introduces a new machinery into his factory with the result that production per worker is increased. The workers are paid by results and it is agreed for every 2% increases in average individual output, an increase of 1% on the rate of wages will be paid.

At the time the machinery is installed the selling price of the products falls $8\frac{1}{3}\%$. Show the new saving in production costs which would be required to offset the losses expected from the turnover and bonus paid to workers.

	Ist period	**IInd period**
No. of workers	175	125
Number of articles produced	16,800	14,000
Wages paid	₹ 33,600	
Total Sales	₹ 75,600	

Solution:

Number of units per worker in Period I $= \frac{16,800}{175} = 96$

Number of units per worker in Period II $= \frac{14,000}{125} = 112$

Increase in production per worker $= 112 - 96 = 16$ units

Percentage increase in output in Period II $= \frac{16}{96} \times 100 = 16\frac{1}{2}\%$

Wages in Period I $= ₹ 33,600$

Wages in Period II (at Period I labour rate) $= \frac{₹ 33,600}{175} \times 125 = ₹ 24,000$

Increase in Wages $= 24,000 \times 8\frac{1}{3}\% = ₹ 2,000$

Sales in Period I $= ₹ 75,600$

Sales in Period II (at Period I sales price) $= \frac{₹ 75,600}{16,800} \times 14,000 = ₹ 63,000$

Decrease in Sales in Period II $= ₹ 63,000 \times 8\frac{1}{3}\% = ₹ 5,250$

Total loss due to increase in wages and reduction in sales = 2,000 + 5,250 = ₹ 7,250

To offset the loss, the saving in other must be ₹ 7,250

Illustration 40

A work measurement study was carried out in a firm for 10 hours and the following information was generated.

Units produced : 350

Idle time : 15%
Performance rating : 120%
Allowance time : 10% of standard time
What is the standard time for task?

Solution:

Calculation of Standard time for the task

Total time 10 hours x 60 = 600 minutes

Less: Idle Time 15% x 600 = 90 minutes

Actual Time = 510 minutes

Normal Time = 510 x 120% = 612 minutes

Add: Allowance time

[10% or $\frac{1}{10}$ on standard time i.e., $\frac{1}{9}$ on normal time] $= \frac{1}{9} \times 612$ = 68 minutes

Standard Time = 680 minutes

Alternatively

Standard Time – Allowance Time = Normal Time

or, Standard Time – 10% of Standard Time = 612

or, 90% Standard Time = 612

or, Standard Time = $\frac{612}{90\%}$ = 680 minutes

Illustration 41

In a factory bonus to workman is paid according to Rowan Plan. Time allotted for a job is 40 hours and the normal rate of wages is ₹ 1.25 per hour. The factory overheads charges are 50 paise per hour for the hours taken.

The factory cost of a work order, executed by a worker is ₹ 161.875. The cost of material in each case is ₹ 100.

Calculate the hours of time taken by the workman to completer the work order.

Solution:

Let 'T' be the time taken by the worker

Earnings under Rowan Plan = $T \times R + \frac{TS}{TA} \times T \times R$

T = Time Taken, TA = Time Allotted or Allowed, TS = Time Saved = TA – T, R = Rate per hour

or, Earnings $= T \times 1.25 + \frac{40 - T}{40} \times T \times 1.25$

or, $= \frac{50T + 50T - 1.25T^2}{40}$

or, $= \frac{100 - 1.25T^2}{40}$

Factory Cost = Material Cost + Wages + Factory Overheads

or, $161.875 = 100 + = \frac{100T - 1.25T^2}{40} + 0.5T$

or, $6,475 = 4,000 + 100T - 1.25T^2 + 20T$

or, $1.25T^2 - 120T + 2,475 = 0$

Dividing the equation by 1.25

or, $T^2 - 96T + 1,980 = 0$

or, $T^2 - 66T - 30T + 1,980 = 0$

or, $T(T - 66) - 30(T - 66) = 0$

or, $(T - 66)(T - 30) = 0$

or, T66 [Since, Time taken should not be more than Time Allotted]

So, T = 30. Hence, Time taken by the worker = 30 hours

Illustration 42

Two fitters, a labourer and a boy undertake a job on piece rate basis for ₹ 1,290. The time spent by each of them is 220 ordinary working hours. The rates of pay on time rate basis, are ₹ 1.50 per hour for each of the two fitters, ₹ 1 per hour for the labourer and ₹ 0.50 per hour for the boy.

The amount of piece work premium and the share of each worker, when the piece work premium is divided proportionately to the wages paid.

Compute the selling price of the above job on the basis of the following additional data:

Cost of the direct material ₹ 2,010; works overheads at 20% of prime cost; selling overheads at 10% of works cost and profit at 25% on cost of sales.

Solution:

Statement showing computation of earnings of each worker

Particulars	Fitter 1 (₹)	Fitter 2 (₹)	Labourer (₹)	Boy (₹)	Total (₹)
Basic Wage	220 x 1.5 = 330	220 x 1.5 = 330	220 x 1 = 220	220 x 0.5 = 110	990
Add: Bonus	100	100	67	33	300
Total Wage	430	430	287	143	1,290

Bonus = Total Wage – Basic Wage = 1,290 – 990 = ₹ 300

Bonus of Fitter 1 and Fitter 2 = $\frac{330}{990} \times 300$ = ₹ 100 each

Bonus of Labourer = $\frac{220}{990} \times 300$ = ₹ 67

Bonus of Boy = $\frac{110}{990} \times 300$ = ₹ 33

Computation of Selling Price of Job

Particulars	Amount (₹)

Materials	2,010
Labour	1,290
Prime Cost	3,300
Add: Works Overheads @ 20% x 3,300	660
Factory Cost	3,960
Add: Selling and Distribution Overheads @ 10% x 3,960	396
Cost of Sales or Total Cost	4,356
Add: Profit @ 25% x 4,356	1,089
Selling Price	5,445

Illustration 43

Two workmen, Vishnu and Shiva, produce the same product using the same material. Their normal wage rate is also the same. Vishnu is paid bonus according to the Rowan System, while Shiva is paid bonus according to Halsey System. The time allowed to make the product is 100 hours. Vishnu takes 60 hours while Shiva takes 80 hours to complete the product. The factory overheads rate is ₹ 10 per man-hour actually worked. The factory cost for the product for Vishnu is ₹ 7,280 and for Shiva it is ₹ 7,600.

You are required:

a) to find the normal rate of wages;

b) to find the cost of materials;

c) to prepare a statement comparing the factory cost of the products as made by the two men.

Solution:

Let Cost of Material be 'M' and Wage Rate per hour be 'R'

Particulars	Vishnu (Rowan Plan)	Shiva (Halsey Plan)
Material	M	M
Labour	$60 \times R + \frac{40}{100} \times 60 \times R = 84\ R$	$80 \times R + \frac{50}{100} \times 20 \times R = 90\ R$
Prime Cost	M + 84 R	M + 90 R
Add: Overheads	60 × 10 = 600	80 × 10 = 800
Factory Cost	7,280	7,600
So	M + 84R + 600 = 7,280	M + 90R + 800 = 7,600
	or, M + 84R = 6,680	or, M + 90R = 6,800

So, Equation (1) => M + 84R = 6,680

And, Equation (2) => M + 90R = 6,800

Equation (2) – Equation (1)

or, 6R = 120

or, R = 20

a) Wage Rate per hour = ₹ 20 per hour

putting R = 20 in equation (1) => M = 6,680 – 84 x 20 = 6,680 – 1,680 = 5,000

b) Material Cost = ₹ 5,000

c) Statement comparing the factory cost of the products as made by the two workmen

Particulars	Vishnu (₹)	Shiva (₹)
Material	5,000	5,000
Wages	1,680	1,800
Overheads	600	800
Factory Cost	7,280	7,600

Computation of Wages

Vishnu	Shiva
Rowan Plan = $T \times R + \frac{TS}{TA} \times T \times R$ T = 60 hrs, TA = 100 hrs, TS = 100 – 60 = 40 hrs	Halsey Plan = $T \times R + \frac{50}{100} \times TS \times R$ T = 80 hrs, TS = 100 – 80 = 20 hrs

Illustration 44

Measurement of Employee Cost

Basic pay ₹ 5,00,000; Lease rent paid for accommodation provided to an employee ₹ 2,00,000, amount recovered from employee ₹ 40,000, Employer's Contribution to P.F. ₹ 75,000, Employee's Contribution to P.F. ₹ 75,000; Reimbursement of Medical expenses ₹ 67,000, Hospitalisation expenses of employee's family member borne by the employer ₹ 19,000, Festival Bonus ₹ 20,000, Festival Advance ₹ 30,000. Compute the Employee Cost.

Solution:

Computation of Employee Cost

Particulars	Amount (₹)
Basic Pay	5,00,000
Add: Net cost to employer towards lease rent paid for accommodation provided to employee [2,00,000 – 40,000]	1,60,000
Add: Employer's contribution to PF	75,000
Add: Reimbursement of Medical Expenses	67,000
Add: Hospitalisation expenses of employee's family member paid by the employer	19,000
Add: Festival Bonus	20,000
Employee Cost	**8,41,000**

Note:

1. Festival advance is a recoverable amount. Hence, not included in employee cost.
2. Employee's contribution to PF is not a cost to the employer. Hence, not considered.

Illustration 45

Measurement of Employee Cost (with special items)

Gross pay ₹10,30,000 (including cost of idle time hours paid to employee ₹ 25,000); Accommodation provided to employee free of cost [this accommodation is owned by employer, depreciation of accommodation ₹ 1,00,000, maintenance charges of the accommodation ₹ 90,000, municipal tax paid for this accommodation ₹ 3,000], Employer's Contribution to P.F. ₹ 1,00,000 (including a penalty of ₹ 2,000 for violation of P.F. rules), Employee's Contribution to P.F. ₹ 75,000. Compute the Employee Cost.

Solution:

Computation of Employee Cost

Particulars	Amount (₹)
Gross Pay (net of cost of idle time) [10,30,000 – 25,000]	10,05,000
Add: Cost of Accommodation provided by employer	
= Depreciation + Maintenance Charges + Municipal Tax	
= 1,00,000 + 90,000 + 3,000	1,93,000
Add: Employer's contribution to PF excluding penalty paid to PF authority	98,000
Employee Cost	**12,96,000**

Note:

1. Assumed that the entire accommodation is exclusively used by the employee. Hence, cost of accommodation provided includes all related expenses / costs, since these are identifiable / traceable to the cost centre.
2. Cost of idle time hours is assumed as abnormal. Since, it is already included in the gross pay, hence, excluded.
3. Penalty paid to PF authorities is not a normal cost. Since, it is included in the amount of contribution, it is excluded.

Illustration 46

Measurement of Employee Cost (with special items)

Trial Balance as on 31.3.2022 (relevant extracts only)

Particulars	Amount (₹)	Particulars	Amount (₹)
Materials Consumed	25,00,000	Special Subsidy received from Government towards Employee Salary	2,75,000
Salaries	15,00,000		
Employee Training Cost	2,00,000		
Perquisites to Employee	4,50,000	Recoverable amount from Employee out of perquisites extended	35,000
Contribution to Gratuity Fund	4,00,000		
Lease rent for accommodation provided to employees	3,00,000		
Festival Bonus	50,000		
Unamortised amount of Employee cost related to a discontinued operation	90,000		

Solution:

Computation of Employee Cost

Particulars	**Amount (₹)**
Salaries	15,00,000
Add: Net cost of Perquisites to Employees	
= 4,50,000 – 35,000	4,15,000
Add: Contribution to Gratuity Fund	4,00,000
Add: Lease rent for accommodation provided to employees	3,00,000
Add: Festival Bonus	50,000
Less: Special Subsidy received from Government towards employee salary	2,75,000
Employee Cost	**23,90,000**

Note:

1. Recoverable amount from employee is excluded from the cost of perquisites.
2. Employee training cost is not an employee cost. It is to be treated as an overheads, hence not included.
3. Special subsidy received is to be excluded, as it reduces the cost of the employer.
4. Unamortized amount of employee cost related to a discontinued operation is not an includible item of cost.

Direct Expenses

2.3

2.3.1 Definitions

All expenditures other than those incurred for procurement of material and labour are termed as 'expenses'. Expenses can be classified direct expense or indirect expense. This classification is based on whether the expense is traceable to cost centre or cost unit. It is important to note that;

- Proper classification of expenses into direct and indirect categories is essential for accurate financial reporting and cost analysis.
- Understanding the nature of expenses helps in making informed decisions about cost control, pricing strategies, and resource allocation.
- The distinction between direct and indirect expenses is crucial for calculating the true cost of producing goods or services and determining the profitability of specific products or projects.

Simply, expenses or costs which can be allocated to a cost centre or cost unit are referred as direct expense.

Cost Accounting Standard (CAS) 10 issued by the Council of the Institute of Cost Accountants of India deliberates various provisions for treatment of direct expenses in cost accounting. Indirect expenses, on the other hand, are those that are not traceable to the cost centre or cost unit. These are to be apportioned to a cost centre or cost unit.

Paragraph 4.4 of CAS 10 defines direct expenses as *expenses relating to manufacture of a product or rendering a service, which can be identified or linked with the cost object other than direct material cost and direct employee cost.*

The statement highlights that in the context of manufacturing a product or rendering a service, there are expenses beyond direct material and direct employee costs. These additional expenses are identifiable and linked to the specific cost object, contributing to a more comprehensive understanding of the total costs associated with the production or service process. This is defined as direct expense.

Paragraph 5.1 of CAS 10 states that *identification of Direct Expenses shall be based on traceability in an economically feasible manner.*

Examples of direct expenses are royalties charged on production, job charges, hire charges for use of specific equipment for a specific job, cost of special designs or drawing for a job, software services specifically required for a job, travelling expenses for a specific job.

2.3.2 Nature of Direct Expenses or Chargeable Expenses

A direct expense in relation to a product forms part of the prime cost. Indirect expenses are treated as overheads. In relation to products, direct material is a material that becomes a part of it and can be physically traced in some form in the finished products, whereas the direct expenses are cost providing services or other kinds of special charges, but no trace of them can be obtained in the finished product like raw material. Both the direct material and direct expenses form part of the prime cost.

Principles of Measurement as per CAS – 10 (Para 5)

The para states that in general, the identification of direct expenses should rely on economically viable traceability methods. Specifically,

1. Direct expenses arising from the utilization of externally procured resources will be determined based on the invoice or agreed-upon price, inclusive of duties, taxes, and directly attributable expenditures. This calculation will be net of trade discounts, rebates, and any refundable or credited taxes and duties.
2. For research and development costs, the amount specifically linked to the cost object for enhancing existing product processes will be considered part of direct expenses.
3. Direct expenses settled in lump-sum or characterized as one-time payments will be amortized based on the estimated output or anticipated benefit derived from such expenses.
4. Examples like royalty fees or technical know-how payments, ensuring future benefits, will involve estimating production or service volumes for the effective period. The amortization charge will then be determined based on the achieved volume during the cost accounting period.
5. If a direct expense item is not deemed material, it may be treated as part of overheads.
6. Finance costs associated with internally generated or procured resources will not be categorized as direct expenses.
7. Direct expenses will exclude imputed costs, and for goods produced for internal consumption, imputed costs will adhere to CAS – 4 guidelines.
8. When accounting for direct expenses at standard cost, variances resulting from normal reasons will be considered part of direct expenses. Variances arising from abnormal reasons will not be included.
9. Any subsidy, grant, incentive, or similar payment received or expected concerning direct expenses will be deducted to ascertain the cost of the related cost object.
10. Any significant and quantifiable abnormal portion of direct expenses will not be considered part of direct expenses.
11. Penalties or damages paid to statutory authorities or third parties will not be included in direct expenses.
12. Credit or recoveries related to direct expenses, if material and quantifiable, will be deducted to determine the net direct expenses.
13. Changes in cost accounting principles for measuring direct expenses should only be made if required by law, compliance with cost accounting standards, or if the change results in a more appropriate preparation or presentation of the organization's cost statements.

Disclosures

Paragraph 8 of CAS-10 specifies that disclosures regarding direct expenses should only be made if they are material, significant, and quantifiable. Such disclosures can be presented within the body of the cost statement, as a footnote, or in a separate schedule. The key aspects outlined for the disclosure of direct expenses in cost statements include:

1. The rationale for distributing direct expenses to cost objects or cost units.
2. Quantities and rates of items constituting direct expenses, where applicable.
3. Details on price and usage variances in cases where direct expenses are accounted for at standard cost.
4. Direct expenses related to the procurement of resources and expenses associated with internally generated resources.

5. Direct expenses paid or payable to related parties, in accordance with relevant legal requirements applicable to the cost statement as of the statement date.
6. Direct expenses incurred in foreign exchange.
7. Any subsidy, grant, incentive, or similar payment subtracted from direct expenses.
8. Credits or recoveries related to direct expenses.
9. Identification and disclosure of any abnormal portion of direct expenses.
10. Clarification that penalties and damages are excluded from direct expenses.

Illustration 47

Measurement of Direct Expenses

Royalty paid on sales ₹ 30,000; Royalty paid on units produced ₹ 20,000, hire charges of equipment used for production ₹ 2,000, Design charges ₹ 15,000, software development charges related to production ₹ 22,000, compute the direct expenses.

Solution:

Computation of Direct Expenses

Particulars	₹
Royalty paid on sales	30,000
Add: Royalty paid on units produced	20,000
Add: Hire charges of equipment used for production	2,000
Add: Design charges	15,000
Add: Software development charges related to production	22,000
Direct Expenses	**89,000**

Note:

1. Expenses are related to either manufacturing of the product or rendering of service.
2. These costs are directly identifiable and can be linked with the cost object and are not related to direct material cost or direct employee cost. Hence, these are considered as direct expenses.

Illustration 48

Measurement of Direct Expenses – allocation to cost object products (in a multi-product situation)

A manufacturing unit produces two products X and Y. the following information is furnished:

Particulars	Product X	Product Y
Units produced (quantity)	20,000	15,000
Units sold (quantity)	15,000	12,000
Machine Hours utilized	10,000	5,000
Design charges	15,000	18,000
Software development charges	24,000	36,000

Royalty paid on sales ₹ 54,000 [@ ₹ 2 per unit sold, for both the products]; Royalty paid on units produced ₹ 35,000 [@ ₹ 1 per unit produced, for both the products], Hire charges of equipment used in manufacturing process of Product X only ₹ 5,000, Compute the direct expenses.

Solution:

Computation of Direct Expenses

Particulars	Product X (₹)	Product Y (₹)
Royalty paid on sales	15,000 x 2 = 30,000	12,000 x 2 = 24,000
Add: Royalty paid on units produced	20,000 x 1 = 20,000	15,000 x 1 = 15,000
Add: Hire charges of equipment used in manufacturing process of Product X only	5,000	-
Add: Design charges	15,000	18,000
Add: Software development charges related to production	24,000	36,000
Direct Expenses	**94,000**	**93,000**

Note:

1. Royalty on production and royalty on sales are allocated on the basis of units produced and units sold respectively. These are directly identifiable and traceable to the number of units produced and units sold. Hence, this is not an apportionment.
2. No adjustments are made related to units held, i.e., closing stock.

Overheads

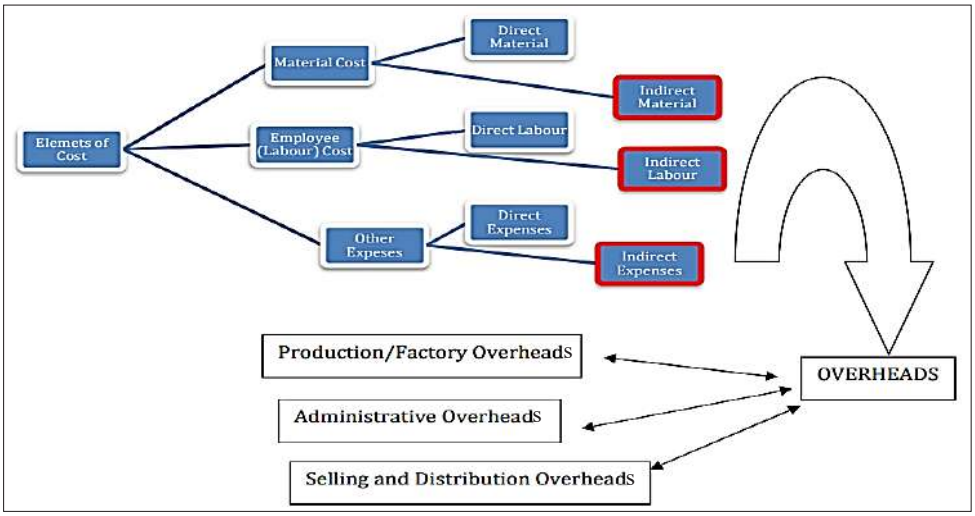
2.4

Introduction

Any cost which is not directly identifiable to any particular product, job, operation or process is mentioned as overheads. As such, it is summing up of total of indirect material cost, indirect labour cost and indirect expenses and may also be referred as indirect cost. Indirect costs are costs which are not traceable to a cost center or and cost unit and therefore have to be apportioned to the cost centre or cost unit.

CIMA defines overheads as *expenditure on labour, materials or services that cannot be economically identified with a specific saleable cost unit*.

Indirect cost which encompasses of indirect material, indirect labour and indirect expenses is generally classified as production/factory overheads, administrative overheads, selling overheads and distribution overheads. The following diagram clarifies the issue.



With the advent of time service sector organizations have become more and more prominent and this have contributed to proportionately higher overheads costs. Also, with the modern trend towards the mechanization, automation, and mass production, overheads costs have grown considerably. In service organizations the proportion of overheads costs to the total costs of products is comparatively higher.

It is important to note that the Institute of Cost Accountants of India have issued CAS 3 (Production and Operation Overheads), CAS 11 (Administrative Overheads) and CAS 15 (Selling and Distribution Overheads) which stipulates the scope, objective, principles of measurement, assignment, basis of absorption, presentation and disclosure of each specific overheads.

Production or operation overheads is the most important of the overheads as it is intricately related to the production process.

Paragraph 6.1 of Cost Accounting Standard (CAS) (Production or Operation Overheads) – 3 issued by the Institute of Cost Accountants of India states the guiding principle of assigning production or operation overheads is its traceability to a cost object in an economically feasible manner. The cost which can be traced directly to a cost object shall be directly assigned.

As per Paragraph 6.2, assignment of production overheads to the cost objects shall be based on 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. Benefits received – Production Overheads are to be apportioned to the various cost objects in proportion to the benefits received by them.

In case of facilities created on a standby or ready to serve basis, the cost shall be assigned on the basis of expected benefits instead of actual.

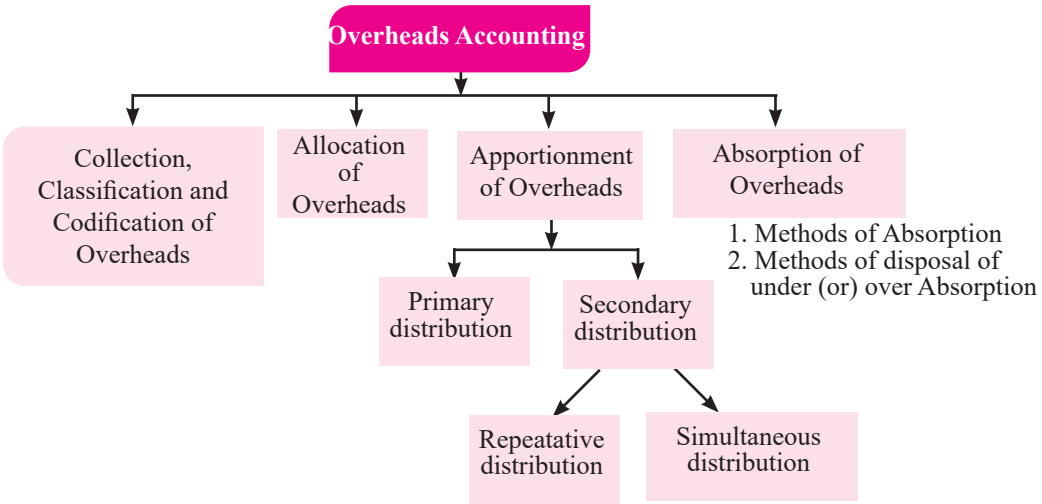
The variable production or operation overheads shall be absorbed to products or services based on actual production. The fixed production or operation overheads shall be absorbed based on the normal capacity.

Overheads Accounting

The ultimate aim of overheads accounting is to absorb them in the units produced by the firm. Absorption of overheads means charging each unit of a product with an equitable share of overhead expenses. As overheads are indirect costs, it becomes difficult to charge them to the units produced. So, it becomes necessary to charge them to the units produced on some equitable basis which is called as 'Absorption' of overheads. The important steps involved in overheads accounting are as follows:

1. Collection, Classification and Codification of Overheads.
2. Allocation, Apportionment and Reapportionment of Overheads,
3. Absorption of Overheads.

As mentioned above, the ultimate objective of overhead accounting is 'absorption' of the total overhead on the units produced by the firm. This is important as accurate absorption will help in arriving at accurate cost of production. Overheads are indirect costs and hence there are numerous difficulties in charging the overheads to the units produced. Following is a pictorial representation of the various aspects of overhead accounting.



Collection, Codification and Classification of Overheads

Collection of Overheads

Collection of overheads involves the systematic recording of every cost item in the records dedicated to determining the cost of each cost center or unit. In the realm of overheads accounting, the gathering of overheads holds significant importance. Identifying indirect expenses is crucial, and the specified source documents play a vital role in this process. The meticulous collection of overhead expenses is essential for obtaining a precise understanding of the total overhead costs. Overheads are collected on the basis of pre-planned groupings, called cost pools. Homogeneity of the cost components in respect of their behavior and character is to be considered in developing the cost pool. The *source documents* for the collection of overheads include:

1. Stores Requisitions: These are used to obtain indirect materials from the stores and show standing order numbers and the department using such materials
2. Job Card/Time Cards: These are used to record the time spent by workers on a particular job or activity
3. Invoices: These are used to record payments for stores and services, and the vouchers are recorded in the purchase journal
4. Cash Book: It is scrutinized to collect petty indirect expenses against standing order numbers
5. Subsidiary Records: These are used to record overheads that do not involve current cash outlay, such as depreciation, notional rent, and notional interest

These documents are essential for the proper recording and allocation of overhead expenses in a business

It is important to note that indirect materials originate in store requisitions. Each stores requisitions note specifies the standing order number and the department for which the stores are drawn. The departmentalization is done at sources. A material issue analysis sheet is prepared from store requisitions. At the end of each month, the total of these items is charged or debited to Factory Overheads Control Account and credited to Stores Ledger Control Account.

Indirect labour is obtained from the time cards and pay rolls. Wages paid to workers against each standing order number can be obtained from the time tickets or job cards. From the time tickets, the wages analysis sheet is prepared each month and at the end of the month, the total is debited to Factory Overheads Control Account and credited to the Wages account.

Codification of Overheads

Codification of overheads is the process of representing each item of overheads by a number, the digits of which indicate the group, subgroup, type, and dimension of the item. The main objectives of codification are to group items of overheads of similar nature, facilitate allocation and apportionment of overheads to different departments or cost centers, and analyze overhead expenses for control purposes. The basic requirements of a system of codification of overhead expenses include classifying expenses according to nature, object, or function, being simple and easy to comprehend, and facilitating the process of allocation, apportionment, and absorption of overheads. Codification can be done by allotting numerical codes, alphabetical codes, or a combination of both. It helps in the systematic and easy recording of expenses and reduces the task of maintaining a huge number of accounts.

The Methods of codification

The methods of codification of materials include alphabetical, mnemonic, numerical, decimal, alphanumeric, and color codification.

- Alphabetical Codification: This method involves the use of alphabetical letters as codes to facilitate easy and quick identification.

- Mnemonic Codification: It is simple to operate because it helps staff to memorize the items in a store.
- Numerical Codification: This is the simplest and most widely used method in manufacturing.
- Decimal Codification: It has the advantage of flexibility and unlimited scalability.
- Alphanumeric Codification: It involves the use of both letters and numbers to create codes.
- Color Codification: This method uses colors to represent different categories of items.

Classification of Overheads[1]

Overhead costs are indirect expenses that are not directly tied to the production of goods or services but are necessary for the overall operation of the business. The classification of overheads refers to the categorization and organization of various types of overhead costs incurred by a business. Proper classification of overheads helps businesses analyze and manage their costs effectively and is a prerequisite to any form of cost analysis and control system. Classification may be made either on the basis of the element of cost or on the basis of function. It is important to note that classification used for cost collection is mostly combination of elemental and functional. The behavioural classification[2] cannot be used for booking of costs; it is used only for analysis and decision making. Some important aspects of the classification are stated in the following lines.

- **Elementwise classification –**

Overheads may be classified in terms of the elements of the cost; indirect material, indirect labour and indirect overheads.

a) As per CAS – 3, indirect material cost is defined as '*Materials, the cost of which cannot be directly attributed to a particular cost object*'. For example, lubricant used in a machine is an indirect material and so is nuts and bolts.

b) As per CAS – 3, '*indirect employee cost is the employee cost, which cannot be directly attributed to a particular cost object'*. Wages and salaries paid to indirect workers, i.e., workers who are not directly engaged on the production is an example of indirect labour (employee cost).

c) As per CAS – 3, '*indirect expenses are expenses, which cannot be directly attributed to a particular cost object'*. Rent and taxes, printing and stationery, power, insurance, electricity, marketing and selling expenses are the examples of indirect expenses.

- **Functional Classification**

- **Production (Factory, Manufacturing or Operation) Overheads –** As per CAS – 3, Indirect Cost involved in the production process or in rendering service is referred as production overheads. These overheads are the aggregate of indirect materials cost, indirect wages and indirect expenses associated with manufacturing activities. Factory power, works manager's salary, factory insurance, depreciation of factory machinery and other fixed assets are examples of factory overheads.

  These costs cannot be identified specifically with or traced to cost object in an economically feasible way.

- **Office and Administration Overheads -** Indirect expenses incurred for running the administration are known as Administrative Overheads.

  Paragraph 4.3 of CAS 11 defines Administrative Overheads as *cost of all activities relating to general management and administration of an entity.* This paragraph also states that administrative overheads shall exclude production overheads, marketing overheads and finance cost.

1. Classification of cost as per CAS 1 is discoursed in details in Module 1 of this study note.
2. Overhead as fixed and variable Classifying. This aspect is covered in Module 1 of this study note.

- **Selling and Distribution Overheads**

  Paragraph 4.9 of CAS 15 defines selling overheads as '*the expenses related to sale of products or services and include all indirect expenses incurred in selling the products or services'.* Examples of selling overheads include the following*;*

  - o Sales team salaries, commissions, and bonuses.
  - o Advertising and promotional expenses.
  - o Sales office rent and utilities.
  - o Sales travel and entertainment expenses.
  - o Sales training costs.
  - o Sales administration expenses.
  - o Trade shows and exhibitions costs.

  Paragraph 4.4 of CAS 15 defines distribution overheads as overheads which are *'also known as distribution costs, are the costs incurred in handling a product or service from the time it is ready for despatch or delivery until it reaches the ultimate consumer including the units receiving the product or service in an inter-unit transfer.* Examples of selling overheads include the following

  - o Warehouse rent and maintenance.
  - o Packaging costs.
  - o Shipping and freight expenses.
  - o Handling and storage costs.
  - o Distribution staff salaries.
  - o Vehicle maintenance and fuel for delivery vehicles.
  - o Distribution network costs.
  - o Costs associated with inventory management.

Distinguishing Between Selling Overheads and Distribution Overheads:

Selling overheads and distribution overheads are distributed on the basis of the following points.

1. Focus:

   Selling Overheads: Primarily focus on sales and promotional activities aimed at convincing customers to make purchases.

   Distribution Overheads: Primarily focus on the logistics and physical distribution of products to customers.

2. Nature of Expenses:

   Selling Overheads: Include costs related to the sales team, advertising, and promotional efforts.

   Distribution Overheads: Include costs associated with warehousing, packaging, and transportation.

3. Timing of Expenses:

   Selling Overheads: Often incurred before the sale, during the marketing and persuasion stage.

   Distribution Overheads: Incurred during the physical movement and delivery of products.

4. Impact on Sales:

   Selling Overheads: Directly impact the sales process by influencing customer purchasing decisions.

Distribution Overheads: Impact the efficiency and reliability of product delivery, contributing to customer satisfaction.

- **Research and Development Overheads**

  Research Cost is the cost of searching for new or improved products, new applications of material, or new or improved methods, process, systems or services. In the modern days, firms spend heavily on research and development. Expenses incurred on research and development is known as Research and Development Overheads. Research may be of the following types:

  - o Pure or basic research to gain general know how regarding the production or market, not directed towards any particular product.
  - o Applied research which applies the basic knowledge in practice i.e., improvement of existing products, new process, exploring of new products, improved measures of safety, etc.

Development cost is the cost of the process which begins with the implementation of the decision to use scientific or technical knowledge to produce a new or improved product or to employ a new or improved method, process, system, etc. and ends with the commencement of formal production of that product by that method. Development starts where the research ends. Development cost is the expenditure incurred for putting the results of research on a practical commercial basis.

Accounting of Research and Development Overheads

Accounting of Research and Development Cost arise due to the following causes:

- The expenditure is in the nature of pre-production costs and there is a considerable time lag between the incidence and expenditure and realization of benefit.
- There is no immediate production. Thus, it becomes impossible to charge this cost to products on immediate basis.

It is because of these difficulties that the accounting of research and development costs has been a subject of some controversy. Three methods are available for charging research and development costs as:

a) Charging off to the current year profit and loss account.

b) Capitalization so that cost may be amortized on a long-term basis.

c) Deferment and charge off to costs of the next two or three years – a short / medium term amortization.

In the following chart, various items of overheads are cross classified according to their elements and according to their functions

Functions	Elements of Cost		
	Material	Labour	Expenses
Factory or Production or Manufacturing or Works Overheads	Nuts & bolts, consumables, lubricants, welding electrodes, cleaning materials, nails, threads, ropes etc.	Salaries and wages to foremen, supervisors, inspectors, maintenance, labour, idle time	Factory lighting and heating, factory rent, power and electricity, factory insurance, depreciation on machinery, repairs
Administrative Overheads	Printing and Stationery, Office Supplies	Salary of office staff, managers, directors, and other administrative departments as IT, Audit, Credit, Taxation	General office rent, insurance, telephones, fax, travel, legal fees, depreciation on office assets

Selling Overheads	Price lists, catalogues, mailings, advertising material such as leaflets, danglers, samples, free gifts, exhibition material	Salaries of staff and managers, commission on sales, bonus on schemes	Sales office expenses, travelling, subscription to sales magazines, bad debts, rent and insurance of showrooms, cash discount, brokerage, market research
Distribution Overheads	Secondary packing, material items used in delivery vans	Salaries of delivery staff such as drivers, dispatch clerk, logistic manager	Carriage outwards, forwarding expenses, rent and insurance of warehouses and depots, insurance, running expenses and depreciation of delivery vans

- **Control-wise Classification**

  Overheads may also be categorized as Overhead costs controllable or uncontrollable. This is reliant on the quantum of influence of the management on the overhead cost.

  - Controllable overheads are costs that can be influenced or controlled by the management and operational levels within a specific time frame. These costs are usually associated with day-to-day activities and decisions made at lower organizational levels.
  - Uncontrollable overheads are costs that are beyond the immediate influence or control of lower-level management. These costs are often determined at higher levels of the organization or are influenced by external factors such as market conditions, government regulations, or economic trends.

  It is important to note that the classification of overhead costs as controllable or uncontrollable can vary depending on the organization, industry, and specific circumstances. Additionally, advancements in technology and changes in business environments may influence the degree of control that management can exert over certain costs.

Allocation, Apportionment and Reapportionment of Overheads

After the collection, codification and classification of overheads, the next step is allocation and apportionment of overheads to the units produced. The following steps are required to complete this process.

- **Departmentalization**

  Departmentalization of overhead expenses is the process of determining the overhead costs of each department involved in production. This process involves dividing the departments in a factory into two categories: production departments and service departments. The departmentalization of overheads is undertaken in two stages: allocation of overheads and apportionment of overhead expenses. The allocation of overheads is the process of charging the full amount of overhead costs to a specific cost center, while the apportionment of overhead expenses is the technique of dividing up an item of overhead cost and charging it to the cost centers on an equitable basis.

  Departmentalization of overheads allows for better planning and control if the head of each department is held responsible for the costs. It also allows for the computation of plant-wide overhead rates, which is important when there are a variety of products. Some products require many operations, while others require very few operations, especially in the high-cost department.

- **Allocation and Apportionment**
  - Allocation involves identifying overheads to particular cost centre. It means charging of overhead to a particular cost centre as the overhead is relatable to that particular cost centre. It may be said that allocation is allotment of items of indirect costs to cost centre. For example, If the cost of a specialized machine is entirely associated with the production department, the total cost of that machine is allocated to the production department.
  - Apportionment involves the distribution of overhead costs among two or more cost centers or departments. This method is used when a particular cost cannot be directly attributed to a single department and needs to be shared among several units based on a reasonable and equitable basis. For example, if the rent for a building is incurred for multiple departments, the total rent cost is apportioned among these departments based on factors like the floor area, number of employees, or machine usage in each department.

Distinction between Allocation and Apportionment

The key distinction between allocation and apportionment is summarized in the following table

Feature	Allocation	Apportionment
Definition	Assignment of the entire cost to a single department.	Distribution of costs among multiple departments or cost centers.
Scope	Applied when a cost is entirely associated with a specific department.	Used when a cost is shared among multiple departments, and a fair basis is needed for distribution.
Applicability	Direct assignment without further distribution.	Involves distributing costs among various departments based on a predetermined allocation basis.
Method	Direct assignment of a cost to a specific unit.	Requires the use of a basis (e.g., floor area, machine usage) to distribute costs among departments.
Examples	Entire cost of a specialized machine assigned to a production department.	Rent cost of a building distributed among different departments based on relevant factors.
Precision	May be more precise when a cost is exclusively related to a particular department.	Requires a basis for distribution, involving some degree of estimation or approximation.

Primary distribution and secondary distribution

In overheads accounting, primary distribution and secondary distribution are two stages involved in the process of allocating and apportioning overheads to cost centers. These stages help in distributing overhead costs to the appropriate departments or production units.

- Primary distribution involves the allocation and apportionment of overheads to all departments in a factory on a rational basis. This process is also known as the departmentalization of overheads. It ignores the distinction between production and service departments and aims to distribute overhead expenses among different departments based on equitable and practicable criteria.

  In primary distribution following basis of apportionment of overheads is generally used.

Overheads item	Basis of apportionment
Rent, Rates and Taxes	Floor Area Occupied
Repairs to Building	Value of Buildings / Floor Space
General Lighting	No. of light points in each department

Power	Horse Power of Machines
Telephones	No. of extensions in a department
Supervision	No. of employees
Material Handling	No. of material requisitions or value of material used

The above list is not exhaustive and depending upon peculiarities of the organisation, it could be extended.

- Secondary distribution is the process of redistributing the cost-of-service departments among the production departments. This step ensures that the product cost bears the equitable share of the cost-of-service departments that render services to the production departments. It is the second step in the overall process of overheads distribution

Principles of Apportionment of Overhead Cost:

The broad principles on which the allocation or apportionment of overheads is made is given in the following lines;

(i) Allocation Based on Services Rendered: Overheads are apportioned to production departments based on the extent of services received from service departments. The production department that benefits the most from the services provided by service departments bears the largest share of the overhead costs. Consequently, the overheads of service departments are allocated to production departments.

(ii) Ability to Pay: This approach suggests assigning a significant portion of service department overhead cost to production departments whose products contribute the most to the business firm's income. However, the practical challenge lies in determining the most financially impactful department, making this method operationally complex.

(iii) Survey or Analysis Method: When finding a suitable base for apportionment is challenging or selecting a method is deemed costly, the survey or analysis method is employed. For instance, postage costs could be apportioned based on a survey of postage usage throughout the year.

(iv) Efficiency Method: Overheads apportionment is determined by production targets in the efficiency method. Exceeding the target results in a reduction in unit costs, indicating above-average efficiency. Conversely, falling short of the target leads to an increase in unit costs, revealing the inefficiency of the department.

Illustration 49

A factory has 3 production departments (P1, P2, P3) and 2 service departments (S1 and S2). The following overheads and other information are extracted from the books for the month of January 2022.

Expense	Amount (₹)
Rent	6,000
Repair	3,600
Depreciation	2,700
Lighting	600
Supervision	9,000
Fire Insurance for stock	3,000
ESI contribution	900
Power	5,400

Particulars	P1	P2	P3	S1	S2
Area sq ft	400	300	270	150	80
No. of workers	54	48	36	24	18
Wages	18,000	15,000	12,000	9,000	6,000
Value of plant	72,000	54,000	48,000	6,000	-
Stock Value	45,000	27,000	18,000	-	-
Horse power of plant	600	400	300	150	50

Allocate or apportion the overheads among the various departments on suitable basis.

Solution:

The primary distribution of overheads is as follows:

Expense	Total ₹	Basis	P1 ₹	P2 ₹	P3 ₹	S1 ₹	S2 ₹
Rent	6,000	Area sq ft [40:30:27:15:8]	2,000	1,500	1,350	750	400
Repair	3,600	Value of plant [12:9:8:1]	1,440	1,080	960	120	-
Depreciation	2,700	Value of plant [12:9:8:1]	1,080	810	720	90	-
Lighting	600	Area sq ft [40:30:27:15:8]	200	150	135	75	40
Supervision	9,000	No. of workers [9:8:6:4:3]	2,700	2,400	1,800	1,200	900
Fire Insurance for stock	3,000	Stock Value [5:3:2]	1,500	900	600	-	-
ESI contribution	900	Wages [6:5:4:3:2]	270	225	180	135	90
Power	5,400	Horse power of plant [12:8:6:3:1]	2,160	1,440	1,080	540	180
Total	**31,200**		**11,350**	**8,505**	**6,825**	**2,910**	**1,610**

Secondary Distribution of Production Overheads

The next step is to reapportion the service department costs over the production departments. This also needs to be done on some suitable basis, as there may not be a direct linkage between services and production activity. The products actually do not pass through the service departments but the cost-of-service departments have to be recovered from the sales of the finished products. Hence, the overheads of the service departments have to be apportioned to production department. This process is called secondary distribution of overheads.

The basis of secondary distribution is dependent on the nature of service given by the service departments to the production departments

In the Illustration 1, the cost of S1 is ₹ 2,910 and that of S2 is ₹ 1,610 which will be loaded on to the totals of P1, P2 and P3.

Some examples of the bases that can be used to distribute cost of different service departments:

Service department	Basis
Quality	No. of inspection done
Maintenance	No. of maintenance calls or Material usage for maintenance or Time spent on maintenance

Stores	Indirect material cost or No. of issue slips or Quantity of material issued for Value of stock handled
Canteen, Welfare	No. of workers
Internal Transport	No. of truck or trolleys used for Tonne miles consumed
Payroll office	No. of labour hours
Purchase office	No. of purchase orders or Value of material purchased

This is not an exhausted list and could differ from company to company. Many times, percentage estimation is also done for such distribution if the service cannot be measured on the basis of any of the above bases.

Methods of Secondary Distribution

- **Direct Distribution Method**

This method is based on the assumption that one service department does not give service to other service department/s. thus between service departments there is no reciprocal service exchange. Hence, under this method, service costs are directly loaded on to the production departments. This is simple, but the assumption may not be correct. It is incorrect to assume that canteen service is not available to other service departments like labour office or stores or maintenance department and thus, the method should not be used as far as possible.

In the Illustration 50. The cost of S1 and S2 is apportioned as follows:

	Production Department		
Service Department	P1	P2	P3
S1	40%	30%	30%
S2	$^{5}/_{10}$	$^{3}/_{10}$	$^{2}/_{10}$

Distribution of cost-of-service departments is as follows:

Department	Total ₹	Basis of Apportionment	P1 ₹	P2 ₹	P3 ₹
As per primary distribution	26,680		11,350	8,505	6,825
Distribution of S1	2,910	40%:30%:30%	1,164	873	873
Distribution of S2	1,610	5:3:2	805	483	322
Total	31,200		13,319	9,861	8,020

- **Step Distribution Method or Non-reciprocal Method**

This method is based on the assumption that one service department gives service to the other but does not receive service from other service department. In Illustration 50, it may be assumed that S1 may render services to S2 but not vice versa, i.e., S2 may not render service to S1. In such situation, cost of that service department will be distributed first which render services to maximum number of other service departments. After this, the cost-of-service department serving the next large number of departments is distributed. This process is continued till all service departments are over. Because it is done in steps, it is called as Step Distribution Method.

Illustration 50

A manufacturing company has two production departments Fabrication and Assembly and 3 service departments as Stores, Time Office and Maintenance. The departmental overheads summary for the month of March 2022 is given below:

Fabrication	₹ 24,000
Assembly	₹ 16,000
Stores	₹ 5,000
Time office	₹ 4,000
Maintenance	₹ 3,000

Other information relating to the department was:

Particulars	Production departments		Service departments		
	Fabrication	Assembly	Stores	Time Office	Maintenance
No. of employees	40	30	20	16	10
No. of stores requisition slips	24	20	-	-	6
Machine Hours	2,400	1,600	-	-	-

Apportion the costs of service departments to the production departments.

Solution:

The overheads of the service departments have to be allocated to the production departments. The sequence and the bases on which the service departments should be selected has to be determined first. The following logical bases are decided based on the additional information given:

Service Departments	**:**	**Basis of allocation**
Time Office	:	No. of employees
Stores	:	No. of stores requisition slips
Maintenance	:	Machine Hours

Number of employees exist in all the departments. So, overheads of the time office department is allocated first. No. of stores requisition slips is used by three departments, hence overheads of the stores department is allocated next and machine hours is used by only production department. So, overheads of the maintenance department is allocated last.

Hence, the sequence of distribution of overheads will be time office, stores and maintenance.

Particulars	Total ₹	Basis	Fabrication ₹	Assembly ₹	Time Office ₹	Stores ₹	Maintenance ₹
As per primary distribution	52,000	As given	24,000	16,000	4,000	5,000	3,000
Time Office	4,000	No. of Employees (4:3:2:1)	1,600	1,200	(4,000)	800	400
Stores	5,800	No. of stores requisition slips (12:10:3)	2,784	2,320	-	(5,800)	696

Maintenance	4,096	Machine Hours (3:2)	2,458	1,638	-	-	(4,096)
Total			**30,842**	**21,158**	-	-	-

When the cost of Time Office is distributed first, the charge to stores department is ₹ 800. This makes the total cost of stores to be distributed as ₹ 5,800 (i.e., ₹ 5,000 + ₹ 800). Same is the logic for ₹ 4,096 i.e., the cost of Maintenance.

- **Reciprocal Service Method**

This approach acknowledges that service departments can both provide and receive services from other service departments reciprocally. The exchange of services among departments is duly considered in allocating overhead costs. Two methods are employed for distribution based on this principle: the reciprocal distribution method and the simultaneous equation method.

- **Repeated Distribution Method**

This involves consistent allocation of overhead costs across all departments. The predetermined ratios are applied to allocate the costs of service departments to both production and other service departments. This process continues until the figures for service departments reach 'nil' or become 'negligible'.

Illustration 51

The summary as per primary distribution is as follows:

Production departments A - ₹ 2,400; B - ₹ 2,100; C - ₹ 1,500

Service departments X - ₹ 700; Y - ₹ 900

Expenses of service departments are distributed in the ratios of:

X Department: A – 20%, B – 40%, C – 30% and Y – 10%

Y Department: A – 40%, B – 20%, C – 20% and X – 20%

Show the distribution of service costs among A, B and C under repeated distribution method.

Solution:

	Production Departments			Service Departments	
	A ₹	B ₹	C ₹	X ₹	Y ₹
As per primary distribution	24,00	2,100	1,500	700	900
Service department X (2:4:3:1)	140	280	210	(700)	70
Service department Y (2:1:1:1)	388	194	194	194	(970)
Service department X (2:4:3:1)	38.8	77.6	58.2	(194)	19.4
Service department Y (2:1:1:1)	7.76	3.88	3.88	3.88	(19.4)
Service department X (2:4:3:1)	0.776	1.552	1.164	(3.88)	0.388
Total	2,975.336	2,657.032	1,967.244	-	0.388

Ignore the fraction of the undistributed amount of the Service Department Y.

- **Simultaneous Equations Method**

Under this method, simultaneous equations are formed using the service departments' share with each other. Solving the two equations will give the total cost of service departments after loading the inter-departmental exchange of services. These costs are then distributed among production departments in the given ratio.

In Illustration 52, service department X gives 10% of its service to Y and receives 20% of Y's service.

Let 'x' be the total expense of Department X and

'y' be the total expense of Department Y

So, $x = 700 + 0.20y$ ------ equation (1)

and, $y = 900 + 0.10x$ ------ equation (2)

putting $y = 900 + 0.10x$ in equation (1)

$=> x = 700 + 0.20\ (900 + 0.10x)$

$=> x = 700 + 180 + 0.02x$

$=> 0.98\ x = 880$

$=> x =$

Now putting $x = 898$ in equation (2)

$=> y = 900 + 0.10$ x 898 $900 + 90 = 990$

total cost of S1 = ₹ 898 and of S2 = ₹ 990

Statement showing redistribution of Overheads

	Department				
	A ₹	B ₹	C ₹	X ₹	Y ₹
Primary Distribution	2,400	2,100	1,500	700	900
Distribution of cost of X	180	359	269	(898)	90
Distribution of cost of Y	396	198	198	198	(990)

- **Trial and Error Method**

This method is to be followed when the question of distribution of costs of service cost centres which are interlocked among them arises. In the first stage, gross costs of services of service cost centres are determined. In the second stage cost of service centres are apportioned to production cost centres.

Limitations of Apportionment

Regardless of the method chosen, it relies on an appropriate basis, which inevitably introduces approximations. Using approximate data for analysis, control, and decision-making can result in errors. Therefore, caution must be exercised when associating cost data with a cost center or cost unit. Most indirect costs, particularly overheads, naturally relate to a specific time period. Attempting to link them to a cost unit is often arbitrary, given that overheads are typically period costs. Consequently, traditional methods of allocation and apportionment are frequently contested in the industry, and techniques like marginal costing have emerged in response to the limitations of Traditional Costing.

Capacity Levels and Overheads Rate

Para 5.1 of CAS 2 states that Capacity shall be determined in terms of units of production or services or equivalent machine or man hours.

The determination of the overheads rate relies significantly on the assumed activity level. The overheads rate varies across different capacity levels. To ensure the accurate calculation of a product's cost, it is essential to maintain consistency and uniformity in the principles and methods used for determining capacity[3]. Following capacity concepts merit consideration for overheads rate determination: -

Installed capacity (Theoretical or Maximum Plant Capacity)

Installed capacity (maximum capacity or the ideal capacity) is the capacity for which plant is designed to operate. It is also referred as theoretical capacity. It does not give allowance for waiting, delays and shut down. The capacity is significant for designing the plant mechanically. For cost considerations, this capacity is not important.

The disregard for essential interruptions in the production process makes it impractical to use ideal capacity in determining overhead rates. Installed capacity is defined in para 4.4 of CAS 2 as '*Installed capacity is the maximum capacity of producing goods or providing services, determined either based on technical specification of the facility or through a technical evaluation'*

Practical Capacity

Once the theoretical capacity is assessed, provisions are made for inevitable disruptions such as time spent on repairs, inefficiencies, equipment breakdowns, delays in the delivery of raw materials and supplies, labour shortages and absenteeism, Sundays, holidays, vacations, and inventory checks. Consequently, practical capacity represents the highest achievable capacity under the influence of minor, unavoidable interruptions. These interruptions, predominantly stemming from internal factors, exclude major external factors such as a lack of customer orders. The determination of practical capacity takes into account the nature of the industry and the specific circumstances of the factory's location. Standard unavoidable disruptions typically contribute to 15% to 25% of the maximum capacity. Thus, practical capacity ranges from 75% to 85% of the maximum capacity after accommodating normal, unavoidable interruptions. This is also referred as the actual capacity which is defined in para 4.2 of CAS 2 as '*Actual capacity utilization is measured in terms of volume of production achieved or service provided in a specified period'*. It is important to note that actual capacity utilization is usually expressed as a percentage of installed capacity

Actual capacity utilization

Actual capacity utilization is the volume of production achieved or service provided in a specified period, expressed as a percentage of installed capacity.

Volume may be measured in terms of units produced or services provided or equivalent machine or man hours, as applicable. Actual capacity utilization is usually expressed as a percentage of installed capacity.

Normal Capacity

Para 4.5 of CAS 2 defines normal capacity as '*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 refers to the maximum level of output that a company can sustain over a set period of time. It is the level of production or service provision that a given system can maintain. Normal capacity is a key factor in measuring a company's capacity utilization rate, which is the percentage of potential output that is being achieved. Ideally, a 100% capacity utilization rate is desirable, but operating at full capacity for an extended period may not be sustainable. Therefore, normal capacity provides a realistic benchmark for sustainable output levels. It takes into account various factors such as inefficiencies and delays that make it impossible to reach a theoretical level of output over the long term.

3. This is the objective with which CAS 2 (Capacity determination) has been designed.

Capacity based on Sales Expectancy

Capacity may be derived from anticipated sales for the upcoming year, and it's crucial to discern between normal capacity and capacity based on sales expectations. While normal capacity takes into account a comprehensive analysis of long-term sales trends spanning a cycle of years, capacity based on sales expectancy focuses solely on the sales projections for the upcoming year. When establishing long-term sales trends, it involves considering a cycle of years extensive enough to mitigate cyclical fluctuations. In contrast, capacity based on sales expectancy is more influenced by general economic conditions and industry forecasts than by long-term sales trends.

The primary advantages of determining the overheads rate based on sales expectancy are:

(i) Aligning the overheads rate with the actual sales expectations.

(ii) Effectively spreading overhead costs across production.

(iii) Providing a valuable overheads rate for decision-making purposes, such as fixing prices.

Idle Capacity

Idle capacity refers to the unused or underutilized capacity within a system, facility, or process. It represents the difference between the potential maximum output or production capacity and the actual level of production or activity at a given time. When a system or resource is operating below its full capacity, the unused portion is considered idle capacity.

Idle capacity can result from various factors such as low demand for products or services, maintenance downtime, equipment failures, or other inefficiencies in the production process. Efficient management seeks to minimize idle capacity to enhance productivity and optimize resource utilization. It is categorized as normal idle capacity and abnormal idle capacity.

Para 4.6 of CAS 2 defines normal idle capacity as '*the difference between installed and normal capacity'.*

Abnormal idle capacity *is the difference between normal capacity and actual capacity utilization where the actual capacity is lower than the normal capacity* (para 4.1 of CAS 2).

The standard defines *'Excess Capacity Utilization' is the difference between installed capacity and the actual capacity utilization when actual capacity utilization is more than installed capacity.*

The following illustrates the concepts discussed above

Illustration 52

Manufactures' Specifications – capacity per hour	= 500 units
No of shifts (each shift 8 hours)	= 3 shifts
Holidays in a year:	
Sundays	= 52 days
Other holidays	= 13 days
Annual maintenance is done within these 13 holidays	
Preventive Weekly Maintenance for the machine on Sunday	
Normal idle capacity for batch change over,	
Lunch, Personal need etc.	= 1 hr per shift
Production based on sales expectancy in past 5 years	= 30.1, 26.9, 29.7, 24.4 and 30.2 lakh units
Actual Production for the year	= 30.1
Assume year 1, year 3 & year 5 to be normal years.	

Calculation

Installed Capacity for the machine = 365 * 8 * 3 * 500 = 43.8 lakh units

Practical; Capacity = (365 – 52 – 13) * (8 – 1) * 3 * 500 = 31.5 lakh units

Out of the past five years, normal capacity is average of 3 normal years.

Normal Capacity = (30.1 + 29.7 + 30.2) / 3 = 30.0 lakh units

Actual Capacity Utilization = 30.1 lakh units = 68.7%

Idle Capacity = (43.8 – 30.1) = 13.7 lakh unit = 31.3%

Abnormal idle capacity = 31.5 – 30.1 = 1.4 lakh units

Absorption of Overheads and their treatment in Cost Accounts

A job or product typically traverses several production departments before reaching the stage of a finished, saleable product. It becomes essential to ascertain the cost incurred in each department through which the product passes. The primary and secondary distribution summary discussed above aids in calculating the overheads for each production department. The next phase involves allocating these overall overhead costs to the units produced. Overheads absorption facilitates the Cost Accountant in recovering the overhead costs associated with each unit of the product. Overheads absorption, also referred to as levy or recovery of overheads, is achieved by determining the overheads absorption rate.

For example, if a total of 1,200 tubes are produced and the overheads cost of the turning department is ₹72,000, then the overheads absorption rate is ₹6 per tube.

Absorption means 'recording of overheads in Cost Accounts on an estimated basis with the help of a predetermined overheads rate, which is computed at normal or average or maximum capacity'

CIMA defines absorbed overheads as '*overheads attached to products or services by means of an absorption rate, or rates.'*

In general, the formula for overheads absorption rate is = Amount of Overheads ÷ Number of units of the base

Overheads Absorption Rates: For the purpose of absorption of overhead in costs of jobs, processes or products overhead rates related to suitable factors or bases to be determined. There are several methods in use for determining the overhead rates i.e. Actual or Predetermined Overheads Rate, Blanket or Multiple Rates.

As per para 6.3 of CAS 3 Absorption of Production or Operation Overheads shall be as follows:

- The variable Production or Operation Overheads shall be absorbed to products or services based on actual production.
- The fixed Production or Operation Overheads shall be absorbed based on the normal capacity.

Actual Overheads Rate:

Actual overheads absorption rate

The actual overheads rate is determined retrospectively at the end of a period using the actual overhead costs incurred and the actual level of activity.

The formula for the actual overheads rate is:

Actual Overheads Rate = Actual Total Overhead costs ÷ Actual level of activity

Unlike the predetermined rate (discussed below), the actual overheads rate uses real costs and activity levels.

Pre-determined Overheads Rate

The predetermined overheads rate is a key concept in cost accounting. It is a rate used to allocate overhead costs to products or services based on an estimate before the actual costs are known. The predetermined overheads rate is calculated by dividing the estimated total overhead costs by the estimated level of activity (such as machine hours, direct labor hours, or production units).

The formula for the predetermined overheads rate is:

Predetermined Overheads Rate = Estimated Total Overhead Costs ÷ Estimated level of activity

Once the predetermined overheads rate is established, it is applied to the actual level of activity during a specific period to allocate overhead costs to products. This helps in assigning overhead costs to products in a timelier manner than waiting until the end of the period when actual overhead costs are known. The overheads absorption rates may be categorized as blanket rate or multiple rates;

Blanket (single) Overheads Rate

A single overheads rate for the entire factory may be computed for the entire factory. So, this is known as factory wide or blanket overheads rate method.

Blanket Rate = Overheads Cost for the factory ÷ Total quantum of the base

Blanket Rate of overheads may be applied suitable in a small concern. Blanket Rates are easy to compute. The use of Blanket rate of overheads gives erroneous and misleading results, where several products passing through number of different departments. With blanket rate of overheads, satisfactory level of managerial control is not possible.

Multiple Rates

This method is most commonly used to determine the multiple overhead rates i.e., separate rate:

i) For each production department

ii) For each service department

iii) For each cost centre; and

iv) For each product line.

The multiple rates are worked out as:

Overheads Rate = Overheads Cost allocated and apportioned to each product, department ÷ Corresponding Base

Bases of overheads absorption

Overheads absorption involves distributing indirect costs across various cost centers or products. The choice of absorption bases depends on the nature of the business and the most appropriate measure of activity. The common bases for the absorption of overhead costs are stated below:

A) **Production Unit Method**

The concept here is to average out the total overheads on total units produced. In a tube manufacturing unit, the total overheads are ₹ 72,000 and total tubes processed are 12,000. The overheads absorption rate is ₹ 6 per tube. If this rate is based on the budgeted costs and number of units, and if the factory now gets an order for 2,500 tube processing, the amount of production overheads to be charged to that order will be (2,500x6) ₹ 15,000.

B) **Percentage of Direct Wages**

Under this method, overheads for a job is recovered on the basis of a predetermined percentage of direct wages. This method is used when the component of direct wages is higher. If the overheads to be absorbed is ₹ 1,20,000 and the direct wages are estimated at ₹ 8,00,000, the predetermined rate will be calculated as ($\frac{₹1,20,000}{₹8,00,000} \times 100$) 15%. If a job is received where direct wages are estimated at ₹ 9,000, then the production overheads to be absorbed will be 15% of ₹ 9,000 i.e., ₹1,350. This method is useful if the direct labour hours can be standardized and the labour rates do not fluctuate too much. However, this method ignores the contribution made by other resources like machinery. The method also ignores the fact that there may be different types or grades of workers and each may cost differently and also ignores the fact that most of the production overheads are time related.

C) **Percentage of Direct Material Cost**

Here the absorption rate is expressed as a percentage of direct material cost. This method is useful when the portion of material cost is very high and that of labour cost is comparatively negligible. It is useful if material grades and rates do not fluctuate too much. If production overheads to be absorbed is ₹ 2,000 and the material cost is expected to be ₹ 4,000, then the absorption rate will be as ($\frac{₹2,000}{₹4,000} \times 100$) 50%. Thus, for a job requiring direct material of ₹ 200, the production overheads to be absorbed will be ₹ 100 (i.e., 50% x ₹ 200). However, many overheads items bear no relationship with material cost, and also the fact of time dimension of overheads is not taken into account by this method.

D) **Percentage of Prime Cost**

This method combines the benefits of direct wages and direct material cost methods as we know prime cost means the sum total of direct material cost, direct labour cost and direct expenses. This method could be used when prime cost constitutes a major proportion of the cost and the rates of material and labour are stable. It is needed that the product made is standard product. If the prime cost is expected to be ₹ 50,000 and the production overheads are estimated at ₹ 2,250, then the absorption rate will be ($\frac{₹2,250}{₹50,000} \times 100$) 5% of prime cost. If a job has a prime cost of ₹ 800, then overheads absorbed on that job will be (5% of ₹ 800) ₹ 40.

E) **Direct Labour Hour**

Under this method, the absorption rate is calculated by dividing the overheads amount by the actual or predetermined direct labour hours. This is extremely useful when the production is labour intensive. This method is superior to the earlier ones, because it takes cognizance of the time factor. If the direct labour hours for a month is 10,000 and the overheads to be absorbed are ₹ 5,000, then the absorption rate is be ($\frac{₹5,000}{10,000 \text{ hrs}}$) ₹ 0.50 per labour hour. If a job requires labour time of 250 hours, the production overheads to be loaded on the job will be (250 hrs x ₹ 0.50) ₹ 125. The data related to labour hours has to be properly collected or estimated. The labour hour rate may be calculated as a single rate or different for different group of workers.

F) **Machine Hour Rate**

In the days of mechanized production processes, the most relevant rate to be applied is the machine hour rate. This is the rate calculated by dividing the actual or budgeted overheads cost related to a machine or a group of machines by the appropriate number of machine hours. These hours could be actual hours or budgeted hours. When budgeted hours are used, they are taken at average capacity at which a factory normally operates. Full capacity hours cannot be taken as the factory may not operate at that level and then the absorption rate may be unnecessarily fixed at a

lower level. The overheads in a highly mechanized factory are mostly related to the number of hours a machine runs. Hence, this is supposed to be the best method for absorbing overhead costs into the cost unit. If a machine normally runs for 2,000 hours in a month and monthly overheads to be absorbed are ₹15,000, then the machine hour rate will be calculated as $(\frac{₹15,000}{2,000 \text{ hrs}})$ ₹7.50 per machine hour. If a job takes 75 hours on that machine, then (75 × ₹7.50) ₹562.50 will have to loaded as cost of using the machine for that job.

A machine hour rate may be calculated using only those overheads which are directly related to the machine e.g., power fuel, repairs, maintenance, depreciation etc. Sum total of these expenses are calculated and then divided by the hours to compute the rate. This is called ordinary machine hour rate. Whereas, if costs not related to machine are also included (e.g., supervision, rent, lighting, heating etc.) for the rate calculation, such rate is called as composite machine hour rate. While calculating machine hour rate, the wages paid to machine operators may be added to the total costs. This is because these operators directly work on the machines and thus related to machine operation. At times a factory may have more than one similar machine simultaneously working. In such case, a group machine hour rate may be calculated.

Factors influencing the selection of Overheads Recovery rate

The particular method or methods selected for application in a company would depend upon the factors mentioned below. Selection of the most equitable method is of paramount importance since a method that is not suitable will distort costs and thus make them useless for control and decision-making purpose.

Selection of overheads recovery rates depends on the following factors:

i) Nature of the product and process of manufacture

ii) Nature of overhead expenses

iii) Organizational set up of the undertaking into departments and or cost centres

iv) Individual requirements with regard to the circumstances prevailing policy of the management

v) Accuracy vis-à-vis cost of operating the method. Some of the methods are comparatively more accurate and provide equitable bases for overheads absorption.

The main features of a satisfactory overheads rate are as follows:

a) Simple, easy to operate, practical and accurate

b) Economic in application

c) Fairly stable so that cost from period to period does not vary

d) Related to time factor as far as practical

e) Departmental rates are preferable to blanket rates

f) Area of activity selected for computation of the rate should be homogeneous cost unit

g) Base for the rate should lay stress on the main production element of the concern

Under absorption and Over absorption of Overheads

The amount of overheads absorbed in costs is the sum total of the overhead costs allotted to individual cost units by application of the overheads rate. When a predetermined rate worked out on the basis of anticipated or budgeted overheads and base is applied to the actual base, the amount absorbed may not be identical with the amount of overhead expenses incurred if either the actual base or the actual expenses or both deviate from the estimates or the budget.

If the amount absorbed is less than the amount incurred, which may be due to actual expenses exceeding the estimate and / or the output or the hours worked being less than the estimate, the difference denotes under absorption.

On the other hand, if the amount absorbed is more than the expenditure incurred, which may be due to the expense being less than estimate and / or the output or hours worked being more than the estimates, this would indicate over-absorption, which goes to inflate the costs.

Under or over absorption of overheads may arise due to one or the other of the causes given below:

a) Error in estimating overhead expenses

b) Error in estimating the level of production, i.e., the base

c) Major unanticipated changes in the methods of production

d) Unforeseen changes in the production capacity

e) Seasonal fluctuations in the overhead expenses from period to period

f) Overheads rate may be applied to the normal capacity which may be less than the full operating capacity of the undertaking

How does one deal with the situation of over or under absorption?

There are three ways to handle over or under absorption:

i) **Write off** (in case of under absorption) or **write back** (in case of over absorption) to the Profit and Loss Account. This treatment is valid if most of the overhead items are related to time.

ii) **Carry forward to the next period through a reserve account** – this method is not recommended on the logic that it is inconsistent with Accounting Standard.

iii) **Use of supplementary rates -** to adjust the effect to the cost of sales, finished stocks and work in progress stocks. This sound logical as it does not carry forward the unabsorbed or over absorbed overheads to the next accounting period entirely. It aims at splitting the total effect between the cost of sale (which is charged to current year's profits) and stocks (which are carried forward to the next year).

Illustration 53

Overheads incurred	₹ 1,50,000
Overheads recovered	₹ 1,00,000
Cost of sales	₹ 10,00,000
Finished goods	₹ 8,00,000
Work-in-progress	₹ 7,00,000

How the under / over absorbed overheads will be treated?

Solution:

Overheads Incurred	₹ 1,50,000
Overheads Recovered	₹ 1,00,000
Under Absorption	₹ 50,000

Supplementary Overheads rate is calculated and allocated to Cost of Sales, Finished Goods and Work in Progress.

Total of Cost of Sales, Finished Goods and Work in Progress ₹ 25,00,000

Supplementary Overheads rate $\frac{₹50,000}{25,00,000}$ = ₹ 0.020

∴ Under absorbed overheads amount will be distributed as follows:

Cost of Sales	= (₹ 10,00,000 × 0.020)	= ₹ 20,000
Finished Goods	= (₹ 8,00,000 × 0.020)	= ₹ 16,000
Work in Progress	= (₹ 7,00,000 × 0.020)	= ₹ 14,000

2.4.3 Reporting of Overhead Costs

Presentation

i. Overheads shall be presented as separate cost heads like production, administration and marketing.

ii. Element wise and behaviour wise details of the overheads shall be presented, if material.

iii. Any under – absorption or over – absorption of overheads shall be presented in the reconciliation statement.

Disclosure

a) The basis of assignment of overheads to the cost objects.

b) Overheads incurred in foreign exchange.

c) Overheads relating to resources received from or supplied to related parties.

d) Any subsidy / grant / incentive or any amount of similar nature received / receivable reduced from overheads.

e) Credits / recoveries relating to the overheads.

f) Any abnormal cost not forming part of the overheads.

g) Any unabsorbed overheads.

Illustration 54

In an Engineering Factory, the following particulars have been extracted for the quarter ended 31st December, 2021. Compute the departmental overheads rate for each of the production departments, assuming that overheads are recovered as a percentage of direct wages.

	Production Departments			Service Departments	
	A	B	C	X	Y
Direct Wages ₹	30,000	45,000	60,000	15,000	30,000
Direct Material ₹	15,000	30,000	30,000	22,500	22,500
No. of workers	1,500	2,250	2,250	750	750
Electricity KWH	6,000	4,500	3,000	1,500	1,500
Assets Value	60,000	40,000	30,000	10,000	10,000
No. of Light points	10	16	4	6	4
Area Sq. Yards	150	250	50	50	50

The expenses for the period were:

	Amount (₹)
Power	1,100
Lighting	200
Stores Overheads	800
Welfare of Staff	3,000
Depreciation	30,000
Repairs	6,000
General Overheads	12,000
Rent and Taxes	550

Apportion the expenses of Service Department Y according to direct wages and those of Service Department X in the ratio of 5 : 3 : 2 to the production departments.

Solution

Statement Showing apportionment of overheads

Particulars	**Basis of Apportionment**	**Total** ₹	**A** ₹	**B** ₹	**C** ₹	**X** ₹	**Y** ₹
Material	Actual	45,000	-	-	-	22,500	22,500
Wages	Actual	45,000	-	-	-	15,000	30,000
Power	KWH (4:3:2:1:1)	1,100	400	300	200	100	100
Lighting	No. of Light Points (5:8:2:3:2)	200	50	80	20	30	20
Stores Overheads	Direct Material (2:4:4:3:3)	800	100	200	200	150	150
Welfare of Staff	No. of workers (2:3:3:1:1)	3,000	600	900	900	300	300
Depreciation	Asset Value (6:4:3:1:1)	30,000	12,000	8,000	6,000	2,000	2,000
Repairs	Asset Value (6:4:3:1:1)	6,000	2,400	1,600	1,200	400	400
General Overheads	Direct Wages (2:3:4:1:2)	12,000	2,000	3,000	4,000	1,000	2,000
Rent and Taxes	Area (3:5:1:1:1)	550	150	250	50	50	50
Total		**1,43,650**	**17,700**	**14,330**	**12,570**	**41,530**	**57,520**
Cost of X	As given 5:3:2		20,765	12,459	8,306	(41,530)	-
Cost of Y	Direct Wages (2:3:4)		12,782	19,173	25,565		(57,520)
Total Overheads of Production Department			51,247	45,962	46,441		

Computation of Overheads Recovery Rate

Production Overheads	Overheads Amount ₹	Wages ₹	Overheads Recovery Rate
A	51,247	30,000	$\frac{51,247}{30,000} \times 100 = 170.82\%$
B	45,962	45,000	$\frac{45,962}{45,000} \times 100 = 102.14\%$
C	46,441	60,000	$\frac{46,441}{60,000} \times 100 = 77.40\%$

Illustration 55

The New Enterprises Ltd has three production departments A, B and C two service departments D and E. The following figures are extracted from the records of the Co.

	Amount (₹)
Rent and Rates	5,000
General Lighting	600
Indirect Wages	1,500
Power	1,500
Depreciation on Machinery	10,000
Sundries	10,000

The following further details are available:

	A	B	C	D	E
Floor Space (Sq. Mts)	2,000	2,500	3,000	2,000	500
Light Points	10	15	20	10	5
Direct Wages	3,000	2,000	3,000	1,500	500
H.P. of machines	60	30	50	10	-
Working hours	6,226	4,028	4,066	-	-
Value of Material	60,000	80,000	1,00,000	-	-
Value of Assets	1,20,000	1,60,000	2,00,000	10,000	10,000

The expenses of D and E are allocated as follows:

	A	B	C	D	E
D	20%	30%	40%	-	10%
E	40%	20%	30%	10%	-

What is the factory cost of an article if its raw material cost is ₹50, labour cost ₹30 and it passes through Departments A, B and C. For 4, 5 and 3 hours respectively.

Solution:

Statement showing apportionment of overheads to departments

Particulars	Basis	Total ₹	Production Department			Service Department	
			A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Wages	Actuals	2,000	-	-	-	1,500	500
Rent and Rates	Floor Space (4:5:6:4:1)	5,000	1,000	1,250	1,500	1,000	250
General Lighting	Light Points (2:3:4:2:1)	600	100	150	200	100	50
Indirect Wages	Direct Wages (6:4:6:3:1)	1,500	450	300	450	225	75
Power	H.P. (6:3:5:1)	1,500	600	300	500	100	-
Depreciation on Machinery	Value of Assets (12:16:20:1:1)	10,000	2,400	3,200	4,000	200	200
Sundries	Direct Wages (6:4:6:3:1)	10,000	3,000	2,000	3,000	1,500	500
Total		**30,600**	**7,550**	**7,200**	**9,650**	**4,625**	**1,575**

Repeated Distribution Method

Particulars	Production Department			Service Department	
	A ₹	B ₹	C ₹	D ₹	E ₹
Total Overheads (As per primary distribution)	7,550	7,200	9,650	4,625	1,575
Cost of Service Department D (2:3:4:1)	925	1388	1,850	(4,625)	462
Cost of Service Department E (4:2:3:1)	815	407	611	204	(2,037)
Cost of Service Department D (2:3:4:1)	41	61	82	(204)	20
Cost of Service Department E (4:2:3:1)	8	4	6	2	(20)
Cost of Service Department D (2:3:4:1)	-	2	-	(2)	-
Total Overheads of Production Department	9,339	9,062	12,199	-	-
Working Hours	6,226	4,028	4,066	-	-
Overheads Recovery Rate per hour	1.50	2.25	3.00	-	-

Computation of Factory Cost of the Article

Particulars	Amount (₹)
Material	50.00
Labour	30.00
Prime Cost	80.00
Add: Overheads (Working hours × Rate per hour)	
Department A = 4 × 1.50	6.00
Department B = 5 × 2.25	11.25
Department C = 3 × 3	9.00
Factory Cost	**106.25**

Simultaneous Equation Method

Let total cost of Service Department D be 'd'

And total cost of Service Department E be 'e'

or, $d = 4{,}625 + \frac{10}{100} e$

or, $100\ d = 4{,}62{,}500 + 10\ e$

or, $100\ d - 10\ e = 4{,}62{,}500$ --------- equation (1)

And $e = 1{,}575 + \frac{10}{100} d$

or, $100\ e = 1{,}57{,}500 + 10\ d$

or, $10\ e - d = 15{,}750$ --------- equation (2)

Adding equation (1) and (2)

or, $100\ d - 10\ e + 10\ e - d = 4{,}62{,}500 + 15{,}750$

or, $99\ d = 4{,}78{,}250$

or, $d = \frac{4{,}78{,}250}{99} = 4{,}831$

Now, putting d = 4,831 in equation (2)

or, $10\ e - 4{,}831 = 15{,}750$

or, $e = \frac{20{,}581}{10} = 2{,}058$

∴ Overheads Cost of Service Department D = ₹ 4,831

And Overheads Cost of Service Department E = ₹ 2,058

Particulars	Production Department			Service Department	
	A (₹)	B (₹)	C (₹)	D (₹)	E (₹)
Total Overheads (As per primary distribution)	7,550	7,200	9,650	4,625	1,575
Cost of D ₹ 4,831 is distributed (2:3:4:1)	966	1,450	1,932	(4,831)	483
Cost of E ₹ 2,058 is distributed (4:2:3:1)	823	412	617	-	(2,058)
Total Overheads of Production Department	9,339	9,062	12,199	-	-
Working Hours	6,226	4,028	4,066	-	-
Overheads Recovery Rate per hour	1.50	2.25	3.00	-	-

Illustration 56

The following information relates to the activities of a production department of factory for a certain period.

	Amount (₹)
Material used	36,000
Direct Wages	30,000
Labour Hours	12,000
Hours of Machinery operation	20,000
Overheads Chargeable to the Department	25,000

On one order carried out in the department during the period the relevant data were:

Material used (₹)	6,000
Direct Wages (₹)	4,950
Labour Hours worked	1,650 Hours
Machine Hours	1,200 Hours

Calculate the overheads chargeable to the job by four commonly used methods.

Solution:

The four commonly used methods of absorbing or recovering overheads are as follows:

1. Percentage of Overheads on Material Cost $= \frac{25,000}{36,000} \times 100 = 69.44\%$

2. Percentage of Overheads on Labour Cost $= \frac{25,000}{30,000} \times 100 = 83^{1}/_{3}\%$

3. Overheads Recovery Rate per Labour Hour $= \frac{₹\ 25,000}{12,000\ \text{Hours}} = ₹\ 2.083$

4. Overheads Recovery Rate per Machine Hour $= \frac{₹\ 25,000}{20,000\ \text{Hours}} = ₹\ 1.25$

The Overheads chargeable to job under the above methods is as follows:

1. Percentage of Overheads on Material Cost	= ₹ 6,000 × 69.44%	= ₹ 4,166.40
2. Percentage of Overheads on Labour Cost	= ₹ 4,950 × $83^{1}/_{3}\%$	= ₹ 4,125
3. Overheads Recovery Rate per Labour Hour	= 1,650 × 2.083	= ₹ 3,437
4. Overheads Recovery Rate per Machine Hour	= 1,200 × 1.25	= ₹ 1,500

Illustration 57

In a machine department of a factory there are five identical machines. From the particulars given below; prepare the machine hour rate for one of the machines.

Space of the department	10,000 Sq. mts.
Space occupied by the machine	2,000 Sq. mts.
Cost of the machine	₹ 20,000
Scrap value of the machine	₹ 300
Estimated life of the machine	13 years
Depreciation charged at	$7^{1}/_{2}\%$ p.a.
Normal running of the machine	2,000 hours
Power consumed by the machine as shown by the meter	₹ 3,000 p.a.

Estimated repairs and maintenance throughout the working life of the machine ₹ 5,200. Sundry supplies including oil, waste etc. charged direct to the machine amount to ₹ 600 p.a.

Other expenses of the department are:

	Amount (₹)
Rent and Rates	9,000
Lighting (to be apportioned according to workers employed)	400
Supervision	1,250
Other charges	5,000

It is ascertained that the degree of supervision required by the machine is $^{2}/_{5}$th and $^{3}/_{5}$th being devoted to other machines.

There are 16 workers in the department of whom 4 attended to the machine and the remaining to the other machines.

Solution:

Computation of Machine Hour Rate

Particulars		Cost per annum Amount (₹)	Total Amount (₹)
Standing Charges			
Rent and Rates	₹ 9,000 ÷ 5	1,800	
Lighting	(4/16) × ₹ 400	100	
Supervision	₹ 1,250 × (2/5)	500	
Other Charges	₹ 5,000 ÷ 5	1,000	
Total Standing Charges			**3,400**
Machine Expenses			
Depreciation	₹ 20,000 × 7.5%	1,500	
Repair Maintenance	₹ 5,200 ÷ 13 years	400	
Sundries		600	
Power		3,000	
Total Machine Expenses			**4,500**
Total Cost p.a.			**8,900**
Machine Hours			2,000
Machine Hour Rate	₹ 8,900 ÷ 2,000		**₹ 4.45 per hour**

Illustration 58

From the following particulars given below compute Machine Hour Rate for a machine.

a) Cost ₹ 24,000

b) Scrap value ₹ 4,000

c) Estimated working life 40,000 hours

d) Estimated cost of repairs and maintenance during the whole life ₹ 2,000

e) Standing charges of the shop for 4 weekly period ₹ 3,000

f) Working hours in 4 weekly period 100 hours

g) No. of machines in the shop each of which is liable for equal charges are 30 machines.

h) Power used per hour 4 units @ 10 paise per unit.

Solution:

Computation of Machine Hour Rate

Particulars		Amount (₹) [Cost per hour]
Standing Charges		
Standing Charges	₹ 3,000 / 100 hours × 30 machines	1.00
Machine Expenses		
Depreciation	₹ 24,000 - ₹ 4,000 / 40,000 Hours	0.50
Repairs and Maintenance	₹ 2,000 / 40,000 Hours	0.05
Power	4 units × ₹ 0.10	0.40
∴ **Machine Hour Rate**		**1.95**

Illustration 59

The following particulars relate to a processing machine treating a typical material. You are required to calculate the machine hour rate.

The cost of the machine	₹ 10,000
Estimated life	10 years
Scrap value	₹ 1,000
Working time (50 weeks of 44 hours each)	2,200 hours
Machine maintenance per annum	200 hours
Setting up time estimated @ 5% of total productive time	
Electricity is 16 units per hour @ 10 paise per unit.	
Chemical required weekly	₹ 20
Maintenance cost per year	₹ 1,200

Two attendants control the operations of the machine together with 6 other machines, their combined weekly wages are ₹ 140. Departmental overheads allocated to this machine per annum ₹ 2,000.

Solution:

Annual working hours = 50 weeks × 44 hours	=	2,200
Less: Maintenance time		200
Production hours		2,000
Less: Setting up time 5% x 2,000		100
Effective hours		1,900

Computation of Machine Hour Rate

Particulars		**Amount (₹)**	**Amount (₹) Rate per hour**
Standing Charges			
Chemical Solution	50 weeks × ₹ 20	1,000	
Attendants Wage	₹140 × 50 × $\frac{1}{7}$	1,000	
Departmental Overheads		2,000	
Total Standing Charges		4,000	
Machine Rate per hour for Standing Charges		= $\frac{₹\ 4,000}{2,200\ \text{Hours}}$	**1.82**
Machine Expenses			
Depreciation	$\frac{₹\ 10,000 - ₹\ 1,000}{10\ \text{years}}$	900	$\frac{₹\ 900}{1,900\ \text{Hours}}$ = **0.47**
Maintenance		1,200	$\frac{₹\ 1,200}{1,900\ \text{Hours}}$ = **0.63**
Power	16 units x ₹ 0.10		1.60
Machine Hour Rate			**4.52**

Illustration 60

Your company uses a historical cost system and applies overheads on the basis of "Predetermined" rates. The following are the figures from the Trial Balance as at 30-09-2021:

	Dr. (₹)	Cr. (₹)
Manufacturing overheads	4,26,544	-
Manufacturing overheads applied	-	3,65,904
Work-in-progress	1,41,480	-
Finished Goods Stock	2,30,732	-
Cost of Goods Sold	8,40,588	-

Give two methods for the disposal of the under absorbed overheads and show the profit implications of the method.

Solution:

	₹
Overheads Incurred	4,26,544
Less: Overheads Absorbed	3,65,904
Under Absorption	60,640

The following are the three methods for disposing off this under absorbed overheads:

1. Transferring to the Costing Profit and Loss Account. Under this method, the profit will decrease by ₹ 60,640.
2. The amount may be disposed off by carrying forward to the next year. In this case, there will be no effect on profit.

3. Applying supplementary overheads rate.

$\therefore$ Supplementary Overheads Rate = $\frac{₹\ 60,640}{₹\ 12,12,800}$ = **₹ 0.05**

Particulars	Existing Value ₹	Additional Overheads Absorbed ₹	New Value ₹
Working in Progress	1,41,480	0.05 x 1,41,480 = 7,074	1,48,554
Finished Goods	2,30,732	0.05 x 2,30,732 = 11,537	2,42,269
Cost of Goods Sold	8,40,588	0.05 x 8,40,588 = 42,029	8,82,617
Total	**12,12,800**	**60,640**	**12,73,440**

Illustration 61

In a factory the expenses of factory are charged on a fixed percentage basis on wages and office overheads expenses are calculated on the basis of percentage of works cost.

	Order I (₹)	Order II (₹)
Material	12,500	18,000
Wages	10,000	14,000
Selling price	44,850	61,880
Percentage of profit on cost	15%	12%

Find the rate of Factory Overheads and Office Overheads.

Solution:

Let X be the percentage of works overheads on wages, and

Y be the percentage of office overheads on works cost

Particulars	Order I ₹	Order II ₹
Material	12,500	18,000
Add: Wages	10,000	14,000
Prime Cost	22,500	32,000
Add: Works Overheads	$\frac{X}{100}$ ×10,000 =100X	$\frac{X}{100}$ × 14,000 = 140X
Works Cost	22,500 + 100X	32,000 + 140X
Add: Office Overheads	$\frac{Y}{100}$ × (22,500+100X) = 225Y+XY	$\frac{Y}{100}$ × (32,000+140X)=320Y+1.40XY
Total Cost	22,500 + 100X + 225Y + XY	32,000 + 140X + 320Y + 1.40XY
Total Cost (WN)	39,000	55,250

So, $22,500 + 100X + 225Y + XY = 39,000$

or, $100X + 225Y + XY = 16,500$ ---------- equation (1)

And $32,000 + 140X + 320Y + 1.40XY = 55,250$

or, $140X + 320Y + 1.40XY = 23,250$ --------equation (2)

equation (1) x 1.40 $\Rightarrow 140X + 315Y + 1.40XY = 23,100$

Less: equation (2) $\Rightarrow \underline{140X + 320Y + 1.40XY = 23,250}$

$-5Y = -150$

or, $Y = 30$

Now, putting the value of Y = 30 in equation (1)

We have, 100X + 225 x 30 + 30X = 16,500

or, 130X = 16,500 - 6,750

or, X = 75

Hence, Percentage of Works Overheads on Wages = 75%

And Percentage of Office Overheads on Works Cost = 30%

Working Notes

1. Calculation of Total Cost for Order I

   Total Cost + Profit = Sales

   or, Total Cost + 15% Total Cost = 44,850

   or, Total Cost = $44,850 \times \frac{100}{115}$ = ₹ 39,000

2. Calculation of Total Cost for Order II

   Total Cost = $61,880 \times \frac{100}{112}$ = ₹ 55,250

Illustration 62

Self-help Ltd gensets and produced its own power Data for power costs are as follows:

	Production Departments		Service Departments	
	A	B	X	Y
Horse Power Hours	10,000	20,000	12,000	8,000
Needed at capacity production used during the month of May	8,000	13,000	7,000	6,000

During the month of May costs for generating power amounted to ₹ 9,300, of this ₹ 2,500 was considered to be fixed. Department X renders service to other Departments in the ratio of 13 : 6 : 1, while Y renders service to A and B in the ratio of 31 : 3. Given that the direct labour hours in Departments A and B are 1,650 hours and 2,175 hours respectively, find the power cost per labour in each of these two departments.

Solution:

Statement Showing apportionment of power cost and computation of cost per hour

Particulars	Basis	Total ₹	A ₹	B ₹	X ₹	Y ₹
Fixed Cost	H P Hours (5:10:6:4)	2,500	500	1,000	600	400
Variable Cost (9,300 – 2,500)	Actual Consumption (8:13:7:6)	6,800	1,600	2,600	1,400	1,200
		9,300	2,100	3,600	2,000	1,600
Cost of X distributed	(13:6:1)		1,300	600	(2,000)	100
Cost of Y distributed	(31:3)		1,550	150	-	(1,700)
Total Power Cost			4,950	4,350	-	-
Labour Hours			1,650	2,175	-	-
Cost of Power per Labour Hour			3	2		

Illustration 63

AT Ltd engineering Co. having 25 different types of automatic machines, furnishes you the following data for 2021-22 in respect of machine B:

1. Cost of the machine ₹ 50,000
   Life – 10 years Scrap value is Nil
2. Overheads expenses are:
   Factory Rent ₹ 50,000 p.a.
   Heating and Lighting ₹ 40,000 p.a.
   Supervision ₹ 1,50,000 p.a.
   Reserve Equipment of Machine B ₹ 5,000 p.a.
   Area of the Factory 80,000 sq. ft.
   Area occupied by Machine B 3,000 sq. ft.
3. Wages of operator is ₹ 24 per day of 8 hours including all fringe benefits. He attends to one machine when it is under set up and two machines while under operation.
4. Estimated production hours 3,600 p.a.
   Estimated setup time 400 hours p.a.
   Power ₹ 0.50 per hour

Prepare a schedule of comprehensive machine hour rate and find the cost of the following jobs:

	Job 1102	Job 1308
Setup time (Hours)	80	40
Operation time (Hours)	130	160

Solution:

Computation of machine hour rate when machine is in operation

Particulars		**Amount (₹)**	**Amount (₹)**
Standing Charges			
Rent	$50,000 \times \frac{3}{80}$	1,875	
Heating and Lighting	$40,000 \times \frac{3}{80}$	1,500	
Supervision	$1,50,000 \times \frac{1}{25}$	6,000	
Reserve Equipment		5,000	
Total Standing Charges		14,375	
Standing Cost per hour	$\frac{14,375}{4,000}$		**3.59**
Machine Expenses:			
Depreciation	$\frac{₹\ 50,000}{10 \text{ years} \times 3,600 \text{ hours}}$	1.39	
Wages	$\frac{24}{8} \times \frac{1}{2}$	1.50	
Power		0.50	
Machine Cost per hour			**3.39**
Machine Hour Rate when in Operation			**6.98**

Computation of machine hour rate when machine is under setup

Particulars		**Amount (₹)**	**Amount (₹)**
Standing Charges			
Rent	$50,000 \times \frac{3}{80}$	1,875	
Heating and Lighting	$40,000 \times \frac{3}{80}$	1,500	
Supervision	$1,50,000 \times \frac{1}{25}$	6,000	
Reserve Equipment		5,000	
Total Standing Charges		14,375	
Standing Cost per hour	$\frac{14,375}{4,000}$		**3.59**
Machine Expenses:			
Depreciation	$\frac{₹\ 50,000}{10 \text{ years} \times 3,600 \text{ hours}}$	1.39	
Wages	$\frac{24}{8}$	3.00	
Machine Cost per hour			**4.39**
Machine Hour Rate when under setup			**7.98**

Computation of cost of the jobs

Particulars	Job 1102		Job 1308	
		₹		₹
Setup Cost	80 x 7.98	638.40	40 x 7.98	319.20
Operation Cost	130 x 6.98	907.40	160 x 6.98	1,116.80
Total Cost of the Job		**1,545.80**		**1,436.00**

Illustration 64

Ganges Printing Co. has three operating departments:

1. Printing and Binding
2. Lithographing and
3. Engraving

The company has a job order cost system using a single predetermined expense rate. The management has been made aware of the deficiencies of using such a rate and is now interested in departmentalizing factory overheads. A study reveals that:

Department 1 has 3 similar machines representing a large investment and calling for high repairs and depreciation charges.

Department 2 has the workers perform similar tasks and are therefore paid the same hourly wage.

Department 3 however has several classes of workers; each group being paid the same hourly wage.

The estimated factory overheads and production data costs are as follows:

	Printing and Binding	Lithographing	Engraving
Factory Overheads (₹)	40,000	68,750	1,20,000
Direct Labour Hours	10,000	20,000	40,000
Direct Labour Cost (₹)	25,000	55,000	80,000
Machine Hours	20,000	Nil	Nil

Required:

1) An analysis to advice the management regarding the types of rates to be used in these departments.

2) A computation of the rates recommended.

Solution:

1. **Printing and Binding Department**

   It is appropriate to use machine hour rate method of absorbing overheads in Department 1 because there is large investment in machine and therefore, they are predominant

   $$\text{Overheads Rate Per Machine Hour} = \frac{\text{Factory Overhead}}{\text{Machine hours}} = \frac{₹\ 40{,}000}{20{,}000\ \text{hours}} = ₹\ 2 \text{ per machine hour}$$

2. **Lithographing Department**

   In Department 2, it is better and appropriate to use labour hour rate of overheads because all the workers are

paid at uniform wage rate.

Overheads Rate Per Labour Hour = $\frac{\text{Factory Overhead}}{\text{Labour hours}} = \frac{₹\ 68,750}{20,000\ \text{hours}} = ₹\ 3.4375$ per labour hour

3. **Engraving Department**

In Department 3 it is better and appropriate to use overheads rate based on certain percentage of wages because workers are paid at different rates.

Overheads Percentage on Wages = $\frac{\text{Factory Overhead}}{\text{Wages}} \times 100 = \frac{₹\ 1,20,000}{₹\ 80,000} \times 100 = 150\%$

Illustration 65

For a department the standard overheads rate is ₹ 2.50 per hour and the overheads allowances are as follows:

Activity Level (Hours)	Budgeted Overheads Allowance (₹)
3,000	10,000
7,000	18,000
11,000	26,000

Calculate:

a) Fixed Cost

b) The standard activity level on the basis of which the standard overheads rate has been worked out.

Solution:

a) Variable Cost per hour = $\frac{\text{Difference in Total Overhead}}{\text{Difference in Activity Level}} = \frac{₹\ 18,000 - ₹\ 10,000}{7,000\ \text{hrs} - 3,000\ \text{hrs}} = \frac{₹\ 8,000}{4,000\ \text{hrs}} = ₹\ 2$ per hour

Fixed Overheads = Total Overheads – Variable Overheads

= ₹ 10,000 – 3,000 hrs x ₹ 2 per hour = ₹ 10,000 - ₹ 6,000 = ₹ 4,000

Alternatively

Let Variable Overheads rate be ₹ x

and Fixed Overheads be ₹ y

So, $3,000x + y = 10,000$ ------ equation (i)

And, $7,000x + y = 18,000$ ------ equation (ii)

Equation (ii) – Equation (i)

$\Rightarrow (7,000x + y) - (3,000x + y) = 18,000 - 10,000$

$\Rightarrow 4,000x = 8,000$

or, $x = \frac{8,000}{4,000} = 2$

putting $x = 2$ in equation (i)

$\Rightarrow y = 10,000 - 6,000 = 4,000$

$\therefore$ Variable Overheads per hour = ₹ 2 per hour

Fixed Overheads = ₹ 4,000

b) Overheads Rate Per Hour = ₹ 2.5 (Given)

$$\text{or, } = \frac{\text{Standard Activity Level} \times \text{Variable Overhead rate per hour} + \text{Fixed Overhead}}{\text{Standard Activity Level}} = 2.5$$

or, Standard Activity Level × 2 + 4,000 = 2.5 Standard Activity level

$$\text{or, Standard Activity Level} = \frac{4{,}000}{2.5 - 2} = 8{,}000$$

∴ Standard Activity Level = 8,000 hours

Illustration 66

In a certain factory three products are made from different materials by similar process. For a typical period, production costs are as under:

	Product A ₹	Product B ₹	Product C ₹
Material Used	1,600	2,000	800
Direct Labour Cost	1,200	1,000	400
Overheads (Actual)	800	650	350

Overheads is charged to cost of each product at the rate of 25% on prime cost.

Do you see anything wrong in principle in this method of charging overheads? If so, suggest a preferable method.

Solution:

Since, different materials are used for producing products, it is advisable, preferable and appropriate to use the method of absorbing overheads based on percentage of material cost instead of percentage on prime cost which is shown as follows:

Particulars	Product A ₹	Product B ₹	Product C ₹
Materials	1,600	2,000	800
Labour	1,200	1,000	400
Prime Cost	2,800	3,000	1,200
Actual Overheads Incurred	800	650	350
Overheads Recovery Rate is calculated based on historical data. So, actual overheads is used to calculate the future recovery rate	$= \frac{₹\ 800}{₹\ 1{,}600} \times 100$ = 50%	$= \frac{₹\ 650}{₹\ 2{,}000} \times 100$ = 32.50%	$= \frac{₹\ 350}{₹\ 800} \times 100$ = 43.75%

Illustration 67

A company produced a simple product in three sizes A, B and C. Prepare a statement showing the selling and distribution expenses apportioned over these three sizes applying the appropriate basis for such apportionment in each case from the particulars indicated:

Express the total of the costs so apportioned to each size as:

a) Cost per unit sold (nearest paise)

b) A percentage of sales turnover (nearest to two places for decimal)

The expenses are:

Expenses	Amount (₹)	Basis of apportionment
Salesman Salaries	10,000	Direct charge
Sales Commission	6,000	Sales turnover
Sales office expenses	2,096	Number of orders
Advertisement General	5,000	Sales turnover
Advertisement Specific	22,000	Direct charge
Packing	3,000	Total volume cu. ft. product sold
Delivery expenditure	4,000	Total volume cu. ft. product sold
Warehouse expenses	1,000	Total volume cu. ft. product sold
Expenses credit collection	1,296	Number of orders

Data available relating to the three sizes are as follows:

	Total	Size A	Size B	Size C
1. No. of salesmen, all paid same salary	10	4	5	1
2. Units sold	10,400	3,400	4,000	3,000
3. No. of orders	1,600	700	800	100
4. % of specific advertisement	100%	30%	40%	30%
5. Sales turnover	2,00,000	58,000	80,000	62,000
6. Volume of cu. ft. per unit of finished products	-	5	8	17

Solution:

Statement Showing apportionment of selling expenses over the sizes and computation of cost per unit and percentage on sales:

Particulars	Basis of apportionment	Total ₹	A ₹	B ₹	C ₹
Salesman Salaries	Direct charge (4:5:1)	10,000	4,000	5,000	1,000
Sales Commission	Sales turnover (29:40:31)	6,000	1,740	2,400	1,860
Sales office expenses	Number of orders (7:8:1)	2,096	917	1,048	131
Advertisement General	Sales turnover. (29:40:31)	5,000	1,450	2,000	1,550
Advertisement Specific	Direct charge (% of specific advertisement) (3:4:3)	22,000	6,600	8,800	6,600
Packing	Total volume cu. ft. product sold (WN 1) (17:32:51)	3,000	510	960	1,530

Delivery expenditure	Total volume cu. ft. product sold (17:32:51)	4,000	680	1,280	2,040
Warehouse expenses	Total volume cu. ft. product sold (17:32:51)	1,000	170	320	510
Expenses credit collection	Number of orders (7:8:1)	1,296	567	648	81
Total Selling Expenses		54,392	16,634	22,456	15,302
Cost p.u.			$=\frac{16,634}{3,400}$ = ₹ 4.89	$=\frac{22,456}{4,000}$ = ₹ 5.61	$=\frac{15,302}{3,000}$ = ₹ 5.10
Percentage of Selling Expenses on Sales			$=\frac{16,634}{58,000}\times100$ = 28.67%	$=\frac{22,456}{80,000}\times100$ = 28.07%	$=\frac{15,302}{62,000}\times100$ = 24.69%

Working Note: 1.

Particulars	A	B	C
Volume of cu. ft. per unit of finished products	5	8	17
Units Sold	3,400	4,000	3,000
Total Volume of cu. ft	17,000	32,000	51,000

Illustration 68

For a production department of a manufacturing company, you are required to:

a) Prepare a fixed budget of overheads

b) Prepare a flexible budget of overheads, at 70% and 110% of budget volume;

c) Calculate a departmental hourly rate of overheads absorption as per (a) and (b) above.

The budgeted level of activity of the department is 5,000 hours per period and the study of the various items of expenditure reveals the following:

Particulars	Particulars	Amount (₹)	₹ per hour
Indirect wages			0.40
Repairs	upto 2,000 hours	100	
	for each additional 500 hours upto a total of 4,000 hours	35	
	additional from 4,001 to 5,000 hours	60	
	additional above 5,000 hours	70	
Rent and Rates		350	
Power	upto 3,600 hours		0.25
	for hours above 3,600		0.20

Consumable supplies			0.24
Supervision	upto 2,500 hours	400	
	additional for each extra 600 hours above 2,500 and upto 4,900 hours	100	
	additional above 4,900 hours	150	
Depreciation	upto 5,000 hours	650	
	above 5,000 hours and upto 6,500 hours	820	
Cleaning	upto 4,000 hours	60	
	above 4,000 hours	80	
Heat and Lighting	from 2,100 hours to 3,500 hours	120	
	from 3,500 hours to 5,000 hours	150	
	above 5,000 hours	175	

Solution:

Fixed and Flexible Budget showing overheads cost per hour

Particulars	At 70% Capacity 5,000 x 70% = 3,500 hours		At 100% Capacity 5,000 hours		At 110% Capacity 5,000 x 110% = 5,500 hours	
		₹		₹		₹
Indirect Wages	0.40x3,500	1,400	0.40 x 5,000	2,000	0.40 x 5,500	2,200
Repairs	100+35x3	205	100 + 35 x 4 + 60	300	100 + 35 x 4 + 60 + 70	370
Rent and Rate		350		350		350
Power	0.25x3,500	875	0.25x3,600+0.20x1,400	1,180	0.25x3,600+0.20x1,900	1,280
Consumable Supplies	0.24x3,500	840	0.24 x 5,000	1,200	0.24 x 5,500	1,320
Supervision	400+100x2	600	400 + 100 x 4 + 150	950	400 + 100 x 4 + 150	950
Depreciation		650		650		820
Cleaning		60		80		80
Heating and Lighting		120		150		175
Total Overheads		5,100		6,860		7,545
Overheads Rate per hour	₹ 5,100 / 3,500	**1.457**	₹ 6,860 / 5,000	**1.372**	₹ 7,545 / 5,500	**1.372**

If under absorbed overheads is 10% or more of actual overheads incurred then supplementary overheads rate is applied otherwise the balance amount can be charged to Profit and Loss Account or can be carried forward to next year.

Illustration 69

In a manufacturing unit, overheads was recovered at a predetermined rate of ₹ 25 per man-day. The total factory overheads incurred and the man-days actually worked were ₹ 41,50,000 and 1,50,000 respectively. Out of the 40,000 units produced during a period of 30,000 units were sold. There were also 30,000 uncompleted units which may be reckoned at 66.67% complete.

On analysing the reasons, it was found that 40% of the unabsorbed overheads were due to defective planning and the rest were attributable to increase overhead costs.

How would unabsorbed overheads be treated in Cost Accounts?

Solution:

		Amount (₹)
Overheads Incurred		41,50,000
Less: Overheads Absorbed	25 x 1,50,000	37,50,000
Under Absorption		4,00,000

The under absorption of ₹ 4,00,000 being considerable whether due to defective planning or due to increase in prices, would be disposed off by applying supplementary overheads rate in the following manner

Supplementary Overheads Rate $= \dfrac{₹\ 4,00,000}{30,000 + 10,000 + 30,000 \times \frac{2}{3}} = \dfrac{₹\ 4,00,000}{60,000 \text{ units}} = \dfrac{₹\ 20}{3}$ per unit

Finished Goods Sold = 30,000 units

Closing Stock of Finished Goods = 10,000 units

Work in Progress = 30,000 units; equivalent finished goods = $30,000 \times \frac{2}{3}$ = 20,000 units

So, under absorbed overheads will be absorbed by

Cost of Goods Sold = $30,000 \times \frac{20}{3}$ = ₹ 2,00,000

Closing Stock of Finished Goods = $10,000 \times \frac{20}{3}$ = ₹ 66,667

Work in Progress = $20,000 \times \frac{20}{3}$ = ₹ 1,33,333

Total = ₹ 4,00,000

Exercise

A. Theoretical Questions:

Multiple Choice Questions

1. Which of the following is considered as normal loss of material?
   a. Pilferage
   b. Loss due to accident
   c. Loss due to careless handling of material
   d. None of these

2. The most important element of cost is
   a. Material
   b. Labour
   c. Overheads
   d. All of these

3. Direct Material is a
   a. Administration Cost
   b. Selling and Distribution Cost
   c. All of these
   d. None of these

4. Which of the following is considered as accounting record?
   a. Bind Card
   b. Bill of Material
   c. Store Ledger
   d. None of these

5. Direct Material can be classified as
   a. Fixed Cost
   b. Semi-Variable Cost
   c. Variable Cost
   d. Prime Cost

6. In which of the following methods of pricing, costs lag behind the current economic values?
   a. Replacement price method
   b. Last in first out price method
   c. First in first out price method
   d. Weighted average price method

7. In which of the following methods, issues of materials are priced at pre-determined rate?
   a. Replacement price method
   b. Inflated price method
   c. Specific price method
   d. Standard price method

8. Which of the following methods smoothes out the effect of fluctuations when material prices fluctuate widely?
   a. FIFO
   b. Simple Average
   c. LIFO
   d. Weighted average

9. In which of the following incentive plan of payment, wages on time basis are not Guaranteed?
   a. Halsey Plan
   b. Rowan Plan
   c. Taylor's differential piece rate system
   d. Gantt's task and bonus system

10. Cost of idle time arising due to non availability of raw material is
   a. Charged to costing profit and loss account
   b. Charged to factory overheads
   c. Recovered by inflating the wage rate
   d. Ignored

11. When overtime is required for meeting urgent order, overtime premium should be
   a. Charged to costing profit and loss account
   b. Charged to overheads costs
   c. Charged to respective jobs
   d. Ignored

12. Labour turnover is measured by
   a. Number of workers replaced / average number of workers
   b. Number of workers left / number in the beginning plus number at the end
   c. Number of workers joining / number in the beginning of the period
   d. All of these

13. Idle time is
    a. Time spent by workers in factory
    b. Time spent by workers in office
    c. Time spent by workers off their work
    d. Time spent by workers on their job

14. Overtime is
    a. Actual hours being more than normal time
    b. Actual hours being more than standard time
    c. Standard hours being more than actual hours
    d. Actual hours being less than standard time

15. Labour productivity is measured by comparing
    a. Total output with total man-hours
    b. Added value for the product with total wage cost
    c. Actual time and standard time
    d. All of the above

16. 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. Equal wages under two plans
    b. More wages to workers under Halsey Plan than Rowan Plan
    c. More wages to workers under Rowan Plan than Halsey Plan
    d. None of the above

17. Under Taylor's differential piece rate scheme, if a worker fails to complete the task within the standard time, then he is paid
    a. 83% of the piece work rate
    b. 175% of the piece work rate
    c. 67% of the piece work rate
    d. 125% of the piece work rate

18. Direct Expenses _____ includes imputed cost.
    a. Shall
    b. Shall not
    c. Shall be
    d. None of these

19. Direct expenses do not meet the test of materiality can be _____ part of overheads.
    a. Treated
    b. Not treated
    c. All of these
    d. None of these

20. Example of Direct Expenses.
    a. Rent
    b. Royalty charged on production
    c. Bonus to employee
    d. None of these

21. The allotment of whole items of cost of centres or cost unit is called
    a. Cost Allocation
    b. Cost Apportionment
    c. Overheads Absorption
    d. None of the above

22. The allotment of whole items of cost of centres or cost unit is called
    A. Cost Allocation
    B. Cost Apportionment
    C. Overheads Absorption
    D. None of the above

23. Packing cost is a
    A. Production Cost
    B. Selling Cost
    C. Distribution Cost
    D. It may be any of the above

24. Directors' remuneration and expenses form a part of
    A. Production Overheads
    B. Administration Overheads
    C. Selling Overheads
    D. Distribution Overheads

25. Charging to a cost centre those overheads that result solely for the existence of that cost centre is known as

    A. Allocation

    B. Apportionment

    C. Absorption

    D. Allotment

26. Absorption means

    A. Charging of overheads to cost centres

    B. Charging of overheads to cost units

    C. Charging of overheads to cost centres or cost units

    D. None of the above

27. Which method of absorption of factory overheads do you suggest in a concern which produces only one uniform type of product?

    A. Percentage of direct wages basis

    B. Direct labour rate

    C. Machine hour rate

    D. A rate per units of output

28. When the amount of under or over absorption is significant, it should be disposed of by

    A. Transferring to costing profit and loss account

    B. The use of supplementary rates

    C. Carrying over as a deferred charge to the next accounting year

    D. None of the above

29. When the amount of overheads absorbed is less than the amount of overheads incurred, it is called

    A. Under absorption of overheads

    B. Over absorption of overheads

    C. Proper absorption of overheads

    D. None of the above

30. Warehouse expense is an example of

    A. Production overheads

    B. Selling overheads

    C. Distribution overheads

    D. None of the above

31. Selling and Distribution overheads are absorbed on the basis of

    A. Rate per unit

    B. Percentage on works cost

    C. Percentage on selling price of each unit

    D. Any of these

32. Primary packing cost is a part of

    A. Direct material cost

    B. Distribution overheads

    C. Selling overheads

    D. Production cost

33. Chairman's remuneration and expenses form part of

    A. Administration overheads

    B. Production overheads

    C. Distribution overheads

    D. Selling overheads

34. Normal capacity of a plant refers to the difference between:

    A. Maximum capacity and practical capacity

    B. Maximum capacity and actual capacity

    C. Practical capacity and estimated idle capacity as revealed by long term sales trend

    D. Practical capacity and normal capacity

35. Find out from the following scientific and accurate method of factory overheads absorption:

    A. Percentage of prime cost method

    B. Machine hour rate method

    C. Percentage of direct material cost method

    D. Percentage of direct labour cost method

Answer:

1	C	2	A	3	D	4	C	5	C	6	C	7	D	8	D
9	C	10	A	11	B	12	A	13	C	14	A	15	D	16	C
17	A	18	B	19	A	20	B	21	A	22	A	23	D	24	B
25	A	26	B	27	D	28	B	29	A	30	C	31	D	32	D
33	A	34	C	35	B										

⊙ **State True or False:**

1. Perpetual inventory system enables management to ascertain stock at any time without physical inventory being taken.
2. Continuous stock taking is not an essential feature to the perpetual inventory system.
3. Stores ledger is maintained in the stores department.
4. Purchase requisition is usually prepared by the storekeeper.
5. In centralized purchasing all purchases are made by the purchasing department.
6. Weighted average method of pricing issue of materials involves adding all the different prices and dividing by the number of such prices.
7. Material returned note is prepared to keep a record of return of surplus materials to stores.
8. Waste and Scrap of material have small realization value.
9. Bin card are not the part of accounting records.
10. Store Ledger is maintained inside the stores of store keeper.
11. Direct employee cost shall be presented as a separate cost head in the financial statement.
12. As per the Payment of Bonus Act, 1965 the maximum limit of bonus is 20% of gross earning.
13. Flux method means for measurement of labour turnover
14. Is overtime premium is directly assigned to cost object?
15. Time recording clocks can be successfully used for recording time of workers in large undertakings.
16. Idle time arises only when workers are paid on time basis.
17. Personnel department is concerned with proper recruitment, placement and training of workers.
18. Wages paid for abnormal idle time are added to wages for calculating prime cost.
19. The two principal systems of wage payment are payment on the basis of time and payment on the basis of work done.
20. The piece rate system of wage payment cannot be successfully applied where quantity of output can be measured.
21. If an expense can be identified with a specific cost unit, it is treated as direct expense.
22. Travelling expenses to site is a direct expense.
23. Identification of direct expenses shall be based on traceability in an economically feasible manner.
24. CAS – 9 is for Direct Expenses as issued by the cost accounting standard board (CASB) of the Institute of Cost Accountants of India

25. Finance cost shall form part of direct expenses.
26. Departments that assist producing department indirectly are called service departments.
27. Factory overheads cost applied to a job is usually based on a predetermined rate.
28. When actual overheads are more than absorbed overheads, it is known as over absorption.
29. A blanket overheads rate is a single overheads rate computed for the entire factory.
30. Under absorption of overheads means that actual overheads are more than absorbed overheads
31. Variable overheads varies with time.
32. Cash discounts are generally excluded completely from the costs.
33. Cost of indirect materials is apportioned to various departments.
34. The principal base used for applying factory overheads are: units of production, material cost, direct wages, direct labour hours and machine hours.
35. Allocation for overheads implies the identification of overheads cost centres to which they relate.

Answer:

1	T	2	F	3	F	4	T	5	T	6	F	7	T	8	F
9	T	10	F	11	F	12	T	13	T	14	T	15	T	16	T
17	T	18	T	19	T	20	F	21	T	22	T	23	T	24	F
25	F	26	T	27	T	28	F	29	T	30	T	31	F	32	T
33	F	34	T	35	T										

⊙ **Fill in the Blanks:**

1. In _____ systems, two piece rates are set for each job.
2. In Halsey plan, a worker gets bonus equal to _____ of the time saved.
3. Under Gantt Task and Bonus Plan, no bonus is payable to a worker, if his efficiency is less than _____.
4. Cost of normal idle time is charged to _____.
5. Idle time arises only when workers are paid on _____ basis.
6. Direct Expenses relating to _____ or _____.
7. Penalties / damages paid to statutory authorities be form part of direct expenses.
8. A direct expense related to a _____ form part of Prime Cost.
9. Direct expenses incurred for bought out resources shall be determined at _____.

10. Direct expenses incurred lump – sum shall be _____.
11. Example of after sales service are _____ and _____.
12. The difference between actual and absorbed factory overheads is called _____.
13. The difference between practical capacity and the capacity based on sales expectancy is known as _____.
14. Under or over absorption of overheads arises only when overheads are absorbed by _____.
15. In Absorption Costing _____ cost is added to inventory.
16. Overheads are an aggregate of _____ and _____ and _____.
17. Example of after sales service are _____ and _____.
18. Administration overheads are usually absorbed as a percentage of _____.
19. The difference between actual and absorbed factory overheads is called _____.
20. The term used for charging of overheads to cost units is known as _____.
21. The _____ rate is computed by dividing the overheads by the aggregate of the productive hours of direct workers.
22. Overheads incurred ₹ 16,000 and overheads absorbed ₹ 15,300. There is under absorption of ₹ _____.

Answer:

1	Taylor's differential piece rate	2	50%
3	100%	4	factory overheads
5	time	6	Manufacture of a product or rendering of service
7	Shall not	8	Product
9	Invoice Price	10	Amortized
11	Repair and Maintenance, Replacement of Components.	12	Under or over absorbed overheads.
13	Idle Capacity	14	Predetermined overheads rates
15	Fixed	16	Indirect Material, Indirect Labour, Indirect Expense
17	Repair and Maintenance, Replacement of Components	18	Works Cost
19	Under or over absorbed overheads	20	Absorptions
21	Direct Labour Hour	22	700

Essay Type Questions

1. What is the prime objective of material control? It is said that in any system of material control there are always two counteracting or opposing factors. What are these and why do these factors arise?
2. "The Perpetual Inventory System is an integral part of material control". Discuss this statement by bringing out briefly the salient features and the advantages of this system.
4. What is Economic Order Quantity? How it is calculated?
5. What is meant by Bill of Materials? When will you recommend drawal of stores under Bill of Material as opposed to individual requisition?
6. What are the stores that normally come under "Packing Materials"? what are the major classifications of packing expenses and how they are treated in cost?
7. How would you deal with the following in Cost Accounts?
   a. Packing Cost
   b. Cost of Tools
8. Write short notes on the following:
   a. ABC analysis
   b. VED analysis
   c. Treatment of Scrap in costing
   d. Valuation of Work in Progress
   e. Moving Average Price Method of material issue valuation
   f. Just in time
   g. Bin Card vs Stores Ledger
   h. Principles of valuation of receipt of material as per CAS – 6
   i. Re-order Level
   j. Maximum Stock Level
   k. Minimum Stock Level
9. How normal and abnormal loss of material are treated in Cost Accounts?
10. What are the causes of Labour Turnover? Suggest remedial measures to reduce the Labour Turnover?
11. How do you treat idle time in Cost Accounts as per CAS – 7?
12. How do you treat overtime in Cost Accounts?
13. What are the various wage payment methods?

14. How do you treat the following in Cost Accounts?
    a. Supervisor's salary
    b. Night shift allowance
    c. Lost time due to major hauling
15. Write short notes on:
    a. Time and Motion Study
    b. Works Study and Works Measurement
    c. Job Evaluation
    d. Merit Rating
    e. Straight Piece Rate vs Differential Piece Rate
    f. Halsey Plan
    g. Rowan Plan
    h. Guidelines for ascertaining the Labour Cost as per CAS – 7
16. Discuss the means to measure employee efficiency.
17. "High wages do not necessarily mean high Labour Cost". Comment.
18. Write a short note on Direct Expenses.
19. What are the disclosure requirements as per CAS – 10?
20. List down the principle of measurement of Direct Expenses?
21. What is meant by classification of overheads and why it should be attempted?
22. What do you understand by Semi-Variable Overheads? Explain the various methods of segregating Fixed and Variable Overhead Costs.
23. Define Cost Allocation and Cost Apportionment. Explain fully the distinction between Cost Allocation and Cost Apportionment.
24. How are the following items treated in Cost Accounts?
    a. Defectives due to bad workmanship and bad materials.
    b. Major repairs of a plant to prolong its useful life.
    c. Labour amenities.
    d. ESI contribution.
    e. Fringe benefits to workers.

f. After sales service cost.

g. Losses due to obsolescence.

h. Lay off wages paid to workers.

25. As a Cost Accountant explain with reasons how would you treat the following items in Cost Accounts:

    a. Bonus payable under the Payment of Bonus Act, 1965.

    b. Bad Debts.

    c. Leave Travel Assistance.

    d. Night Shift Allowance.

26. Explain the terms "Practical Capacity", "Normal Capacity", "Idle Capacity", and "Imbalanced Capacity". With reference to any industry with which you are familiar, how will you measure the effect of idle capacity?

27. What is Under or Over Absorption? What are the causes for Under or Over Absorption?

28. Explain the nature of administration overheads? How they are apportioned?

29. Distinguish between cost allocation and cost absorption.

30. Discuss the methods of re-appointment of service department expenses over the production departments.

31. What is meant by classification of overheads and why it should be attempted?

32. What do you understand by Semi-Variable Overheads? Explain the various methods of segregating Fixed and Variable Overheads Costs.

33. What are the main sources of overheads expenses? State with examples the procedure for such collection from these sources.

34. Define Cost Allocation and Cost Apportionment. Explain fully the distinction between Cost Allocation and Cost Apportionment.

35. Explain the various basis of apportionment of overheads to departments with illustrations as to the items of expenses.

36. Briefly describe two ways of dealing with the problem of apportioning service department costs among service departments which, in addition to do work for the main operational departments, also serve one another.

37. How are the following items treated in Cost Accounts?

    a) Defectives due to bad workmanship and bad materials.

    b) Major repairs of a plant to prolong its useful life.

    c) Labour amenities.

    d) ESI contribution.

    e) Fringe benefits to workers.

f) After sales service cost.

g) Losses due to obsolescence.

h) Lay off wages paid to workers.

38. As a Cost Accountant explain with reasons how would you treat the following items in Cost Accounts:

a) Bonus payable under the Payment of Bonus Act, 1965.

b) Bad Debts.

c) Leave Travel Assistance.

d) Night Shift Allowance.

39. Explain the terms "Practical Capacity", "Normal Capacity", "Idle Capacity", and "Imbalanced Capacity". With reference to any industry with which you are familiar, how will you measure the effect of idle capacity?

40. What is Absorption? What are the various methods of absorbing overheads in Cost Accounts?

41. What is Under or Over Absorption? What are the causes for Under or Over Absorption?

42. What are the various methods of disposing off under or over absorbed overheads?

43. Write a note on Supplementary Overheads Rate.

44. How to report overheads cost in the cost statement?

45. Explain the nature of administration overheads? How they are apportioned?

46. On what basis would you analyse selling overheads for the purpose of judging the effectiveness of these expenses?

47. "While manufacturing overheads are part of costs, selling overheads are result of policy". Comment.

48. "Management's interest in overheads is not in the method of their absorption but in their behaviour under various conditions of production". As a CMA please throw light on the above statement.

49. Distinguish between cost allocation and cost absorption.

50. Discuss the methods of re-appointment of service department expenses over the production departments.

B. Numerical Questions

⊙ Comprehensive Numerical Problems

1. Your factory buys and use a component for production at ₹ 10 per unit. Annual requirement is 2,000 units. Carrying cost of inventory is 10% p.a. and ordering cost is ₹ 40 per order. The purchase manager argues that as the ordering cost is very high, it is advantageous to place a single order for the entire annual requirement. He also says that if we order 2,000 pieces at a time, we can get a 3% discount from the supplier. Evaluate this proposal and make your recommendations?

2. P Ltd uses three types of materials A, B and C for production of 'X', the final product. The relevant monthly data for the components are as given below:

	A	B	C
Normal usage (in units)	200	150	180
Minimum usage (in units)	100	100	90
Maximum usage (in units)	300	250	270
Re-order quantity (in units)	750	900	720
Re-order period (in months)	2 to 3	3 to 4	2 to 3

Calculate for each component:

a. Re-order Level

b. Minimum Level

c. Maximum Level

d. Average Stock Level

3. The purchases and issues of material X in the month of January 2022, is as follows:

January 3	Purchase	800 units @ ₹ 20 per unit
January 8	Purchase	700 units @ ₹ 18 per unit
January 9	Issue	600 units
January 11	Issue	800 units
January 17	Purchase	800 units @ ₹ 20 per unit
January 25	Purchase	500 units @ ₹ 25 per unit
January 31	Issue	1,000 units

The standard price per unit of material is ₹ 20 fixed for the year 2022. Show the Stores Ledger entries under LIFO method and determine the price variance for the month of January.

4. XYZ company buys in lots of 500 boxes which is a 3 month supply. The cost per box is ₹ 125 and the ordering cost is ₹ 150. The inventory carrying cost is estimated at 20% of unit value.

What is the total annual cost of the existing inventory policy?

How much money could be sabed by employing the economic order quantity?

5. Following information in an inventory problem is available:

Annual demand	4,800 units
Unit price	₹ 2.40
Ordering cost	₹ 4.00
Storage cost	2% p.a.
Interest rate	10% p.a.
Lead time	Half month

Calculate EOQ and Total Annual Inventory Cost in respect of the particular raw material.

6. A company requires 1,00,000 units of an item annually. The cost per unit is ₹ 10. Ordering cost is ₹ 500 per order and inventory carrying cost is 50% per unit per annum.

   i. Find the EOQ

   ii. The supplier offers a discount of 3% for order quantity 4,500 – 5,999 and 3.5% for order quantity 6,000 and above. Work out a statement comparing the total inventory management costs for the EOQ, 4,500 and 6,000 units of order and comment on your findings. Advise the company on how much to order.

7. G Ltd produces a product which has a monthly demand of 4,000 units. The product required 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 EOQ

   If the minimum lot size to be supplied is 4,000 units. What is the extra cost, the company has to incur?

   What is the minimum carrying cost, the company has to incur?

8. What will be the earnings of a worker at 60 paise per hour when he takes 100 hours to do a volume of work for which the standard time is 160 hours the plan of payment for bonus is on a sliding scale as under:

Within the first 10% saving in the Standard Time, the Bonus is	: 40% of the Time Saved
Within the second 10% saving in the Standard Time, the Bonus is	: 50% of the Time Saved
Within the third 10% saving in the Standard Time, the Bonus is	: 60% of the Time Saved
Within the fourth 10% saving in the Standard Time, the Bonus is	: 70% of the Time Saved
For the rest of the time saved	: 75% of the Time Saved

9. Using Taylor's differential piece rate system find out the earnings of X and Y from the following particulars:

Standard time per piece		- 20 minutes
Normal rate per hour		- 90 paise
In a 9 hour day:	X produced	- 25 units
	Y produced	- 30 units

10. The following are particulars applicable to a work process

Time rate	₹ 5 per hour
High task	- 40 units per week
Piece rate above high task	- ₹ 6.50 per unit

In a 40 hour week, the production of the workers:

A – 35 units; B – 40 units; C – 41 units; D – 52 units

Calculate the wages of the workers under Gantt Task Bonus.

11. In a unit, 10 men work as a group. When the production of the group exceeds the standard output of 200 pieces per hour, each man is paid an incentive for the excess production in addition to his wages at hourly rates. The incentive is at half the percentage, the excess production over the standard hours bears to the standard production. Each man is paid an incentive at the rate of this percentage of a wage rate of ₹ 2 per hour. There is no relation between the individual workman's hourly rate and the bonus rate.

    In a week, the hours worked are 500 hours and total production is 1,20,000 units.

    a. Compute the total amount of bonus for the week.

    b. Calculate the total earnings of two workers A and B of the group:

    A worked 44 hours and his basic rate per hour was ₹ 2.20

    B worked 48 hours and his basic rate per hour was ₹ 1.90

12. In a factory bonus system, bonus hours are credited to the employee in the proportion of time taken which time saved based to time allowed. Jobs are carried forward from one week to another. No overtime is worked and payment is made in full for all units worked, and including those subsequently rejected.

    From the following information you are required to calculate for each employee

    a. The bonus hours and amount of bonus earned;

    b. The total wages cost; and

    c. The wages cost of each good unit produced.

Particulars	A (₹)	B (₹)	C (₹)
Basic wage rate / hour	0.25	0.40	0.30
Units produced	2,500	2,200	3,600
Time allowed / 100 units	2 hour 36 minute	3 hours	1 hours 30 minute
Time taken	52 hours	75 hours	48 hours
Rejects	100 units	40 units	400 units

13. In a factory bonus to workman is paid according to the Rowan Plan. Time allotted for a job is 40 hours and the normal rate of wages is ₹ 1.25 per hour. The factory overheads charges are 50 paise per hour for the hours taken.

    The factory cost of a work order executed by a worker is ₹ 155.468. The cost of material is ₹ 100.

    Calculate the hours of time taken by the workman to complete the work order.

14. Compute the value of Direct Expenses based on the following data: Royalty paid on units produced ₹ 50,000, software development charges relating to production ₹ 36,000, design charges ₹ 17,500, hire charges of equipment used for production ₹ 5,500.

15. The 'Prabhat Ltd' is divided into two production cost centres A and B and two service cost centres X and Y. The following is the summary of overheads costs for a particular period. Works Manager's salary ₹ 4,000; Power ₹ 21,000; Contribution to PF ₹ 9,000; Rent ₹ 6,000; Plant Maintenance ₹ 4,000; Canteen expenditure ₹ 12,000; Depreciation of Plant and Machinery ₹ 20,000.

    The following information is made available from the various departments.

	Department A	Department B	Department X	Department Y
No. of Employees	16	8	4	4
Area Sq. ft.	2,000	3,000	500	500
Value of Plant	₹ 75,000	₹ 1,00,000	₹ 25,000	-
Wages	₹ 40,000	₹ 20,000	₹ 10,000	₹ 5,000
Horse Power	3	3	1	-

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

16. In a factory there are 5 machines, you are required to calculate Machine Hour rate from the following data.

Space of the Departments	8,000 sq. ft.
Cost of machine	₹ 20,000
Space occupied by each machine	1,600 sq. ft.
Power consumed as indicated by meter is	₹ 3,000 p.a. for this machine.
Depreciation	$7\frac{1}{2}$% p.a.
Estimated life 10 years (working hours 2,000 p.a.)	
Estimated Repairs p.a. for this machine	₹ 520
Rent and Rates	₹ 9,000 p.a.
Lighting	₹ 750 for all machines p.a.
Supervision	₹ 1,500 p.a.
Other charges	₹ 4,000 p.a.

    of the supervision is for this machine. There are three mechanics drawing ₹50, ₹ 60, ₹ 70 p.m. respectively.

17. You are required to calculate the machine hour rate from the following particulars.

    a. Cost of the machine ₹ 10,000, its estimated working life is 10 years and the estimated scrap value at the end of its life is ₹ 1,000. The estimated working time per year (50 weeks of 40 hours each) is 2,000 hours.

    b. Electricity used by the machine is 16 units per hour at the cost of ₹ 0.10 per unit.

    c. The machine requires a chemical solution which is replaced at the end of each week at cost of ₹ 20 each time.

    d. The estimated cost of maintenance per year is ₹ 1,200.

e. Two attendants control the operation of the machine together with five other identical machines their combined weekly wages amount to ₹ 120.

f. Departmental and General works overheads allocated to the machine for the year were ₹ 2,000.

18. XYZ manufactures household pumps which pass through three departments viz Foundry, Machine Shop and Assembling.

The manufacturing expenses are as follows:

	Foundry	Machine	Assembling	Total
	₹	₹	₹	₹
Direct Wages	10,000	50,000	10,000	70,000
Works Overheads	5,000	90,000	10,000	1,05,000

The factory cost of manufacturing a type of 'C' pump was prepared by the company as follows:

	₹
Material	16
Wages:	
Foundry	2
Machine Shop	4
Assembling	2
	8
Works Overheads	**12**
150% of Direct Wages	
Total	**36**

It seems that there is some fallacy. Try to correct it.

19. The following are the maintenance costs incurred in a machine shop for six months with corresponding machine hours.

Month	Machine Hours	Maintenance Cost (₹)
January	2,000	300
February	2,200	320
March	1,700	270
April	2,400	340
May	1,800	280
June	1,900	290
	12,000	1,800

Analyse the machine cost which is semi-variable into fixed and variable element.

20. From the following data segregate fixed cost and variable costs.

	Level of Activity	
Capacity (%)	80	100
Labour Hours	400	500
Maintenance expenses of a plant (₹)	2,600	2,750

21. In a factory, there are two service departments P and Q and three production departments A, B and C. In April, 2022, the departmental expenses were:

Departments	A	B	C	P	Q
₹	6,50,000	6,00,000	5,00,000	1,20,000	1,00,000

The service department expenses are allotted on a percentage basis as follows:

Service Departments	Production Departments			Service Departments	
	A	B	C	P	Q
P	30	40	15	-	15
Q	40	30	25	5	-

Prepare a statement showing the distribution of the two service departments' expenses to the three departments by a) Simultaneous Equation Method b) Repeated Distribution Method.

22. The monthly budget of a department is as under:

	Amount (₹)
Direct Material	45,000
Direct Wages	60,000
Overheads	90,000
Direct Labour Hours	15,000
Machine Hours	30,000

Find out the overheads recovery rate based on at least five different possible methods of absorption of overheads.

23. The following particulars were extracted from the records of Epsilon Ltd on 31st December:

	Department A	Department B	Department C
	₹	₹	₹
Overheads Incurred	2,000	1,500	2,500
Overheads Absorbed	2,200	1,400	2,250

The departmental loads during the three months to 31st December averaged:

Department A: 100% of Normal Capacity

Department B: 75% of Normal Capacity

Department C: 50% of Normal Capacity

How would you deal with the balances under or over absorbed? What preliminaries enquiries would you make?

24. The overheads expenses of a factory are allowed on the machine hour method. You are required to calculate the hourly rate for a certain machine from the following information:

Cost	₹ 58,000
Estimated scrap value	₹ 3,000
Estimated working life	20,000 hours
Estimated cost of maintenance during working life of machine	₹ 12,000
Power used for machine	₹ 1 per hour
Rent, rates etc per month (10% to be charged for this machine)	₹ 1,500
Normal machine running hours during a month	180 hours
Standing charges other than rent, rates etc per month	₹ 200

Answer

1.	Proposal of the purchase manager is not acceptable because it increases cost by ₹ 10; buying 400 units (i.e., EOQ) at a time is economical
2.	(a) 900 units; 1,000 units; 810 units; (c) 1,450 units; 1,600 units; 1,350 units (b) 400 units; 475 units; 360 units; (d) 925 units; 1,037 units; 855 units
3.	Valuation of stock ₹ 8,000, Price variance – Nil
4.	Saving by adopting EOQ = ₹ 2,977
5.	EOQ 365 units, ₹ 11,629
6.	(i) EOQ – 4,472 units, (ii) Total Cost at EOQ ₹ 10,22,360, at 4,500 units ₹ 9,92,023, at 6,000 units ₹ 9,87,808
7.	Minimum carrying cost ₹ 2,400
8.	Total earnings ₹ 79.44
9.	X: ₹ 6.23; Y: ₹ 15.75
10.	A - ₹ 200; B - ₹ 240; C - ₹ 266; D - ₹ 338
11.	(a) Total Bonus for the week is ₹ 100; (b) Earnings of A: ₹ 105.60; B: ₹ 100.80
12.	(a) A: 13 hours; B: Nil; C: 6 hours; Amount of Bonus A: ₹ 2.60; B: Nil; C: ₹ 1.60 (b) Total wages cost A: ₹ 15.60; B: ₹ 30; C: ₹ 16; (c) Cost per good units produced A: ₹ 0.0065; B: ₹ 0.0139; C: ₹ 0.005
13.	Actual hours 25
14.	₹ 1,09,000

15.	A: ₹ 32,800; B: ₹ 30,400; X: ₹ 9,700; Y: ₹ 3,100
16.	Machine Hour Rate ₹ 4.401
17.	Machine Hour Rate ₹ 4.65
18.	Correct Factory Cost ₹ 34.20
19.	Variable Cost per machine hour ₹ 0.10; Fixed Cost ₹ 100
20.	Variable Cost per hour ₹ 1.50; Fixed Cost ₹ 2,000
21.	Total Cost: A - ₹ 7,35,340; B - ₹ 6,86,045 and C - ₹ 5,48,615
22.	Direct Material Cost Method 200%; Direct Labour Cost Method 150%; Prime Cost Method 85.71%; Direct Labour Hour Rate Method ₹ 6; Machine Hour Rate Method ₹ 3
23.	Department A: Over absorbed ₹ 200; Department B: Under absorbed ₹ 100; Department C: Under absorbed ₹ 250
24.	₹ 6.30

Cost Accounting Standards (CAS 1 To CAS 24)

3

SLOB Mapped against the Module:

To obtain a detail understanding of the framework suggested by Cost Accounting Standards for cost ascertainment, cost accounting and reporting. (CMLO 4a, b, c)

Module Learning Objectives:

After studying this module, the students will be able to –

- Grasp the provisions of the Cost Accounting Standards issued by the Council of the Institute of Cost Accountants of India.
- Grasp the provisions of the Generally Accepted Cost Accounting Principles issued by the Council of the Institute of Cost Accountants of India.

Cost Accounting Standards (CAS 1 To CAS 24)

3

Introduction

Cost Accounting Standards (CAS) are a set of guidelines and principles formulated to standardize the methods and processes involved in cost determination, measurement, and reporting. These standards provide a structured framework for organizations engaged in various industries to consistently and transparently account for costs related to their products, services, or operations. CAS are designed to enhance the reliability, comparability, and relevance of cost information, supporting effective cost management and decision-making. Their significance lies in providing a common framework that enhances the reliability of cost information, supports better decision-making, and ensures compliance with regulatory requirements. CAS contribute to the overall efficiency and effectiveness of cost and management accounting processes within organizations.

The significance of CAS can be categorically stated as;

1. Consistency: CAS play a crucial role in promoting consistency in cost accounting practices. By providing a standardized set of rules and procedures, CAS ensure that organizations consistently apply cost accounting principles across different periods and business units. This consistency is essential for meaningful comparisons and trend analysis.
2. Comparability: CAS facilitate comparability by establishing uniform standards for cost determination. When organizations adhere to the same set of principles, it becomes easier to compare costs between entities within the same industry. This comparability is valuable for benchmarking and assessing performance relative to industry norms.
3. Transparency: Transparency is one of the key objectives of CAS. These standards require organizations to disclose relevant cost information in a clear and understandable manner. This transparency enhances the understanding of cost structures, helping stakeholders, including management, investors, and regulatory authorities, make informed decisions.
4. Improved Decision-Making: CAS contribute to improved decision-making by providing accurate and reliable cost information. Managers can make informed choices regarding pricing, resource allocation, and cost control strategies. The availability of consistent and transparent cost data enhances the decision-making process at various levels within an organization.
5. Regulatory Compliance: CAS often serve as a basis for regulatory compliance. In certain industries, adherence to CAS is mandated by regulatory authorities. By complying with these standards, organizations ensure that their cost accounting practices align with legal requirements, fostering trust and accountability.
6. Resource Allocation and Efficiency: With standardized cost accounting practices, organizations can allocate resources more efficiently. CAS assist in identifying the true cost of products and services, enabling management to allocate resources based on accurate and relevant information.

7. Cost Control: CAS contribute to effective cost control measures. By providing a systematic approach to cost identification and measurement, organizations can identify cost variances, analyze the reasons behind them, and implement corrective actions to control costs and improve profitability.

Evolution of Cost Accounting Standard

The evolution of Cost Accounting Standards (CAS) in the Indian context has been shaped by various factors, including industrial growth, regulatory requirements, and the need for standardization in cost accounting practices. Here is an overview of how CAS evolved in the Indian context:

1. Pre-Independence period: In the pre-independence era, cost accounting practices were relatively basic, and there was limited standardization. The focus was on rudimentary costing methods for financial reporting.
2. Post-Independence period: With the industrial growth and economic development, post-independence, the complexity of business operations increased. This necessitated a more structured approach to cost accounting to meet the evolving needs of businesses.
3. Formation of Professional Bodies: The Institute of Cost and Works Accountants of India (ICWAI), now known as the Institute of Cost Accountants of India (ICAI), was established in 1959. The formation of this professional body marked a significant milestone in the development of cost accounting as a distinct discipline in India.
4. Regulatory Mandates: after giving due recognition to the importance of cost accounting in economic planning and resource allocation, the Indian government took initiatives to promote standardized cost accounting practices. Over time, regulatory authorities in India, such as the Ministry of Corporate Affairs, mandated the adoption of CAS for certain industries, particularly those involved in government contracts. Compliance with CAS became a regulatory requirement for these entities.
    - Section 209(1)(d) - Books of Accounts - Under Section 209(1)(d) of the Companies Act 1956, companies were required to maintain proper books of accounts, including records of cost of production or acquisition of goods and the cost of related services.
    - Cost Audit Rules 1958 - The government introduced the Cost Audit Rules in 1958 under the Companies Act 1956, requiring companies engaged in certain industries to conduct cost audits. This initiative aimed to ensure that cost accounting records were maintained and that the cost audit reports were submitted to the government.
        - It is imperative to note that subsequent inclusion of two sections, namely Section 209(1)(d) of the Companies Act, 1956 (maintenance of cost accounting records for certain classes of companies) and section 233B (audit of cost accounts of such companies) triggered the development of CAS.
    - The Cost Audit (Report) Rules (these rules govern the maintenance of cost records and the submission of cost audit reports by companies in India) -These rules which outline the procedures, forms, and timelines for the cost audit process, ensuring compliance with the Companies Act and related regulations) have evolved over the years. Here is a list of the relevant rules and their dates:
        - Cost Audit (Report) Rules, 1996: These rules were initially established in 1996 and were amended in 2001[1].
        - Companies (Cost Records and Audit) Rules, 2014: These rules were introduced in 2014 and have been subsequently amended. The most recent known amendment was made on 14th July 2016[2].
5. Mandatory Cost Audit: The Companies (Cost Records and Audit) Rules, 2014, make it mandatory for companies engaged in specified industries or meeting certain turnover criteria to conduct a cost audit. The objective is to ensure that cost records accurately reflect the cost of production, cost of sales, and other related expenses.

---

1. https://www.mca.gov.in/Ministry/actsbills/rules/CARR1996.pdf
2. https://icmai.in/upload/Students/Circulars/Companies-Rules-2014.pdf

Legal Provisions

The legal provisions for maintaining cost records and the audit of the same are primarily outlined in the Companies Act, 2013, and the Companies (Cost Records and Audit) Rules, 2014. These provisions are designed to ensure that certain classes of companies maintain accurate cost records and undergo cost audits, contributing to transparency and accountability in their financial reporting. An overview of the legal provisions is presented for comprehension of the importance of the importance of the Cost Accounting Standards

- **Companies Act, 2013:**

  The Companies Act of 2013 in India significantly transformed the landscape of cost accounting by mandating its applicability for certain classes of companies. This legislative shift aimed at enhancing transparency, accountability, and efficiency in financial reporting, fostering a more comprehensive and standardized approach to cost management within corporate entities. The following aspects are specifically covered.

  Section 148: Section 148 of Companies Act 2013 empowers the central government to prescribe the maintenance of cost records for certain classes of companies and to conduct cost audits. Additionally, it refers to the adherence to Cost Accounting Standards for the purpose of ensuring consistency and standardization in cost accounting practices. Other aspects of the section covers the following;

  - Applicability: The Central Government has the authority to prescribe the maintenance of cost records and the audit of such records for specified classes of companies engaged in certain industries or activities.
  - Cost Audit: The section empowers the government to mandate companies to conduct a cost audit of their cost accounting records. The scope, nature, and extent of the cost audit are specified in the rules framed by the government.
  - Cost Accounting Records: Companies subject to cost audit provisions are required to maintain cost accounting records as specified by the Central Government. These records typically include details related to the cost of production, cost of sales, and other cost elements specific to the industry.

- **Companies (Cost Records and Audit) Rules, 2014**

  Companies (Cost Records and Audit) Rules, 2014: The government, in exercise of the powers conferred by Section 148, issued the Companies (Cost Records and Audit) Rules, 2014. These rules specify the companies that are required to maintain cost records and undergo cost audits. The rules outline the formats for cost records and the procedures for cost audits. Some of the main directions are stated in the following lines;

  Rule 3: Maintenance of Cost Records

  - Applicability: Specifies the classes of companies that are required to maintain cost records. These include companies engaged in industries such as pharmaceuticals, fertilizers, electricity generation, chemicals, cement, etc.
  - Cost Records: Outlines the particulars to be included in the cost records, which may vary based on the industry. The objective is to capture accurate information related to the cost structure of the company's operations.

  Rule 4: Cost Audit Report

  - Appointment of Cost Auditor: Companies falling under the ambit of the rules are required to appoint a Cost Auditor. The auditor is responsible for conducting a cost audit of the cost records maintained by the company.
  - Cost Audit Report: Specifies the content and format of the cost audit report, which includes observations on the compliance with cost accounting records, adherence to cost accounting standards, and any other relevant findings.

Rule 6: Filing of Cost Audit Report

- Submission to the Board: Requires the Cost Auditor to submit the cost audit report to the Board of Directors within 180 days from the closure of the financial year.
- Board's Responsibility: Mandates the Board to consider and submit the cost audit report along with its comments (if any) to the Central Government within 30 days from the receipt of the report.

Rule 8: Cost Auditor's Report to Central Government

- Submission to Central Government: Requires the Board of Directors to submit the cost audit report along with the Board's comments to the Central Government within 30 days of receiving the report.
- Penalties for Non-compliance: Specifies penalties for non-compliance with the provisions of maintaining cost records and the cost audit. Penalties may be imposed on the company and its officers.

Cost Accounting Standards

The Institute of Cost Accountants of India, recognizing the need for structured approach to the measurement of cost in manufacture or service sector and to provide guidance to the user organizations, government bodies, regulators, research agencies and academic institutions to achieve uniformity and consistency in classification, measurement and assignment of cost to product and services, constituted *Cost Accounting Standards Board (CASB)* with the objective of formulating the Cost Accounting Standards. While formulating the Cost Accounting Standards, the CASB takes into consideration the applicable laws, usage and business environment prevailing in India. CASB also gives due consideration to the Cost Accounting Standards, principles and practices being followed by the other countries in the world. If due to subsequent changes in the law, a particular standard or any part thereof becomes inconsistent with such a law, the provisions of the said law shall prevail.

Objectives and Functions of the CASB

The objectives of the CASB are to develop high quality Cost Accounting Standards to enable the management to take informed decisions and to enable regulators to function more effectively by Integrating, harmonizing, and standardizing cost accounting principles and practices.

The following are the specific functions of the CASB:

1. To issue the framework for the Cost Accounting Standards.
2. To equip the Cost and Management Accounting professionals with better guidelines on Cost Accounting Practices.
3. To assist the members in preparation of uniform cost statements under various statutes.
4. To provide from time-to-time interpretations on Cost Accounting Standards.
5. To issue application guidance relating to a particular standard.
6. To propagate the Cost Accounting Standards and to persuade the users to adopt them in the preparation and presentation of General-Purpose Cost Statement.
7. To persuade the Government and appropriate authorities to enforce Cost Accounting Standards, to facilitate the adoption thereof, by industry and corporate entities in order to achieve the desired objectives of standardization of Cost Accounting practices.
8. To educate the users about the utility and need for compliance of cost accounting standards.

CAS at a glance[3]

CAS No.	Title
CAS 1	Classification of Cost
CAS 2	Capacity Determination
CAS 3	Production and Operation Overheads
CAS 4	Cost of Production for Captive consumption
CAS 5	Average (Equalised) Cost of Transportation
CAS 6	Material Cost
CAS 7	Employee Cost
CAS 8	Cost of Utilities
CAS 9	Packing Material Cost
CAS 10	Direct Expenses
CAS 11	Administrative Overheads
CAS 12	Repairs and Maintenance Cost
CAS 13	Cost of Service Cost Centre
CAS 14	Pollution Control Cost
CAS 15	Selling and Distribution Overheads
CAS 16	Depreciation and Amortisation
CAS 17	Interest and Financing Charges
CAS 18	Research and Development Costs
CAS 19	Joint Costs
CAS 20	Royalty and Technical Know How Fee
CAS 21	Quality Control
CAS 22	Manufacturing Cost
CAS 23	Overburden Removal Cost
CAS 24	Treatment of Revenue in Cost Statements

CAS – Some Important Aspects[4]

CAS – 1 – Cost Accounting Standard on "Classification of Cost"[5]

This standard establishes a framework for systematically classifying costs, ensuring transparency and comparability in financial reporting for products or services.

1. Introduction: CAS - 1 addresses the principles of cost classification to determine the cost of a product or service.

3. For details students may refer to the original document available at https://icmai.in/upload/Students/CAS-1-24-CASB.pdf.
4. It is important to note that the students need to read the following Cost Accounting Standards carefully for the purpose of Paper 8: Cost Accounting; CAS 1: Classification of Cost, CAS 3: Production and Operation Overheads, CAS 6: Material Cost, CAS 7: Employee Cost, CAS 10: Direct Expenses, CAS 11: Administrative Overheads, CAS 15: Selling and Distribution Overheads, CAS 19: Joint Cost. CAS 21: Quality Control. This module should be read with added emphasis to these particular CASs.
5. This has been revised in the year 2015

2. Objective: The objective is to ensure uniformity and consistency in the classification of costs for disclosure and presentation in cost statements.
3. Scope: Applies to cost statements requiring classification, presentation, and disclosure, including those needing attestation.
4. Definitions: Defines key terms such as abnormal cost, administrative overheads, conversion cost, cost center, cost object, cost of production, and others.
5. Principles of Classification of Costs: Costs are classified based on nature, traceability to a cost object, function, behavior, and production/operation process. The scheme ensures every cost item is classified.
6. Classification of Costs:
   - By Nature of Expenses: Material, Employee, and Expenses.
   - By Nature of Traceability: Direct and Indirect Costs.
   - By Function: Production, Administration, Selling, Distribution, Research, and Development.
   - By Nature of Behavior: Fixed, Variable, and Semi-Variable Costs.
   - By Nature of Production/Operation Process: Batch Cost, Process Cost, Operation Cost, Contract Cost, Joint Costs.
7. Presentation: Cost items in the cost statement must be presented based on relevant classification consistently from period to period.
8. Disclosure: Changes in cost classification are allowed only if required by law or compliance with a standard. Material changes must be disclosed in cost statements.

CAS – 2 Cost Accounting Standard on "Capacity Determination"

This standard deals with the principles and methods of determining the capacity of a facility for producing goods or providing services by an entity. This standard deals with the principles and methods of classification and determination of capacity of an entity for ascertainment of the cost of product or service, and the presentation and disclosure in cost statements.

1. Objective: The objective of this standard is to bring uniformity and consistency in the principles and methods of determination of capacity with reasonable accuracy.
2. Scope: This standard shall be applied to the cost statements, including those requiring attestation, which require determination of capacity for assignment of overheads.
3. Determination of Capacity: Capacity shall be determined in terms of units of production or services or equivalent machine or man hours.
4. Installed Capacity: Installed capacity is usually determined based on:
   - Technical specifications of facility.
   - Technical evaluation.
   - Capacities of individual or interrelated production or operation centres.
   - Operational constraints or capacity of critical machines or equipment.
   - Number of shifts or machine hours or man hours.
5. Normal Capacity: Normal capacity is determined after suitable adjustments to the installed capacity.The adjustments may be of the following nature:

- Time lost due to scheduled preventive or planned maintenance.
- Number of shifts or machine hours or man hours.
- Holidays, normal shut down days, normal idle time.
- Normal time lost in batch change over.

CAS – 3 Cost Accounting Standard on "Production and Operation Overheads"

1. Introduction: CAS-3 addresses principles and methods for determining Production or Operation Overheads, focusing on classification, measurement, assignment, and disclosure for the cost of goods or services.
2. Objective: The objective is to ensure uniformity and consistency in determining Production or Operation Overheads with reasonable accuracy.
3. Scope: Applies to cost statements requiring classification, measurement, assignment, presentation, and disclosure of Production or Operation Overheads, including those needing attestation.
4. Definitions: Defines key terms such as abnormal cost, absorption of Production or Operation Overheads, administrative overheads, cost center, and fixed costs.
5. Principles of Measurement: Outlines principles for determining Production or Operation Overheads, covering procurement, imputed costs, abnormal costs, subsidies, fines, penalties, credits, and recoveries.
6. Assignment: Guidelines for assignment of Production or Operation Overheads, emphasizing traceability in an economically feasible manner, and the principles of cause and effect or benefits received.
7. Presentation: Production or Operation Overheads are presented as a separate cost head. Detailed presentation includes material, element-wise, and behavior-wise details. Any under-absorption or over-absorption is reconciled.
8. Disclosures: Disclosures include the basis of assignment, foreign exchange transactions, dealings with related parties, subsidies, credits, abnormal costs, unabsorbed overheads, and changes in cost accounting principles.
9. Effective Date: Effective from April 1, 2016, for the preparation and certification of General-Purpose Cost Accounting Statements.

CAS – 4 Cost Accounting Standard on "Cost of Production for Captive Consumption"

1. Introduction: This standard was issued to specify the principles for determination of cost of production for valuation of goods meant for captive consumption, as required under the Central Excise Valuation (Determination of Price of Excisable Goods) Rules 2000. CEBC, vide circular No. 692/8/2003-CX dated 13-2-2003 had clarified that in case of captive consumption, cost calculation should be as per CAS-4 only. With the introduction of Goods and Services Tax (GST) with effect from July 1, 2017, the concept of 'captive consumption' is no more relevant for computing the tax incident. However, the concept of cost of production or manufacture is relevant under the GST laws where the value of supply of goods or services or both are determined based on cost.
2. Objective: The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the cost of production or acquisition or supply of goods or provision of services as required under the provisions of GST Act / Rules.
3. Definition: definitions of cost of production, captive consumption and normal capacity is provided in para 4 of this standard.
4. Scope: This standard should be applied to cost statements which require classification, measurement,

assignment, presentation, and disclosure of related costs for determination of the following under the relevant provisions of GST Acts / Rules.

i) Determination of cost of production of goods;

ii) Determination of cost of acquisition of goods;

iii) Determination of cost of supply of goods;

iv) Determination of cost of provision / supply of services; and

v) Determination of value of supply of goods or services as per open market value or as per goods or services of like kind and quality.

CAS – 5 Cost Accounting Standard on "Determination of Average Cost of Transportation"

The cost accounting principles for tracing / identifying an element of cost, its allocation / apportionment to a product or service are well established. Transportation Cost is an important element of cost for procurement of materials for production and for distribution of product for sale. Therefore, cost accounting records should present transportation cost separately from the other cost of inward materials or cost of sales of finished goods. The Finance Act 2003 also specifies the certification requirement of Transportation Cost for claiming deduction while arriving at the assessable value of excisable goods cleared for home consumption / export. There is a need to standardize the record keeping of expenses relating to transportation and computation of Transportation Cost.

Objective

i) To bring uniformity in the application of principles and methods used in the determination of averaged / equalised Transportation Cost.

ii) To prescribe the system to be followed for maintenance of records for collection of cost of transportation, its allocation / apportionment to cost centres, locations or products.

iii) To provide transparency in the determination of cost of transportation.

Scope

This standard should be applied for calculation of cost of transportation required under any statute or regulations or for any other purpose. For example, this standard can be used for:

i) Determination of average transportation cost for claiming the deduction for arriving at the assessable value of excisable goods.

ii) Insurance claim valuation.

iii) Working out claim for freight subsidy under Fertilizer Industry Coordination Committee.

iv) Administered price mechanism of freight cost element.

v) Determination of inward freight costs included or to be included in the cost of purchases attributable to the acquisition.

vi) Consumption of freight included in the value of inventory for accounting on inventory or valuation of stock hypothecated with Banks / Financial Institution etc.

CAS – 6 Cost Accounting Standard on "Material Cost"

CAS 6 aims to standardize the determination and reporting of material costs, promoting consistency and transparency in cost accounting practices. It provides guidelines for valuation, assignment, presentation, and disclosure of material costs in cost statements, contributing to effective cost management and decision-making.

1. Introduction: CAS 6 focuses on principles and methods for determining Material Cost, covering various types of materials used in production. It excludes Packing Materials, as a separate standard is dedicated to that.
2. Objective: The primary objective is to establish uniformity and consistency in determining material costs with reasonable accuracy.
3. Scope: CAS 6 applies to cost statements requiring classification, measurement, assignment, presentation, and disclosure of material costs, including those requiring attestation.
4. Definitions: Defines terms like abnormal cost, administrative overheads, cost object, defectives, imputed costs, intermediate product, material cost, production overheads, scrap, standard cost, waste, and spoilage.
5. Principles of Measurement: Details principles for the valuation of material receipts and issues, including the treatment of abnormal costs, waste, spoilage, and the inclusion of imputed costs.
6. Assignment of Costs: Outlines the basis for assigning costs to products or services, covering materials, direct expenses, and indirect materials.
7. Presentation: Cost statements should classify direct materials (e.g., raw materials, components) and indirect materials (e.g., tools, stores) under suitable heads.
8. Disclosures: Specifies information to be disclosed in cost statements, including quantity and rates of major items, valuation basis, changes in accounting principles, excluded abnormal costs, demurrage or detention charges, subsidies/grants, and costs from related parties.

CAS – 7 Cost Accounting Standard on "Employee Cost"

CAS 7 aims to standardize the determination and reporting of Employee Costs, ensuring consistency and transparency in cost accounting practices. It provides guidelines for valuation, assignment, presentation, and disclosure of Employee Costs in cost statements, contributing to effective cost management and decision-making.

1. Introduction: CAS 7 addresses the principles and methods for determining Employee Cost, covering its classification, measurement, assignment, presentation, and disclosure in cost statements.
2. Objective: The objective is to establish uniformity and consistency in determining Employee Cost with reasonable accuracy.
3. Scope: CAS 7 applies to cost statements requiring classification, measurement, assignment, presentation, and disclosure of Employee Cost, including those requiring attestation.
4. Definitions: Defines terms like abnormal cost, abnormal idle time, administrative overheads, cost object, direct employee cost, distribution overheads, employee cost, idle time, imputed costs, indirect employee cost, marketing overheads, overtime premium, production overheads, selling overheads, standard cost.
5. Principles of Measurement: Specifies the ascertainment of Employee Cost, including gross pay, bonuses, remuneration to managerial personnel, separation costs, and treatment of variances. Excludes imputed costs.
6. Assignment of Costs: Outlines principles for assigning Employee Costs to cost objects, considering traceability and materiality. Covers recruitment costs, training costs, overtime premiums, and idle time costs.
7. Presentation: Direct Employee Costs presented separately, while indirect costs are included in overheads related to functions like manufacturing, administration, and marketing. Cost statements should detail resources consumed, category-wise.
8. Disclosures: Requires disclosure of Employee Cost attributable to capital works, separation costs, abnormal costs, penalties, subsidies, grants, incentives, payments to related parties, and costs in foreign exchange. Disclosures on changes in accounting principles are made where material, significant, and quantifiable.

CAS – 8 Cost Accounting Standard on "Cost of Utilities"

This standard deals with the principles and methods of determining the cost of utilities. This standard deals with the principles and methods of classification, measurement and assignment of cost of utilities, for determination of the cost of product or service and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the cost of utilities with reasonable accuracy.

Scope

This standard shall be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of cost of utilities including those requiring attestation.

For determining the cost of production to arrive at an assessable value of excisable utilities used for captive consumption, Cost Accounting Standard 4 on Cost of Production for Captive Consumption shall apply. This standard shall not be applicable to the organisations primarily engaged in generation and sale of utilities. This standard does not cover issues related to the ascertainment and treatment of carbon credits, which shall be dealt with in a separate standard.

CAS – 9 Cost Accounting Standard on "Packing Material Cost"

This standard deals with the principles and methods of determining the Packing Material Cost. This standard deals with the principles and methods of classification, measurement and assignment of Packing Material Cost, for determination of the cost of product, and the presentation and disclosure in cost statements. Packing Materials for the purpose of this standard are classified into primary and secondary packing materials.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the packing material cost with reasonable accuracy.

Scope

This standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of Packing Material Cost including those requiring attestation.

CAS – 10 Cost Accounting Standard on "Direct Expenses"

CAS-10 ensures a systematic approach to Direct Expenses accounting, promoting transparency and accuracy in cost reporting.

1. Introduction: CAS-10 focuses on determining, classifying, measuring, and assigning Direct Expenses.

   Pertains to the cost of a product or service and outlines principles for presentation and disclosure in cost statements.

2. Objective: Aims for uniformity and consistency in determining Direct Expenses with reasonable accuracy.
3. Scope: Applicable to cost statements requiring classification, measurement, assignment, and disclosure of Direct Expenses, including those needing attestation.
4. Definitions: Defines terms such as Abnormal Cost, Cost Object, Direct Employee Cost, Direct Expenses, Direct Material Cost, Imputed Costs, Interest and Finance Charges, Overheads, and Standard Cost.
5. Principles of Measurement:

- Emphasizes traceability for identification of Direct Expenses.
- Details the determination of Direct Expenses for bought-out resources, other than those incurred for such resources, and one-time payments.
- Addresses amortization of lump-sum expenses based on estimated output or benefit.
- Stresses materiality, excluding finance costs from Direct Expenses, and avoiding imputed costs.
- Discusses treatment of standard costs, variances, subsidies, abnormal portions, penalties, and recoveries.

6. Assignment of Costs: Direct Expenses directly traceable to the cost object should be assigned to that object.
7. Presentation: Direct Expenses, if material, should be presented as a separate cost head with appropriate classification (e.g., subcontract charges, royalties).
8. Disclosures:
   - Specifies disclosure requirements related to the basis of distribution, quantity and rates, standard cost variances, expenses paid to related parties, foreign exchange transactions, subsidies/grants/incentives, credits/recoveries, abnormal portions, penalties, and damages.
   - Emphasizes material, significant, and quantifiable disclosures, which can be made in the body of the cost statement, footnotes, or as a separate schedule.
   - Addresses changes in cost accounting principles and methods with material effects.

CAS – 11 Cost Accounting Standard on "Administrative Overheads"

CAS-11 ensures transparency and accuracy in accounting for administrative overheads, promoting standardized practices in cost accounting.

1. Introduction:
   - CAS-11 outlines principles and methods for determining, classifying, measuring, and assigning administrative overheads.
   - Focuses on the cost of general management and administration activities in an organization.
2. Objective: Aims to establish uniformity and consistency in determining administrative overheads with reasonable accuracy.
3. Scope: Applicable to cost statements requiring classification, measurement, assignment, presentation, and disclosure of administrative overheads, including those needing attestation.
4. Definitions: Defines terms such as Abnormal Cost, Absorption of Overheads, Administrative Overheads, Cost Object, Imputed Costs, Interest and Finance Charges, Normal Capacity, and Overheads.
5. Principles of Measurement:
   - Administrative overheads represent the cost of shared services, infrastructure, and general management.
   - Involves employee costs, utilities, office supplies, legal expenses, and outside services.
   - Details the measurement of various elements within administrative overheads, including leased assets, software costs, and services procured from outside.
   - Stresses the reduction of subsidies/grants/incentives and excludes abnormal administrative costs, fines, penalties, damages, and similar levies.

- Discusses credits/recoveries, treatment of changes in cost accounting principles, and emphasizes transparency in disclosures.

5. Assignment of Cost:
   - Assigning administrative overheads involves traceability to a cost object in an economically feasible manner.
   - Assignment principles include Cause and Effect, Benefits Received, and rational basis for general management costs.
6. Presentation:
   - Administrative overheads should be presented as a separate cost head in the cost statement.
   - Element-wise details based on materiality should be presented.
8. Disclosures:
   - Disclosures include the basis of assignment, inclusion of imputed costs, administrative overheads incurred in foreign exchange, transactions with related parties, subsidies/grants/incentives, credits/recoveries, abnormal portions, and penalties/damages.
   - Emphasizes material, significant, and quantifiable disclosures, to be made in the body of the Cost Statement, footnotes, or as a separate schedule.
   - Requires disclosure of changes in cost accounting principles with material effects.

CAS – 12 Cost Accounting Standard on "Repairs and Maintenance"

This standard deals with the principles and methods of determining the Repairs and Maintenance Cost.

This standard deals with the principles and methods of classification, measurement and assignment of Repairs and Maintenance Cost, for determination of the cost of product or service, and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Repairs and Maintenance Cost with reasonable accuracy.

Scope

The standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of Repairs and Maintenance Cost including those requiring attestation.

CAS – 13 Cost Accounting Standard on "Cost of Service Cost Centre"

This standard deals with the principles and methods of determining Cost of Service Cost Centres. This standard covers the service cost centre and excludes utilities and repair and maintenance costs dealt with in CAS – 8 and CAS – 12 respectively. This standard deals with the principles and methods of classification, measurement and assignment of Cost of Service Cost Centre, for determination of the cost of product or service, and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Cost of Service Cost Centre with reasonable accuracy.

Scope

The standard should be applied to the presentation of cost statements, which require classification, measurement and assignment of Cost of Service Cost Centres including those requiring attestation.

CAS – 14 Cost Accounting Standard on "Pollution Control Cost"

This standard deals with the principles and methods of determining Pollution Control Cost. This standard deals with the principles and methods of classification, measurement and assignment of Pollution Control Costs, for determination of the cost of product or service, and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Pollution Control Costs with reasonable accuracy.

Scope

The standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of Pollution Control Costs including those requiring attestation.

CAS – 15 Cost Accounting Standard on "Selling and Distribution Overheads"

1. Introduction:
    - CAS-15 focuses on determining principles and methods for Selling and Distribution Overheads.
    - Deals with classification, measurement, assignment, and presentation of these overheads for determining the cost of sales of products or services.
2. Objective: Aims to bring uniformity and consistency in determining Selling and Distribution Overheads with reasonable accuracy.
3. Scope: Applicable to cost statements requiring classification, measurement, assignment, presentation, and disclosure of Selling and Distribution Overheads, including those needing attestation.
4. Definitions: Provides definitions for terms like Abnormal Cost, Absorption of Overheads, Cost Object, Distribution Overheads, Imputed Costs, Indirect Expenses, Marketing Overheads, Selling Overheads, and Overheads.
5. Principles of Measurement:
    - Selling and Distribution Overheads comprise the cost of resources consumed in related activities.
    - Resources procured from outside are determined at invoice or agreed price, net of applicable discounts, taxes, and duties.
    - Post-sales costs like warranty and after-sales service estimated reasonably.
    - Excludes imputed costs, abnormal costs, demurrage or detention charges, and penalties from Selling and Distribution Overheads.
    - Reduction of subsidies/grants/incentives and deduction of credits/recoveries are considered.
    - Encourages transparency in the disclosure of changes in cost accounting principles.

6. Assignment of Cost:
    - Directly traceable Selling and Distribution Overheads assigned to relevant products or services.
    - Transportation cost follows CAS-5 principles when relevant.
    - Assignment principles include Cause and Effect and Benefits Received.
7. Presentation:
    - Selling and Distribution Overheads presented as a separate cost head in the cost statement.
    - Allows the use of the term "Marketing Overheads" instead of "Selling and Distribution Overheads."
    - Element-wise details presented if material.
8. Disclosures:
    - Disclosures include the basis of distribution, Selling and Distribution Overheads in foreign exchange, services to related parties, subsidies/grants/incentives received, credits/recoveries, penalties/damages.
    - Disclosures made where material and significant, in the body of the Cost Statement, footnotes, or a separate schedule.
    - Any change in cost accounting principles disclosed if material, with indication if the effect is not wholly or partly ascertainable.
9. Effective Date: CAS-15 is effective from the period commencing on or after 1st April 2013, for preparing and certifying General Purpose Cost Accounting Statements.

CAS – 16 Cost Accounting Standard on "Depreciation and Amortisation"

This standard deals with the principles and methods of determining Depreciation and Amortisation Cost.

This standard deals with the principles and methods of measurement and assignment of Depreciation and Amortisation for determination of the cost of product or service, and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Depreciation and Amortisation with reasonable accuracy.

Scope

This standard shall be applied to cost statements which require measurement, assignment, presentation and disclosure of Depreciation and Amortisation, including those requiring attestation.

CAS – 17 Cost Accounting Standards on "Interest and Financing Charges"

This standard deals with the principles and methods of determining Interest and Financing Charges.

This standard deals with the principles and methods of classification, measurement and assignment of Interest and Financing Charges.

Objective

The objective of this standard is to bring uniformity and consistency in the principles, methods of determining and assigning the Interest and Financing Charges with reasonable accuracy.

Scope

This standard should be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Interest and Financing Charges including those requiring attestation. This standard does not deal with costs relating to risk management through derivatives.

CAS – 18 Cost Accounting Standard on "Research and Development Costs"

This standard deals with the principles and methods of determining Research and Development Cost.

This standard deals with the principles and methods of determining the Research and Development Costs and their classification, measurement and assignment for determination of the cost of product or service, and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Research and Development Costs with reasonable accuracy and presentation of the same.

Scope

This standard should be applied to cost statements that require classification, measurement, assignment, presentation and disclosure of Research and Development Costs including those requiring attestation.

CAS – 19 Cost Accounting Standard on "Joint Costs"

1. Introduction: CAS-19 addresses the principles and methods for measuring and assigning Joint Costs, along with their presentation and disclosure in cost statements.
2. Objective: Aims to achieve uniformity and consistency in determining and assigning Joint Costs with reasonable accuracy.
3. Scope: Applicable to cost statements requiring classification, measurement, assignment, presentation, and disclosure of Joint Costs, including those requiring attestation.
4. Definitions: Provides definitions for terms such as By-Product, Cost Object, Imputed Cost, Joint Costs, Joint Product, Scrap, Split off Point, and Waste.
5. Principles of Measurement:
    - Measurement principles for Joint Costs up to the split-off point align with other cost accounting standards.
    - Costs incurred after the split-off point for each Joint/By-Product are measured based on resources consumed.
    - Further processing costs include direct and indirect costs.
    - Cost of processing by outside parties determined at invoice or agreed price, including duties and taxes, net of applicable discounts, taxes, duties, and other attributable expenditures.
    - Realized or realizable value of scrap or waste deducted from the cost of Joint Product.

- Any Subsidy/Grant/Incentive related to Joint Product/By-Product reduces the ascertainable cost.
- Penalties and damages paid to authorities or third parties not included in the cost.

6. Assignment:
   - Joint costs assigned to Joint Products based on benefits received, using methods like Physical Units, Net Realizable Value at split-off point, or Technical Estimates.
   - By-Product value estimated using Net Realizable Value or Technical Estimates.
7. Presentation: Cost statement presents element-wise costs of products produced jointly and the assigned value to By-Products.
8. Disclosures:
   - Disclosures include the basis of Joint costs allocation, value assigned to By-Products, and any changes in cost accounting principles affecting Joint/By-Products.
   - Material, significant, and quantifiable disclosures made in the body of cost statements, footnotes, or separate schedules.
9. Effective Date: CAS-19 effective from the period commencing on or after a specified date for preparing and certifying General Purpose Cost Accounting Statements.

CAS – 20 Cost Accounting Standard on "Royalty and Technical Know-How Fee"

This standard deals with the principles and methods of determining the amount of Royalty and Technical Know-How Fee.

This standard deals with the principles and methods of classification, measurement and assignment of the amount of Royalty and Technical Know-How Fee, for determination of the cost of product or service, and their presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the amount of Royalty and Technical Know-How Fee with reasonable accuracy.

Scope

This standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of the amount of Royalty and Technical Know-How Fee including those requiring attestation.

CAS – 21 Cost Accounting Standard on "Quality Control"

1. Introduction: CAS-21 addresses principles and methods for measuring, assigning, presenting, and disclosing Quality Control costs in cost statements.
2. Objective: Aims to bring uniformity and consistency in determining and assigning Quality Control costs with reasonable accuracy.
3. Scope: Applicable to cost statements requiring classification, measurement, assignment, presentation, and disclosure of Quality Control costs, including those needing attestation.

4. Definitions: Provides definitions for terms such as Abnormal Cost, Cost Object, Defectives, Imputed Costs, Quality, Quality Control, Quality Control Cost, Scrap, Waste, and Spoilage.
5. Principles of Measurement:
    - Quality Control cost incurred in-house includes the aggregate cost of resources consumed.
    - Costs procured from outside determined at invoice or agreed price, net of applicable discounts, taxes, and duties.
    - Includes costs of conformance to quality, namely prevention cost and appraisal cost.
    - Identification of Quality Control costs based on traceability.
    - Finance costs in connection with self-generated or procured resources excluded from Quality Control cost.
    - Quality Control costs exclude imputed costs.
    - Subsidies/Grants/Incentives related to Quality Control cost reduce the cost of the corresponding object.
    - Abnormal portions of Quality Control cost, penalties, and damages excluded from the total cost.
6. Assignment of Costs:
    - Directly traceable Quality Control costs assigned to the respective cost object.
    - Assignment based on benefits received, apportioned to cost objects in proportion to the benefits.
7. Presentation: If material, Quality Control cost presented as a separate cost head with suitable classification.
8. Disclosures:
    - Disclosures include the basis of distribution of Quality Control cost, quantity and cost of resources used, payments to related parties, foreign exchange costs, abnormal portions, and penalties and damages excluded.
    - Made where material, significant, and quantifiable, in the body of the Cost Statement, footnotes, or separate schedules.
    - Any changes in cost accounting principles affecting Quality Control costs disclosed, indicating the extent of ascertainability.

CAS – 22 Cost Accounting Standard on "Manufacturing Cost"

This standard deals with the principles and methods of determining the Manufacturing Cost of excisable goods.

This standard deals with the principles and methods of classification, measurement and assignment for determination of the Manufacturing Cost of excisable goods and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Manufacturing Cost of excisable goods.

Scope

This standard should be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Manufacturing Cost of excisable goods.

CAS – 23 Cost Accounting Standard on "Overburden Removal Cost"

The standard deals with the principles and methods of measurement and assignment of Overburden Removal Cost and the presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity, consistency in the principles, methods of determining and assigning Overburden Removal Cost with reasonable accuracy.

Scope

The standard shall be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Overburden Removal Cost including those requiring attestation.

CAS – 24 Cost Accounting Standard on "Treatment of Revenue in Cost Statements"

This standard deals with the principles and methods of classification, measurement, treatment and assignment of revenue and its presentation and disclosure in cost statements.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods for treatment of revenue in cost statements with reasonable accuracy.

Scope

This standard shall be applied to cost statements which require classification, measurement, treatment, assignment, presentation and disclosure of revenue including those requiring attestation.

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. What is the primary objective of Cost Accounting Standards (CAS)?
   A) Ensure profitability
   B) Ensure consistency and standardization in cost accounting practices
   C) Minimize costs
   D) Maximize revenue
2. Who formulates Cost Accounting Standards in India?
   A) Ministry of Corporate Affairs
   B) Institute of Chartered Accountants of India (ICAI)
   C) Institute of Cost Accountants of India (ICAI)
   D) Securities and Exchange Board of India (SEBI)
3. In which section of the Companies Act, 2013, is the provision related to the maintenance of cost records and cost audit found?
   A) Section 142
   B) Section 148
   C) Section 164
   D) Section 176
4. What is the primary focus of CAS-11?
   A. Determining principles for sales and distribution overheads
   B. Outlining principles for administrative overheads
   C. Establishing guidelines for financial reporting
   D. Addressing manufacturing costs
5. CAS 6 focuses on
   A) Material Cost
   B) Employee Cost
   C) Activity-Based Costing
   D) Repairs and Maintenance Cost
6. Which CAS deals with the classification, measurement, and assignment of administrative overheads?
   A) CAS 3
   B) CAS 8
   C) CAS 11
   D) CAS 15

7. What does CAS 16 cover?

   A) Borrowing Costs

   B) Selling and Distribution Overheads

   C) Cost of Transportation

   D) Standard Costing

8. Which CAS deals with the classification, measurement, and assignment of selling and distribution overheads?

   A) CAS 3

   B) CAS 8

   C) CAS 11

   D) CAS 15

9. Which term is defined by CAS-15: Definitions as the cost incurred due to unforeseen circumstances and not part of normal business operations?

   A. Absorption of Overheads

   B. Abnormal Cost

   C. Imputed Costs

   D. Selling Overheads

10. Which section of the Companies Act, 2013, deals with the adoption and adherence to Cost Accounting Standards (CAS)?

    A) Section 135

    B) Section 148

    C) Section 170

    D) Section 184

11. CAS 9 specifically deals with:

    A) Employee Cost

    B) Packing Material Cost

    C) Direct Expenses

    D) Repairs and Maintenance Cost

12. What principle is encouraged by CAS-15 for transparency in the disclosure of changes in cost accounting principles?

    A. Confidentiality

    B. Consistency

    C. Transparency

    D. Secrecy

13. CAS 17: Cost of Transportation primarily focuses on:
    A) Classification of transportation costs
    B) Measurement of transportation costs
    C) Assignment of transportation costs
    D) Determination of total transportation costs
14. What does CAS 22: Intangible Assets primarily cover?
    A) Classification of intangible assets
    B) Measurement of intangible assets
    C) Assignment of intangible assets costs
    D) Determination of total intangible assets
15. CAS 23: Overheads for Intermediary Services deals with:
    A) Classification of intermediary service costs
    B) Measurement of intermediary service costs
    C) Assignment of intermediary service costs
    D) Determination of total intermediary service costs
16. What does CAS-11 emphasize regarding the treatment of abnormal administrative costs?
    A. Inclusion in cost calculations
    B. Exclusion from cost calculations
    C. Separate disclosure in footnotes
    D. Attestation by external auditors
17. Which of the following is a key significance of CAS in cost accounting practices?
    A. Increasing the subjectivity of cost information
    B. Reducing transparency in financial reporting
    C. Enhancing the reliability, comparability, and relevance of cost information
    D. Limiting the scope of cost management
18. What does CAS contribute to in terms of transparency?
    A. Complexity in cost structures
    B. Ambiguity in cost reporting
    C. Clear and understandable disclosure of relevant cost information
    D. Hiding cost details from stakeholders
19. How does CAS promote improved decision-making within organizations?
    A. By introducing ambiguity in cost information
    B. By providing inaccurate cost data
    C. By ensuring accurate and reliable cost information
    D. By limiting the availability of cost data

20. Which of the following classifies cost as direct and indirect cost as per CAS 1
    A. By nature of expenses.
    B. By nature of traceability.
    C. By function.
    D. By nature of behavior.

Answer:

1	B	2	C	3	B	4	B	5	A	6	C	7	A	8	D
9	B	10	B	11	B	12	C	13	C	14	C	15	C	16	B
17	C	18	C	19	C	20	B								

⊙ State True or False

1. CAS 19 stands for Joint Cost.
2. Cost Accounting Standard Board should have minimum three eminant practicing members of the Insititute of Cost Accounts of India.
3. The function of CASB is to issue the framework for the Cost Accounting Standard.
4. CAS 2 stands for classification of cost.
5. The objective of CAS 10 is to bring uniformity and consistency in the period and methods of determining the direct expenses with reasonable accuracy.

Answer

1	True	2	False	3	True	4	False	5	True

⊙ Fill in the Blanks

1. CAS 9 stands for _____.
2. The _____ of the CASB will be nominated by the council of The Institute of Cost Accountants of India.
3. _____ nominee from the regulate like CAG, RBI to the CASB Board.
4. CAS _____ stands for cost of service cost centre.
5. The function of CASB is to assists the members in preparations of uniform _____ under various statue.

Answer

1	Predetermined	2	chairman
3	four	4	13
5	cost statement		

Short Question

1. What is the main objective of Cost Accounting Standards (CAS)?
2. Who formulates and issues Cost Accounting Standards in India?
3. In which section of the Companies Act, 2013, is the provision related to the maintenance of cost records and cost audit found?
4. Explain the purpose of CAS 4: Cost of Production for Captive Consumption.
5. Which CAS specifically deals with the classification, measurement, and assignment of material costs?
6. What is the primary focus of CAS 11: Administrative Overheads?
7. Briefly describe the coverage of CAS 16: Borrowing Costs.
8. What is the significance of CAS 20: Total Cost in cost accounting practices?
9. Which CAS is related to the determination of cost for items intended for captive consumption?
10. In the context of CAS, what does "standard costing" refer to, and which CAS provides guidelines for it?

Essay type questions

1. What is the significance of cost accounting standards?
2. How did cost accounting standards evolve in India?
3. Discuss the legal provisions for maintaining and cost records and the audit of the same.
4. CAS 1 gives details of classification of cost. Explain the various classifications of costs as given in CAS 1, highlighting the significance and implications of each classification.
5. Write short notes on
   i. CAS 1: Classification of Cost,
   ii. CAS 3: Production and Operation Overheads,
   iii. CAS 6: Material Cost,
   iv. CAS 7: Employee Cost,
   v. CAS 10: Direct Expenses,
   vi. CAS 11: Administrative Overheads,
   vii. CAS 15: Selling and Distribution Overheads,
   viii. CAS 19: Joint Cost.
   ix. CAS 21: Quality Control.

Cost Book Keeping 4

This Module includes

4.1 Cost Book - Keeping

4.2 Reconciliation of Costing and Financial Profit

4.3 Integrated Accounting System

Cost Book Keeping

SLOB Mapped against the Module:

To provide a conceptual framework of the cost record keeping and its integration with financial accounting (CMLO 4a)

Module Learning Objectives:

After studying this module, the students will be able to –

- Conceptualise the methods of recording of cost transactions
- Rationalise the importance of maintaining integrated system of cost book keeping.
- Understand the reconciliation process of costing profit or loss with financial profit or loss.

Cost Book - Keeping

4.1

Introduction

Maintaining cost records is of prime importance, particularly due to legal provisions outlined in the Companies Act, 2013, and the Companies (Cost Records and Audit) Rules, 2014. Several reasons underscore the significance of cost records in India, some of which may be outlined below:

1. **Legal Compliance:** The Companies Act, 2013, mandates certain classes of companies to maintain cost records as specified by the government[1]. Adhering to these legal requirements is crucial for compliance and can help companies avoid penalties, legal consequences, or regulatory issues.
2. **Government Regulations:** The Companies (Cost Records and Audit) Rules, 2014[2], provide specific guidelines on the maintenance of cost records, including the classes of companies that need to comply. These rules are instrumental in ensuring standardized and transparent cost accounting practices across industries.
3. **Cost Audit requirement:** Companies falling within the specified classes are required to undergo cost audit. The cost audit ensures that the cost records are accurate and comply with the prescribed standards. The companies are also are required to submit the cost audit report to the Board of Directors and subsequently to the Central Government. This reporting ensures transparency and compliance with the legal framework.

Thus, for the specified companies[3] for which cost audit is mandatory, the maintenance of cost records is required.

As such, the financial accounting system is designed to create records exclusively for the monetary aspects of each business transaction. In contrast, the cost accounting system is established with the intention of fulfilling its own distinct set of objectives viz; cost ascertainment, cost control, cost reporting, etc. Both systems gather transactions from the same invoices, vouchers, or receipts. The cost accounting system then organizes costs based on functions, departments, or products. While real accounts and nominal accounts play a direct role in determining product costs, personal accounts and cash or bank accounts are not directly linked to ascertaining costs. In the maintenance of a cost accounting system, specific records are kept to document day-to-day transactions, and adherence to a double-entry system is not mandatory. Cost books in cost accounting are managed under two systems:

1. Section 148 of the Companies Act, 2013, grants the Central Government the authority to prescribe the maintenance of cost records for certain classes of companies.
2. In exercise of the powers conferred by Section 148, the Central Government has formulated the Companies (Cost Records and Audit) Rules, 2014, which specify the classes of companies that are required to maintain cost records. These classes are primarily determined based on the nature of the industry or business activities.
3. The Companies (Cost Records and Audit) Rules, 2014, provide the framework for identifying the classes of companies that are required to maintain cost records and undergo cost audit. The list of industries and the criteria for applicability may be revised by the Central Government from time to time.

1. Non-integral or non-integrated cost accounting, and
2. Integral or integrated cost accounting.

The integrated system combines the maintenance of cost and financial accounts, whereas the non-integrated system keeps these records separate.

Non-integrated cost accounting

Non-integrated cost accounting is a specialized accounting system that maintains separate ledgers for cost accounts and financial accounts within an organization. Unlike integrated systems that consolidate cost and financial information, the non-integrated approach focuses solely on capturing transactions related to the production or provision of specific products or services. This distinct accounting methodology is designed to offer a more detailed and targeted analysis of costs associated with various operational facets.

In a non-integrated cost accounting system, the cost accounts limit themselves to recording transactions directly linked to the product or service being offered. This typically includes expenses related to sales, production, and other items managed *within* the operational confines of the factory or service provision. By concentrating on these specific cost elements, non-integrated systems provide a more granular view of the financial implications of production processes.

One noteworthy feature of non-integrated systems is their ability to handle notional expenses, such as rent or interest on capital tied up in stock. Notional expenses are theoretical or imputed costs that may not involve actual cash outflows but are crucial for comprehensive cost analysis.

For example, accounting for notional rent allows for meaningful comparisons between factories, whether owned or rented, contributing to strategic decision-making.

Unlike financial accounting, non-integrated systems exclude certain elements such as general expenses, purchases, and balance sheet items like fixed assets, debtors, and creditors. The exclusion of these items results in a simplified set of accounts. The representation of the excluded items is consolidated into a single account known as the cost ledger control account.

In essence, non-integrated cost accounting systems provide organizations with a focused and detailed approach to understanding and managing the costs associated with specific products or services. By segregating cost accounts from financial accounts, this system allows for targeted analysis, cost control, and strategic decision-making within the operational context of the organization.

Basic Features of Non-Integral System:

1. Separate ledgers are maintained for cost and financial accounts.
2. Analogous to financial accounting, it is also based on double entry system.
3. There are no personal accounts because cost accounts do not show relationship with outsiders.
4. Cost accounts are concerned with impersonal accounts i.e., real and nominal accounts.
5. In real accounts, only stocks are shown in cost accounts.
6. Transactions affecting the nominal accounts are recorded separately in detail. Thus, cost accounting department is concerned mainly with the ascertainment of income and expenditure of business,
7. Under this system one main ledger (i.e., Cost Ledger) and various subsidiary ledgers are maintained,
8. Since the system is not properly integrated, some items may appear in financial ledgers only, while some other items appear only in cost ledger,
9. The profit or loss disclosed by the two sets of accounts for a particular period will never be the same and as such a reconciliation of costing profit or loss with that of financial accounts is essential.

Principal Ledgers in non-integrated system

In a non-integrated cost accounting system, two separate sets of books are maintained: one for cost accounts and the other for financial accounts. The cost accounts in this system do not show personal accounts and are concerned with impersonal accounts, i.e., real and nominal accounts. This system is characterized by the absence of personal accounts, the maintenance of separate ledgers for cost and financial accounts, and the use of control accounts to keep the two sets of accounts continuously in agreement. The following are the important accounts to be maintained under a non-integrated cost accounting system:

1.. The principal financial ledgers are:

i. **General Ledger:** It contains all real, nominal and personal accounts except trade debtors and trade creditors account.

ii. **Debtors Ledger:** It has personal accounts of trade debtors.

iii. **Creditors Ledger:** It has personal accounts of trade creditors.

2. The principal cost ledgers are:

i. **Cost Ledger:** It is the principal ledger in cost books which controls all other ledgers in the costing department. It contains all impersonal accounts and is similar to General Ledger of financial accounts.

ii. **Stores Ledger:** It contains all stores related transactions.

iii. **Work-in-Progress Ledger:** It is a subsidiary ledger. It contains a separate account for each job in progress. Each such account is debited with the materials costs, wages and overheads chargeable to the jobs and credited with the cost of work completed. The balance in this account shows the cost of uncertified work.

iv. **Finished Goods Ledger:** It is a subsidiary ledger. It contains accounts of completely finished goods and jobs. The cost ledger is made self-balancing by opening a control account for each of the above subsidiary ledgers.

In addition to the above, various other ledger accounts may be needed for the recording of the transfers. Some of them are given below;

- **Wages Control Account –** Total wages (direct or indirect) paid or payable is debited to this account. Direct wages are transferred to work in progress account and indirect wages are transferred to respective overheads account i.e., factory, administration, selling and distribution.
- **Factory Overheads Control Account –** This account is debited with indirect manufacturing expenses incurred such as indirect material, indirect labour, indirect expenses. It is credited with the amount of overheads absorbed and is transferred to work in progress control account. The difference between overheads incurred and overheads absorbed (i.e., under or over absorbed overheads) is transferred to costing profit and loss account or overheads adjustment account.
- **Finished Goods Control Account –** This account is debited with the value of goods transferred from work in progress control account and administrative overheads recovered. This account is credited with the cost of sales account. The opening and closing balance represent the value of finished goods lying in godown.
- **Administration Overheads Control Account –** This account is debited with administration overheads incurred. Administration overheads recovered is credited to this account and debited to finished goods control account. The difference between administration overheads incurred and recovered is transferred to overheads adjustment account or costing profit and loss account.

- **Selling and Distribution Overheads Control Account –** This account is debited with selling and distribution overheads incurred. Selling and distribution overheads recovered is credited to this account and debited to cost of sales account. The difference between selling and distribution overheads incurred and recovered is transferred to overheads adjustment account or costing profit and loss account.
- **Cost of Sales Account –** This account is debited with the cost of finished goods transferred from finished goods control account and selling & distribution overheads recovered (transferred from selling and distribution overheads control account). The balance of this account is transferred to costing profit and loss account.
- **Costing Profit and Loss Account –** This account is debited with the amount of cost of sales (transferred from cost of sales account), under recovery of overheads and abnormal losses and is credited with sales value (the amount of sales value is debited to cost ledger control account), over absorbed overheads and abnormal gains. The net profit or loss in this account is transferred to cost ledger control account.
- **Overheads Adjustment Account –** This account will be debited for under recovery of overheads and credited with over recovery of overheads amount. The net balance in this account is transferred to costing profit and loss account. Sometimes, overheads adjustment account is not maintained and under / over absorbed overheads is transferred to costing profit and loss account from the respective overheads accounts.

Entries to Record Transactions under Non-Integrated System

Sl. No.	Particulars
1.	**Materials purchased** Stores Ledger Control account ..... Dr. To General Ledger Adjustment a/c
2.	**Material purchased for a special job** Work in Progress Control a/c ..... Dr. To General Ledger Adjustment a/c
3.	**For issue of direct materials to production department** Work in Progress Control a/c ..... Dr. To Stores Ledger Control a/c
4.	**For issue of Indirect materials to production departments** Overheads Control a/c ..... Dr. To Stores Ledger Control a/c
5.	**For returning materials to supplier** General Ledger Adjustment a/c ..... Dr. To Stores Ledger Control a/c
6.	**For materials returned from production department** Stores Ledger Control a/c ..... Dr. To Work in Progress Control a/c
7.	**For materials transferred from job to job** No entry is passed in control account. ..... Dr. In work in progress ledger the following Entry is passed ..... Dr. Transferee Job a/c ..... Dr. To Transferor Job a/c

8.	**For total salary and wages paid** Wages Control a/c ..... Dr. To General Ledger Adjustment a/c
9.	**For allocation of direct and Indirect labour** Work in Progress Control a/c ..... Dr. Overheads Control a/c ..... Dr. To Wages Control a/c
10.	**For recording direct expenses** Work in Progress Control a/c ..... Dr. To General Ledger Adjustment a/c
11.	**For recording overheads incurred and accrued** Overheads Control a/c ..... Dr. To General Ledger Adjustment a/c
12.	**For adjusting under or over absorption overheads** The overheads control account is closed by transferring to overheads suspense account.
13.	**For recording finished stock produced** Finished Goods Stock Ledger Control a/c ..... Dr. To Work in Progress Control a/c
14.	**When finished goods are sold at cost** Cost of Sales a/c ..... Dr. To Finished Goods Stock Ledger Control a/c
15.	**When finished goods are sold at total sales value** General Ledger Adjustment a/c ..... Dr. To Costing Profit and Loss a/c
16.	**For recording sales returns** Costing Profit and Loss a/c ..... Dr. To General Ledger Adjustment a/c
17.	**For recording total cost to make and sell** Cost of Sales a/c ..... Dr. To Costing Profit and Loss a/c
18.	**For recording under absorption of overheads which is not yet adjusted** Costing Profit and Loss a/c ..... Dr. To Overheads Suspense a/c
19.	**For recording over absorption of overheads which is not yet adjusted** Overheads Suspense a/c ..... Dr. To Costing Profit and Loss a/c
20	**For recording profit** Costing Profit and Loss a/c ..... Dr. To General Ledger Adjustment a/c

Illustration 1

Pass Journal Entries in the Cost Books of Sulekha Ltd which follows non-integrated system for the following transactions.

1. Materials worth ₹ 50,000 returned to stores from job
2. Gross total wages paid ₹ 96,000.
3. Employer's contribution to PF and State Insurance amount to ₹ 4000.
4. Wages analysis book detailed ₹ 40,000 direct labour,
5. ₹ 24,000 towards indirect factory labour
6. ₹ 20, 000 towards salaries to office staff and ₹ 16,000 for salaries to selling and distribution staff

Solution

Particulars	Dr. (Amount in ₹)	Cr. (Amount in ₹)
Stores Ledger Control A/c	50,000	
To Work-in-progress Control A/c		50,000
[Being material returned from stores]		
Wages Control A/c	1,00,000	
To General Ledger Adjustment A/c		96,000
To Provident Funds and Erployees State Insurance A/c		4,000
[Being gross total wages paid]		
Work-in-progress Control A/c	40,000	
Factory Overheads Control A/c	24,000	
Office Overheads Control A/c	20,000	
Selling Overheads Control A/c	16,000	
To Wages Control A/c		1,00,000
[Being wages allocated]		

Illustration 2

On 31st March, 2022 the following balances were extracted from the books of the Cocoon Ltd.

Particulars	**Dr. (₹)**	**Cr. (₹)**
Stores Ledger Control A/c	35,000	
Work in Progress Control A/c	38,000	
Finished Goods Control A/c	25,000	
Cost Ledger Control A/c		98,000
	98,000	98,000

The following transactions took place in April 2022:

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

Factory overheads are applied to production at 150% of direct wages, any under / over absorbed overheads being carried forward for adjustment in the subsequent months. All administrative and selling expenses are treated as period costs and charged off to the Profit and Loss Account of the month in which they are incurred.

Show the following Accounts:

a) Wages Control A/c
b) Cost of Goods Sold A/c
c) Selling and Administrative Expenses A/c
d) Cost Ledger Control A/c
e) Stores Ledger Control A/c
f) Work in Progress Control A/c
g) Finished Goods Stock Control A/c
h) Factory Overheads Control A/c
i) Costing Profit and Loss A/c
j) Trial Balance as at 30th April 2022

Solution:

Cost Ledger Control Account

Particulars	₹	Particulars	₹
To Stores Ledger Control A/c	3,000	By Balance b/d	98,000
To Costing Profit and Loss A/c	3,00,000	By Stores Ledger Control A/c	95,000
		By Wages Control A/c	40,000
To Balance c/d	95,000	By Wages Control A/c	25,000
		By Factory Overheads Control A/c	50,000
		By Selling and Administrative Exp A/c	40,000
		By Costing Profit and Loss A/c	50,000
	3,98,000		3,98,000

Stores Ledger Control Account

Particulars	₹	Particulars	₹
To Balance b/d	35,000	By Cost Ledger Control A/c	3,000
To Cost Ledger Control A/c	95,000	By Work in Progress Control A/c	98,000
To Work in Progress Control A/c	3,000	By Balance c/d	32,000
	1,33,000		1,33,000

Wages Control Account

Particulars	₹	Particulars	₹
To Cost Ledger Control A/c	40,000	By Work in Progress Control A/c	40,000
To Cost Ledger Control A/c	25,000	By Factory Overheads Control A/c	25,000
	65,000		65,000

Factory Overheads Control Account

Particulars	₹	Particulars	₹
To Wages Control A/c	25,000	By Work in Progress Control A/c (150% x 40,000)	60,000
To Cost Ledger Control A/c	50,000	By Balance c/d	15,000
	75,000		75,000

Work in Progress Control Account

Particulars	₹	Particulars	₹
To Balance b/d	38,000	By Stores Ledger Control A/c	3,000
To Stores Ledger Control A/c	98,000	By Finished Goods Stock Control A/c	2,13,000
To Wages Control A/c	40,000	By Balance c/d	20,000
To Factory Overheads Control A/c	60,000		
	2,36,000		2,36,000

Selling and Administrative Expenses Account

Particulars	₹	Particulars	₹
To Cost Ledger Control A/c	40,000	By Costing Profit and Loss A/c	40,000
	40,000		40,000

Finished Goods Stock Control Account

Particulars	₹	Particulars	₹
To Balance b/d	25,000	By Cost of Goods Sold A/c	2,10,000
To Work in Progress Control A/c	2,13,000	By Balance c/d	28,000
	2,38,000		2,38,000

Cost of Goods Sold Account

Particulars	₹	Particulars	₹
To Finished Goods Stock Control A/c	2,10,000	By Costing Profit and Loss A/c	2,10,000
	2,10,000		2,10,000

Costing Profit and Loss Account

Particulars	₹	Particulars	₹
To Selling & Administrative Exp A/c	40,000	By Cost Ledger Control A/c	3,00,000
To Cost of Goods Sold A/c	2,10,000		
To Cost Ledger Control A/c	50,000		
	3,00,000		3,00,000

Trial Balance as at 30-04-2022

Particulars	Dr. (₹)	Cr. (₹)
Stores Ledger Control A/c	32,000	
Work in Progress Control A/c	20,000	
Finished Goods Control A/c	28,000	
Factory Overheads Control A/c	15,000	
Cost Ledger Control A/c		95,000
	95,000	95,000

Reconciliation of Costing and Financial Profit

4.2

The reconciliation of cost accounting records with financial accounts is a critical process that aligns the detailed cost information maintained by an organization with its broader financial reporting. This practice ensures the consistency and accuracy of financial data across different accounting systems. In this introduction, we will explore the significance of reconciling cost and financial records, examining how this alignment contributes to transparency, regulatory compliance, and informed decision-making within the organizational framework. Additionally, we will delve into the key challenges and complexities involved in reconciling these two sets of records and highlight the proactive measures companies can take to streamline this reconciliation process.

Reasons for difference in Profits of Cost Accounts and Financial Accounts

The difference in profits between cost accounts and financial accounts can arise due to several reasons. These differences stem from the distinct purposes, principles, and scopes of these two accounting systems. Some of the most prominent reasons for variations in profits between cost accounts and financial accounts are given as under:

1. **Scope of Transactions:**
    - **Cost Accounts:** Focus primarily on transactions related to the production or provision of goods and services. Direct costs, indirect costs, and overheads associated with operational activities are emphasized.
    - **Financial Accounts:** Encompass a broader scope, including all financial transactions of the company. This involves not only operational activities but also financing, investing, and non-operational income and expenses.
2. **Timing of Recognition:**
    - **Cost Accounts:** Emphasize the recognition of costs as they are incurred, often on an accrual basis, focusing on the timing of production.
    - **Financial Accounts:** Adhere to generally accepted accounting principles (GAAP) and recognize revenues and expenses based on accrual or cash basis, with an emphasis on periodicity.
3. **Inventory Valuation:**
    - **Cost Accounts:** May use different methods for valuing inventory, such as standard costing or activity-based costing, which can lead to variations in the cost of goods sold.
    - **Financial Accounts:** Follow specific accounting standards (AS, Ind AS) for inventory valuation, which may differ from cost accounting methods.
4. **Treatment of Overheads:**
    - **Cost Accounts:** Allocate overheads costs based on predetermined rates or cost drivers specific to production activities.

- **Financial Accounts:** May allocate overheads differently or include additional overheads not directly linked to production.

5. **Treatment of Non-Operational Items:**
   - **Cost Accounts:** Focus on operational costs directly related to the core business activities.
   - **Financial Accounts:** Include non-operational items such as interest, taxes, and extraordinary items, which can significantly impact net profit.

The specific items of difference may be categorized as under;

(i) Items shown in Financial Accounts

There are a number of items which are included in financial accounts but do not find place in cost accounts. They may be items of income or expense; the former increases the profit and latter reduces the profit.

A. Purely Financial Charges

a) Loss arising from the sale of fixed assets.

b) Loss on sale of investments, discount on debentures, etc.

c) Interest on bank loan, mortgage and debentures.

d) Expenses in connection with issue and transfer of shares

B. Appropriation of Profits

a) Donations and charities

b) Income tax

c) Dividend paid

d) Transfer to Reserves

C. Writing off Intangible and Fictitious Assets

a) Goodwill

b) Patents and Copyrights

c) Advertisement

d) Preliminary Expenses

D. Pure Financial Incomes

a) Rent received or Profit on Sale of Fixed Assets.

b) Share transfer fee received

c) Interest received on Bank Deposits.

d) Dividend received etc.

(ii) Items shown only in Cost Accounts

There are certain items which are included in cost accounts and not in financial accounts. Such items are very few.

e.g., Interest on capital employed, rent for own premises etc

(iii) Over or Under Absorption of Overheads

Overheads are absorbed in Cost Accounts on a certain predetermined estimated basis, while in Financial Accounts, actual amounts incurred are recorded. If there is any over or under absorption, it leads to differences in the profits of both sets of books

(iv) Differences due to different basis of stock valuation and depreciation methods.

Objectives of Reconciliation

a) To assure the mathematical accuracy and reliability of cost accounts.

b) To have proper cost control and ascertainment.

c) To find out the reasons for the profit or loss shown by the financial accounts.

d) To ensure correct profit or loss in financial accounts.

e) To ensure true and fair view of balance sheet of the business concern.

Procedure of Reconciliation

Profit as per Financial Accounts

Add:

1. Items of income included in Cost Accounts but not in Financial Accounts.
2. Items of expenditure included in Financial Accounts and not in Cost Accounts.
3. Amounts by which items of income have been shown in excess in Cost Accounts over the corresponding entries in Financial Accounts.
4. Amounts by which items of expenditure have been shown in excess in Financial Accounts over the corresponding entries in Cost Accounts.
5. Under absorption of Overheads in Cost Accounts.
6. The amount by which closing stock of inventory is overvalued in Cost Accounts.
7. The amount by which opening stock of inventory is undervalued in Cost Accounts.

Less:

1. Items of income included in Financial Accounts but not in Cost Accounts.
2. Items of expenditure (as interest on capital, rent on owned premises etc) included in Cost Accounts but not in Financial Accounts.
3. Amounts by which items of expenditure have been shown in excess in Cost Accounts as compared to the corresponding entries in Financial Accounts.
4. Amounts by which items of incomes have been shown in excess in Financial Accounts as compared to the corresponding entries in Cost Accounts.
5. Over absorption of overheads in Cost Accounts.
6. The amount by which closing stock of inventory in undervalued in Cost Accounts.
7. The amount by which opening stock of inventory is overvalued in Cost Accounts.

Profit as per Cost Accounts

Illustration 3

The net profits of a manufacturing company appeared at ₹ 64,500 as per financial records for the year ended 31st December, 2022. The cost books however, showed a net profit of ₹ 86,460 for the same period. A careful scrutiny of the figures from both the sets of accounts revealed the following facts.

	Particulars	**₹**
1.	Income tax provided in financial books	20,000
2.	Bank Interest (Cr) in financial books	250
3.	Work overheads under recovered	1,550
4.	Depreciation charged in financial records	5,600
5.	Depreciation recovered in cost	6,000
6.	Administrative overheads over-recovered	850
7.	Loss due to obsolescence charged in financial accounts	2,800
8.	Interest on investments not included in cost accounts	4,000
9.	Stores adjustments (Credit in financial books)	240
10.	Loss due to depreciation in stock value	3,350

Prepare Reconciliation Statement.

Solution:

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts as on 31-12-2022

	Amount (₹)	**Amount (₹)**
Profit as per Financial Accounts		64,500
Add: Income tax provided in financial accounts only	20,000	
Works overheads under recovered	1,550	
Loss due to obsolescence charged in financial accounts only	2,800	
Loss due to depreciation in stock value (recorded in financial accounts only)	3,350	27,700
		92,200
Less: Bank interest credited in financial accounts only	250	
Over recovery of depreciation in cost accounts (6,000 – 5,600)	400	
Administrative Overheads over recovered	850	
Interest on investments not included in cost accounts	4,000	
Stores adjustments (credit in financial accounts)	240	5,740
Profit as per Cost Accounts		86,460

Illustration 4

The net profits shown by financial accounts of a company amounted to ₹ 18,550 whilst the profits disclosed by company's cost account for that period were ₹ 28,660. On reconciling the figures, the following difference were noted.

		Amount (₹)
i.	Director's fee not charged in cost accounts	650
ii.	A provision for bad and doubtful debts	570
iii.	Bank interest (cr.)	30
iv.	Income tax	8,300

v. Overheads in the cost accounts were estimated at ₹ 8,500. The charges shown by the financial books was ₹8,320.

vi. Work was started during the year on a new factory and expenditure ₹ 16,000 was incurred. Depreciation of 5% was provided in financial accounts.

Prepare a Statement Reconciling the figures shown by the cost and financial accounts.

Solution:

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts

	Amount (₹)	Amount (₹)
Profit as per Financial Accounts		18,550
Add: Director's fee charged in financial accounts only	650	
Provision for Bad Debt charged in financial accounts only	570	
Income tax shown in financial accounts only	8,300	
Depreciation shown in financial accounts only 16,000 x 5%	800	10,320
		28,870
Less: Bank interest credited in financial accounts only	30	
Over recovery of overheads in cost accounts (8,500 – 8,320)	180	210
Profit as per Cost Accounts		28,660

Illustration 5

During a particular year, the auditors certified the financial accounts, showing profit of ₹ 1,68,000 whereas the same, as per costing books was coming out to be ₹ 2,40,000. Given the following information you are asked to prepare a Reconciliation Statement showing the reasons for the gap.

Trading and Profit & Loss Account

Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening stock A/c	8,20,000	By Sales A/c	34,65,000
To Purchases A/c	24,72,000	By Closing stock A/c	7,50,000
To Direct wages A/c	2,30,000		
To Factory overheads A/c	2,10,000		
To Gross Profit c/d	4,83,000		
	42,15,000		42,15,000
To Administration Expenses A/c	95,000	By Gross Profit b/d	4,83,000
To Selling Expenses A/c	2,25,000	By Sundry Income A/c	5,000
To Net Profit	1,68,000		
	4,88,000		4,88,000

The costing records show:

i. Book value of closing stock ₹ 7,80,000.

ii. Factory overheads have been absorbed to the extent of ₹ 1,89,800.

iii. Sundry income is not considered.

iv. Total absorption of direct wages ₹ 2,46,000.

v. Administration expense are covered at 3% of selling price.

vi. Selling prices include 5% for selling expenses.

Solution:

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts

	Amount (₹)	**Amount (₹)**
Profit as per Financial Accounts		1,68,000
Add: Over Valuation of Closing Stock as per Cost Accounts		
(7,80,000 – 7,50,000)	30,000	
Under recovery of factory overheads (2,10,000 – 1,89,800)	20,200	
Under recovery of Selling Expenses in Cost Accounts		
(2,25,000 – 5% x 34,65,000) = (2,25,000 – 1,73,250)	51,750	1,01,950
		2,69,950
Less: Sundry Income not considered in Cost Accounts	5,000	
Over recovery of wages in cost accounts (2,46,000 – 2,30,000)	16,000	
Over recovery of administration expenses in cost accounts		
(3% x 34,65,000 – 95,000) = (1,03,950 – 95,000)	8,950	29,950
Profit as per Cost Accounts		2,40,000

Illustration 6

A transistor manufacturer, who commenced his business on 1st June, 2022 supplies you with the following information and asks you to prepare a statement showing the profit per transistor sold. Wages and materials are to be charged at actual cost, works overheads at 75% of wages and office overheads at 30% of works cost. Number of transistors manufactured and sold during the year was 540.

Other particulars:

Materials per set	₹ 240
Wages per set	₹ 80
Selling price per set	₹600

If the actual works expenses were ₹32,160 and office expenses were ₹ 61,800, prepare a Reconciliation Statement.

Solution:

Cost Sheet (Computation of Profit as per Cost Accounts)

Particulars Production = 540 transistor set	Cost Per unit ₹	Total Cost ₹
Material	240	1,29,600
Wages	80	43,200
Prime Cost	320	1,72,800
Add: Works Overheads (75% x Wages)	60	32,400
Works Cost	380	2,05,200
Add: Office Overheads (30% x Works Cost)	114	61,560
Cost of Production / Total Cost	494	2,66,760
Add: Profit (Bal. fig.)	106	57,240
Sales	600	3,24,000

Trading and Profit & Loss Account (Computation of Profit as per Financial Accounts)

Particulars	₹	Particulars	₹
To Material A/c	1,29,600	By Sales A/c	3,24,000
To Wages A/c	43,200		
To Works Overheads A/c	32,160		
To Gross Profit c/d	1,19,040		
	3,24,000		3,24,000
To Office Expenses A/c	61,800	By Gross Profit b/d	1,19,040
To Net Profit c/d	57,240		
	1,19,040		1,19,040

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts

	Amount (₹)	Amount (₹)
Profit as per Financial Accounts		57,240
Add: Under recovery of Office Expenses (61,800 – 61,560)	240	240
		57,480
Less: Over recovery of Works Overheads (32,400 – 32,160)	240	240
Profit as per Cost Accounts		57,240

Illustration 7

Given below is the Trading and Profit & Loss Account of Vikas Electronics for the accounting year ended 31st March, 2022.

Dr. **Trading and Profit & Loss Account** **Cr**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Direct Materials (consumed) A/c	3,00,000	By Sales A/c (2,50,000 units @ ₹ 3)	7,50,000
To Direct Wages A/c	2,00,000		
To Factory Expenses A/c	1,20,000		
To Office Expenses A/c	40,000		
To Selling and Distribution Exp. A/c	80,000		
To Net Profit	10,000		
	7,50,000		7,50,000

Normal output of the factory is 2,00,000 units. Factory overheads are fixed upto ₹ 60,000 and office expenses are fixed for all practical purposes, selling and distribution expenses are fixed to the extent of ₹ 50,000 the rest are variable.

Prepare a Statement of Reconciliation of Profit as per Cost Accounts and Financial Accounts.

Solution:

Cost Sheet (Computation of Profit as per Cost Accounts)

Particulars	₹	₹
Material		3,00,000
Wages		2,00,000
Prime Cost		5,00,000
Add: Works Overheads		
Fixed	75,000	
Variable (₹ 1,20,000 - ₹ 60,000)	60,000	1,35,000
Works Cost		6,35,000
Add: Office Expenses		50,000

Cost of Production		6,85,000
Add: Selling and Distribution Overheads		
Fixed	62,500	
Variable (₹ 80,000 - ₹ 50,000)	30,000	92,500
Cost of Sales		7,77,500
Less: Loss		27,500
Sales		7,50,000

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts

	Amount (₹)	Amount (₹)
Profit as per Financial Accounts		10,000
Less: Over recovery of Works Overheads (1,35,000 – 1,20,000)	15,000	
Over recovery of Office Expenses (50,000 – 40,000)	10,000	
Over recovery of Selling and Distribution Overheads (92,500 – 80,000)	12,500	37,500
Profit / (Loss) as per Cost Accounts		27,500

Illustration 8

The financial profit and loss account of a manufacturing company for the year ended 31st March, 2021 is given below:

Dr. **Trading and Profit & Loss Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Opening Stock A/c		By Sales A/c	4,60,000
- Raw Materials	25,000	By Closing Stock A/c	
- Finished Stock	40,000	- Raw Materials	30,000
- WIP	12,500	- Finished Stock	15,000
To Purchases A/c	1,71,000	- WIP	20,700
To Wages (Factory) A/c	30,000		
To Electric Power (Factory) A/c	65,000		
To Gross Profit c/d	1,82,200		
	5,25,700		5,25,700
To Administration Expenses A/c	20,500	By Gross Profit b/d	1,88,200
To Selling Expenses A/c	46,500	By Miscellaneous Revenue A/c	26,800
To Bad Debts A/c	15,600		
To Net Profit	1,32,400		
	2,15,000		2,15,000

The cost accounts of the concern showed a net profit of ₹ 1,32,200. It is seen that the costing profit and loss account is arrived at on the basis of figures furnished below:

Opening stock of raw materials, finished stock and work in progress ₹ 90,800.

Closing stock of raw materials, finished stock and work in progress ₹ 69,500.

Administration Expenses and Miscellaneous Revenue not considered in Cost Accounts.

You are required to prepare a Memorandum Reconciliation Account and reconcile the difference in the profit and loss account.

Solution:

Memorandum Reconciliation Account

Particulars	₹	Particulars	₹
To Over Valuation of Opening Stock in Cost A/c (90,800 – 77,500)	13,300	By Profit as per Financial A/c	1,32,400
To Miscellaneous Revenue not considered in Cost A/c	26,800	By Over Valuation of Closing Stock in Cost A/c (69,500 – 65,700)	3,800
To Profit as per Cost Accounts	1,32,200	By Bad Debts not considered in Cost A/c	15,600
		By Administration Expenses not considered in Cost A/c	20,500
	1,72,300		1,72,300

Valuation of Closing Stock as per Financial Accounts (30,000 + 15,000 + 20,700) = ₹ 65,700

Valuation of Opening Stock as per Financial Accounts (25,000 + 40,000 + 12,500) = ₹ 77,500

Illustration 9

The following represent the Trading and Profit & Loss Account of a manufacturer of a standard fire extinguisher:

Dr. **Trading and Profit & Loss Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Material (used) A/c	29,150.0	By Sales A/c	75,000.000
To Productive wages A/c	18,610.00	By Stock of Finished Goods A/c	1,812.50
To Factory expenses A/c	14,055.00	By Work in progress A/c	
To Gross Profit c/d	20,527.50	- Materials	2,800.00
		- Labour	1,560.00
		- Overheads	1,170.00
	82,342.50		82,342.50
To Administration expenses A/c	13,650	By Gross Profit b/d	20,527.50
To Net Profit	6,877.50		
	20,527.50		20,527.50

1,550 Extinguishers were manufactured during the year, and 1,500 were sold during the same period. The cost records showed that Factory overheads work out at ₹ 8.25 and Administrative Overheads at ₹ 9.0625 per article produced; the Cost Accounts showing an estimated total profit of ₹ 7,031.25 for the year.

From the forgoing information you are required to prepare

a) Factory Overheads Control Account

b) Administration Overheads Control Account in Costing books and

c) An account showing reconciliation between the total net profit as per the Cost Accounts and the net profit shown in Financial Books

Solution:

Factory Overheads Control Account

Particulars	₹	Particulars	₹
To General Ledger Adjustment A/c	14,055.00	By Finished Goods Control A/c	
		(1,550 x 8.25)	12,787.50
		By WIP Control A/c	1,170.00
		By Under Recovery	97.50
	14,055.00		14,055.00

Administration Overheads Control Account

Particulars	₹	Particulars	₹
To General Ledger Adjustment A/c	13,650.00	By Finished Goods Control A/c	14,046.875
To Over recovery	396.875	(1,550 x 9.0625)	
	14,046.875		14,046.875

Memorandum Reconciliation Account

Particulars	₹	Particulars	₹
To Over Recovery of Administrative Overheads	396.875	By Profit as per Financial A/c	6,877.500
		By Under Recovery of Factory Overheads	97.500
To Profit as per Cost Accounts	7,031.250	By Over Valuation of Closing Stock in Cost Accounts	
		(2,265.625 – 1,812.50) (WN 1)	
		Alternatively: 50 x 9.0625	453.125
	7,428.125		7,428.125

Workings:

1. Cost Sheet

	₹	₹	p.u. ₹
Materials		29,150.00	
Wages		18,610.00	
Prime Cost		47,760	
Add: Factory Expenses	1,550 x 8.25	12,787.50	
		60,547.50	
Less: Closing WIP			
Material	2,800.00		
Wages	1,560.00	4,360.00	
Works Cost		56,187.50	
Add: Administration Overheads	1,550 x 9.0625	14,046.875	
Cost of Production		70,234.375	
Less: Closing Stock of Finished Goods	$\frac{70,234.375}{1,550} \times 50$	2,265.625	
Cost of Goods Sold		67,968.75	

Integrated Accounting

4.3

Integrated Accounting is a system where there is a singular set of records being maintained for cost and financial transactions. It eliminates the need for separate accounts in cost accounting and financial accounting. This streamline results in the consolidation of Profit & Loss Accounts, leading to the preparation of a single Profit & Loss Account. This integrated approach facilitates a comprehensive understanding of the cost of each unit and fulfills the legal obligation for balance sheet preparation. Moreover, it provides essential information for the needs of both the costing and finance departments. Notably, there is no creation of a General Ledger Control Account in this integrated system. There is no need for reconciliation of costing and financial results. It serves the purpose of both the accounts.

It's crucial to recognize that integrated accounts serve as a hybrid approach, combining elements of both non-integrated and financial accounting systems. Unlike the non-integrated system, integrated accounts involve the preparation of personal and real accounts, departing from the practice of passing all entries through a general ledger adjustment account. In contrast to the financial accounting system, which lacks a foundation in cost accounting, the integrated accounting system incorporates both personal and real accounts while maintaining a basis in the cost accounting system.

Essential features of Integrated Accounting System

1. Financial transactions not typically required for cost accounting, such as internal cost transactions, prepayments, and accruals, are recorded separately.
2. The stores control account is used to record transactions related to stores. It is debited with the cost of stores purchased, and the corresponding credit is given to either cash or sundry creditors, depending on whether the purchase is made for cash or credit.
3. Wages control account is debited with the wages paid, and a contra-credit is recorded in the cash or bank account.
4. Overheads expenses are debited to the overheads control account, and the corresponding credit is given to either cash, bank account, or sundry creditors.
5. Transactions involving materials, labor costs, and overheads are posted in the stores, wages, and overheads control accounts after conducting suitable cost analysis. At the end of the period, the totals are transferred to the work-in-progress accounts by crediting various control accounts. This process, known as "making third," involves day-to-day cost analysis and is not recorded as typical ledger transactions but serves as a form of cost analysis.
6. All advance payments are credited, and accruals are debited to the respective control accounts through contra entries in the prepayments and accrual accounts.
7. In the cost analysis of capital expenditure, the capital asset account is debited, and respective control accounts are credited.

Advantages of Integrated Accounting System

1. In this system, there is no need to reconcile costing profit with financial profit because only one Profit and Loss Account is generated.
2. Substantial reduction in clerical workload is achieved, given that only a single set of books is managed.
3. Retrieving information is straightforward and rapid.
4. This system is cost-effective as it operates on the principle of centralizing the accounting function.

Pre-requisites of integrated accounts

The pre-requisites for integrated accounts include the following:

1. Management needs to decide the extent of integration between the two sets of books. Some entities may opt for integration up to the primary cost or factory cost stage, while others may choose complete integration of the entire accounting records.
2. A suitable coding system must be established to fulfill the accounting requirements of both financial and cost accounts.
3. An agreed-upon routine should be in place for handling provisions for accruals, prepaid expenses, and other adjustments necessary for preparing interim accounts.
4. There should be seamless coordination between the staff responsible for the financial and cost aspects of the accounts, ensuring the efficient processing of accounting documents.

The following table shows the comparative journal entries in financial accounts, cost accounts and integral accounts:

Sl. No.	Transactions	Financial Accounts	Cost Accounts	Integral Accounts
1.	Credit purchase of Material	Purchases A/c Dr To Creditors	Material Control A/c Dr To G L Adjustment A/c	Material Control A/c Dr To Creditors A/c
2.	Cash purchase of Material	Purchase A/c Dr To Cash / Bank A/c	Material Control A/c Dr To G L Adjustment A/c	Material Control A/c Dr To Cash / Bank A/c
3.	Purchase of special material for direct use in job	Purchases A/c Dr To Cash/Creditors A/c	WIP Control A/c Dr To G L Adjustment A/c	WIP Control A/c Dr To Cash / Creditors A/c
4.	Purchase of materials for repairs	Purchases A/c Dr To Cash / Creditors A/c	Factory OH Control A/c Dr To G L Adjustment A/c	Factory OH Control A/c Dr To Cash / Creditors A/c
5.	Materials returned to suppliers	Creditors A/c Dr To Purchases A/c	G L Adjustment A/c Dr To Material Control A/c	Creditors A/c Dr To Material Control A/c
6.	Payment to creditors for supplies made	Creditors A/c Dr To Cash / Bank A/c	No Entry	Creditors A/c Dr To Cash / Bank A/c
7.	Issue of direct materials to production shop	No Entry	WIP Control A/c Dr To Materials Control A/c	WIP Control A/c Dr To Material Control A/c

8.	Issue of indirect materials to production shops	No Entry	Factory OH Control A/c Dr To Material Control A/c	Factory OH Control A/c Dr To Material Control A/c
9.	Return of direct materials to stores	No Entry	Material Control A/c Dr To WIP Control A/c	Material Control A/c Dr To WIP Control A/c
10.	Return of indirect materials to stores	No Entry	Material Control A/c Dr To Factory OH Control A/c	Material Control A/c Dr To Factory OH Control A/c
11.	Materials transferred from one job to another	No Entry	No Entry	No Entry
12.	Adjustment of normal depreciation in material stocks	No Entry	Factory OH Control A/c Dr To Material Control A/c	Factory OH Control A/c Dr To Material Control A/c
13.	Adjustment of normal surplus in material stocks	No Entry	Material Control A/c Dr To Factory OH Control A/c	Material Control A/c Dr To Factory OH Control A/c
14.	Payment of Wages	Wages A/c Dr To Cash / Bank A/c	Wages Control A/c Dr To G L Adjustment A/c	Wages Control A/c Dr To Cash / Bank A/c
15.	Analysis of distribution of wages	No Entry	WIP Control A/c Dr Factory OH Control A/c Dr Admin OH Control A/c Dr S&D OH Control A/c Dr To Wages Control A/c	WIP Control A/c Dr Factory OH Control A/c Dr Admin OH Control A/c Dr S&D OH Control A/c Dr To Wages Control A/c
16.	Payment of Expenses	Expenses A/c Dr To Cash / Bank A/c	Factory OH Control A/c Dr Admin OH Control A/c Dr S&D OH Control A/c Dr To G L Adjustment A/c	Factory OH Control A/c Dr Admin OH Control A/c Dr S&D OH Control A/c Dr To Cash /Bank A/c
17.	Recording of Depreciation	Depreciation A/c Dr To Asset A/c	Factory OH Control A/c Dr Admin OH Control A/c Dr S&D OH Control A/c Dr To G L Adjustment A/c	Factory OH Control A/c Dr Admin OH Control A/c Dr S&D OH Control A/c Dr To Asset A/c
18.	Absorption of Factory Overheads	No Entry	WIP Control A/c Dr To Factory OH Control A/c	WIP Control A/c Dr To Factory OH Control A/c
19.	Spoiled / Defective work	No Entry	Costing Profit & Loss A/c Dr To WIP Control A/c	Costing Profit & Loss A/c Dr To WIP Control A/c
20.	Recording of Cost of Jobs completed	No Entry	Finished Goods Control A/c Dr To WIP Control A/c	Finished Goods Control A/c Dr To WIP Control A/c

21.	Recording of Cost of Goods Sold	No Entry	Cost of Sales A/c Dr To Finished Goods Control A/c	Cost of Sales A/c Dr To Finished Goods Control A/c
22.	Recording of Sales	Cash / Debtors A/c Dr To Sales A/c	G L Adjustment A/c Dr To Costing P & L A/c	Cash / Debtors A/c Dr To Profit and Loss A/c
23.	Absorption of Administration Overheads	No Entry	Finished Goods Control A/c Dr To Admin OH Control A/c	Finished Goods Control A/c Dr To Admin OH Control A/c
24.	Absorption of Selling Overheads	No Entry	Cost of Sales A/c Dr To S & D OH Control A/c	Cost of Sales A/c Dr To S&D OH Control A/c
25.	Under absorption of Overheads	No Entry	Costing Profit and Loss A/c Dr To Overheads Adjustment A/c	Profit and Loss A/c Dr To Overheads Adjustment A/c
26.	Over absorption of Overheads	No Entry	Overheads Adjustment A/c Dr To Costing Profit and Loss A/c	Overheads Adjustment A/c Dr To Profit and Loss A/c

Note:

- G L Adjustment - General Ledger Adjustment
- WIP Control - Work in Progress Control
- Factory OH Control - Factory Overheads Control
- Admin OH Control - Administration Overheads Control
- S & D OH Control - Selling and Distribution Overheads Control
- Costing P & L - Costing Profit and Loss

Illustration 10

Journalise the following transactions assuming that cost and financial accounts are integrated:

Particulars	Amount (₹)
Raw material purchased	40,000
Direct materials issued to production	30,000
Wages paid (30% indirect)	24,000
Wages charged to production	16,800
Manufacturing expenses incurred	19,000
Manufacturing overheads charged to Production	18,000
Selling and distribution cost	4,000
Finished products (at cost)	40,000
Sales	58,000
Closing stock	Nil
Receipts from debtors	13,800
Payments to creditors	12,000

Solution:

Journal

Particulars		Dr. Amount (₹)	Cr. Amount (₹)
Material Control A/c	Dr	40,000	
To Cash A/c			40,000
Work in Progress Control A/c	Dr	30,000	
To Material Control A/c			30,000
Wages Control A/c	Dr	24,000	
To Cash A/c			24,000
Factory Overheads Control A/c (24,000 × 30%)	Dr	7,200	
To Wages Control A/c			7,200
Work in Progress Control A/c (24,000 × 70%)	Dr	16,800	
To Wages Control A/c			16,800
Factory Overheads Control A/c	Dr	19,000	
To Cash			19,000
Work in Progress Control A/c	Dr	18,000	
To Factory Overheads Control A/c			18,000
Selling and Distribution Overheads Control A/c	Dr	4,000	
To Cash A/c			4,000
Cost of Sales A/c	Dr	4,000	
To Selling and Distribution Overheads A/c			4,000
Finished Goods Control A/c	Dr	40,000	
To Work in Progress Control A/c			40,000
Debtors A/c	Dr	58,000	
To Profit and Loss A/c			58,000
Cash A/c	Dr	13,800	
To Debtors A/c			13,800
Creditors A/c	Dr	12,000	
To Cash A/c			12,000

Illustration 11

Pass the journal entries for the following transactions in a double entry cost accounting system:

Particulars	Amount (₹)
a) Issue of Material:	
- Direct	5,50,000
- Indirect	1,50,000
b) Allocation of wages and salaries:	
- Direct	2,00,000
- Indirect	40,000
c) Overheads absorbed in jobs:	
- Factory	1,50,000
- Administration	50,000
- Selling	30,000
d) Under / Over absorbed overheads:	
- Factory (Over)	20,000
- Administration (Under)	10,000

Solution:

Journal

Particulars		**Dr.**	**Cr.**
		Amount (₹)	**Amount (₹)**
Work in Progress Control A/c	Dr	5,50,000	
Factory Overheads Control A/c	Dr	1,50,000	
To Material Control A/c			7,00,000
Work in Progress Control A/c	Dr	2,00,000	
Factory Overheads Control A/c	Dr	40,000	
To Wages Control A/c			2,40,000
Work in Progress Control A/c	Dr	1,50,000	
To Factory Overheads Control A/c			1,50,000
Finished Goods Control A/c	Dr	50,000	
To Administrative Overheads Control A/c			50,000
Cost of Sales A/c	Dr	30,000	
To Selling and Distribution Overheads Control A/c			30,000
Factory Overheads Control A/c	Dr	20,000	
To Costing Profit and Loss A/c			20,000
Costing Profit and Loss A/c	Dr	10,000	
To Administrative Overheads Control A/c			10,000

Illustration 12

ASA LLP maintains Integrated Accounts of Cost and Financial Accounts. From the following details write up Control Accounts of a factory and prepare a Trial Balance.

Particulars	Amount (₹)
Share Capital	3,00,000
Reserve	2,00,000
Sundry Creditors	5,00,000
Plant and Machinery	5,75,000
Sundry Debtors	2,00,000
Closing Stock (Stores)	1,50,000
Bank and Cash Balance	75,000

Transactions during the year were as follows:

Particulars	₹
Stores purchased	10,00,000
Stores issued to production	10,50,000
Stores in hand	95,000
Direct wages incurred	6,50,000
Direct wages charged to production	6,00,000
Manufacturing expenses incurred	3,00,000
Manufacturing expenses charged to production	2,75,000
Selling and distribution expenses	1,00,000
Finished stock production (at cost)	18,00,000
Sales at selling price	22,00,000
Closing stock (Finished Goods)	95,000
Payment to creditors	11,00,000
Receipts from debtors	21,00,000

Solution:

Share Capital Account

Particulars	₹	Particulars	₹
To Balance c/d	3,00,000	By Balance b/d	3,00,000
	3,00,000		3,00,000

Reserve Account

Particulars	₹	Particulars	₹
To Balance c/d	5,15,000	By Balance b/d	2,00,000
		By Profit and Loss A/c	3,15,000
	5,15,000		5,15,000

Sundry Creditors Account

Particulars	₹	Particulars	₹
To Cash and Bank A/c	11,00,000	By Balance b/d	5,00,000
To Balance c/d	4,00,000	By Material Control A/c	10,00,000
	15,00,000		15,00,000

Plant and Machinery Account

Particulars	₹	Particulars	₹
To Balance b/d	5,75,000	By Balance c/d	5,75,000
	5,75,000		5,75,000

Sundry Debtors Account

Particulars	₹	Particulars	₹
To Balance b/d	2,00,000	By Cash and Bank A/c	21,00,000
To Profit and Loss A/c	22,00,000	By Balance c/d	3,00,000
	24,00,000		24,00,000

Material Control Account

Particulars	₹	Particulars	₹
To Balance b/d	1,50,000	By Work in Progress Control A/c	10,50,000
To Sundry Creditors A/c	10,00,000	By Manufacturing OH Control A/c (Bal. fig.)	5,000
		By Balance c/d	95,000
	11,50,000		11,50,000

Cash and Bank Account

Particulars	₹	Particulars	₹
To Balance b/d	75,000	By Wages Control A/c	6,50,000
To Sundry Debtors A/c	21,00,000	By Manufacturing OH Control A/c	3,00,000
		By S & D Overheads Control A/c	1,00,000
		By Sundry Creditors A/c	11,00,000
		By Balance c/d	25,000
	21,75,000		21,75,000

Work in Progress Control Account

Particulars	₹	Particulars	₹
To Material Control A/c	10,50,000	By Finished Goods Control A/c	18,00,000
To Wages Control A/c	6,00,000	By Balance c/d	1,25,000
To Manufacturing OH Control A/c	2,75,000		
	19,25,000		19,25,000

Wages Control Account

Particulars	₹	Particulars	₹
To Cash and Bank A/c	6,50,000	By Work in Progress Control A/c	6,00,000
		By Manufacturing OH Control A/c (Bal. fig.)	50,000
	6,50,000		6,50,000

Manufacturing Overheads Control Account

Particulars	₹	Particulars	₹
To Cash and Bank A/c	3,00,000	By Work in Progress Control A/c	2,75,000
To Material Control A/c	5,000	By Profit and Loss A/c (Bal. fig.)	80,000
To Wages Control A/c	50,000	(Under recovery)	
	3,55,000		3,55,000

Selling and Distribution Overheads Control Account

Particulars	₹	Particulars	₹
To Cash and Bank A/c	1,00,000	By Cost of Sales A/c (Bal. fig. transferred)	1,00,000
	1,00,000		1,00,000

Finished Goods Control Account

Particulars	₹	Particulars	₹
To Work in Progress Control A/c	18,00,000	By Cost of Sales A/c (Bal. fig. transferred)	17,05,000
		By Balance c/d	95,000
	18,00,000		18,00,000

Profit and Loss Account

Particulars	₹	Particulars	₹
To Manufacturing OH Control A/c	80,000	By Sundry Debtors A/c	22,00,000
To Cost of Sales A/c	18,05,000		
To Reserve A/c	3,15,000		
	22,00,000		22,00,000

Cost of Sales Account

Particulars	₹	Particulars	₹
To S & D Overheads Control A/c	1,00,000	By Profit and Loss A/c	18,05,000
To Finished Goods Control A/c	17,05,000		
	18,05,000		18,05,000

Trial Balance

Particulars	Dr. (₹)	Cr. (₹)
Share Capital		3,00,000
Reserve		5,15,000
Sundry Creditors		4,00,000
Plant and Machinery	5,75,000	
Sundry Debtors	3,00,000	
Closing Stock		
- Material	95,000	
- WIP	1,25,000	
- Finished Goods	95,000	
Cash and Bank	25,000	
	12,15,000	**12,15,000**

Illustration 13

The following balances are shown in the Cost Ledger of Vazir Ltd as on 1st October, 2022:

Particulars	Dr. (₹)	Cr. (₹)
Work-in-Progress	7,056	
Factory Overheads Suspense Account	360	
Finished Stock Account	5,274	
Stores Ledger Control Account	9,450	
Administration Overheads Suspense Account	180	
General Ledger Adjustment Account		22,320

Transactions for the year ended 31/03/2022

Particulars	Amount (₹)

Stores issued to production	45,370
Stores purchased	52,400
Material purchased for direct issued to production	1,135
Wages paid (including indirect labour ₹ 2,520)	57,600
Finished goods sold	1,18,800
Administration expenses	5,400
Selling expenses	6,000
Factory overheads	15,600
Stores issued for Capital Work in Progress	1,500
Finished goods transferred to warehouse	1,08,000
Store issued for factory repairs	2,000
Factory overheads recovered to production	16,830
Administration overheads charged to production	4,580
Factory overheads applicable unfinished work	3,080
Selling overheads allocated to sales	5,500
Stores lost due to fire in store (not insured)	150
Finished goods stock on 30/03/2022	14,274

You are required to record the entries in the cost ledger for the year ended 30th September, 2022 and prepare a Trial Balance as on that date.

Solution:

Work in Progress Control Account

Particulars	₹	Particulars		₹
To Balance b/d	7,056	By Finished Goods Control A/c		1,08,000
To Material Control A/c	45,370	By Balance c/d		20,551
To General Ledger Adjustment A/c	1,135	- Factory OH	3,080	
To Wages Control A/c	55,080	- Others	17,471	
To Factory Overheads Control A/c	16,830			
To Factory Overheads Suspense A/c	3,080			
	1,28,551			1,28,551

Factory Overheads Suspense Account

Particulars	₹	Particulars	₹

To Balance b/d	360	By Work in Progress Control A/c	16,830
To Wages Control A/c	2,520	By Work in Progress Control A/c	3,080
To General Ledger Adjustment A/c	15,600	By Balance c/d	570
To Material Control A/c	2,000		
	20,480		20,480

Finished Goods Control Account

Particulars	₹	Particulars	₹
To Balance b/d	5,274	By Cost of Sales A/c	1,03,580
To Work in Progress A/c	1,08,000	By Balance c/d	14,274
To Administrative OH Suspense A/c	4,580		
	1,17,854		1,17,854

Material Control Account

Particulars	₹	Particulars	₹
To Balance b/d	9,450	By Work in Progress Control A/c	45,370
To General Ledger Adjustment A/c	52,400	By Capital Work in Progress A/c	1,500
		By Factory Overheads Suspense A/c	2,000
		By Costing Profit and Loss A/c	150
		By Balance c/d	12,830
	61,850		61,850

Administration Overheads Suspense Account

Particulars	₹	Particulars	₹
To Balance b/d	180	By Finished Goods Control A/c	4,580
To General Ledger Adjustment A/c	5,400	By Balance c/d	1,000
	5,580		5,580

General Ledger Adjustment Account

Particulars	₹	Particulars	₹
To Costing Profit and Loss A/c	1,18,800	By Balance b/d	22,320
To Balance c/d	51,225	By Material Control A/c	52,400
		By Work in Progress Control A/c	1,135
		By Wages Control A/c	57,600
		By Administration OH Control A/c	5,400
		By S&D OH Control A/c	6,000
		By Factory Overheads Suspense A/c	15,600
		By Costing Profit and Loss A/c	9,570
	1,70,025		1,70,025

Wages Control Account

Particulars	₹	Particulars	₹

To General Ledger Adjustment A/c	57,600	By Work in Progress Control A/c	55,080
		By Factory Overheads Suspense A/c	2,520
	57,600		57,600

Costing Profit and Loss A/c

Particulars	₹	Particulars	₹
To Material Control A/c	150	By General Ledger Adjustment A/c	1,18,800
To Cost of Sales A/c	1,09,080		
To General Ledger Adjustment A/c	9,570		
	1,18,800		1,18,800

Selling and Distribution Overheads Control A/c

Particulars	₹	Particulars	₹
To General Ledger Adjustment A/c	6,000	By Cost of Sales A/c	5,500
		By Balance c/d	500
	6,000		6,000

Capital Work in Progress Account

Particulars	₹	Particulars	₹
To Material Control A/c	1,500	By Balance c/d	1,500
	1,500		1,500

Cost of Sales Account

Particulars	₹	Particulars	₹
To S & D OH Control A/c	5,500	By Costing Profit and Loss A/c	1,09,080
To Finished Goods Control A/c	1,03,580		
	1,09,080		1,09,080

Trial Balance

Particulars	Dr. (₹)	Cr. (₹)
Work in Progress Control A/c	20,551	
Factory Overheads Suspense A/c	570	
Finished Goods Control A/c	14,274	
Material Control A/c	12,830	
Administrative Overheads Suspense A/c	1,000	
General Ledger Adjustment A/c		51,225
Capital Work in Progress A/c	1,500	
Selling and Distribution Overheads Control A/c	500	
	51,225	51,225

Exercise

A. Theoretical Questions:

⊙ **Multiple Choice Questions**

1. Which of the following items is not included in preparation of cost sheet?
   A. Carriage inward
   B. Purchase returns
   C. Sales commission
   D. Interest paid

2. Which of the following items is not excluded while preparing a cost sheet?
   A. Goodwill written off
   B. Provision for taxation
   C. Property tax on factory building
   D. Transfer to reserves

3. Which of the following are direct expenses?
   i. The cost of special designs, drawings or layouts
   ii. The hire of tools or equipment for a particular job
   iii. Salesman's wages
   iv. Rent, rates and insurance of a factory
   A. (i) and (ii)
   B. (i) and (iii)
   C. (i) and (iv)
   D. (iii) and (iv)

4. What is prime cost?
   A. Total direct cost only
   B. Total indirect costs only
   C. Total non-production csots
   D. Total production costs

5. Which of the following is not an element of works overheads?
   A. Sales manager's salary
   B. Plant manager's salary
   C. Factory repairman's wages
   D. Product inspector's salary

6. For the purpose of Cost Sheet preparation, costs are classified based on:

   A. Functions

   B. Relevance

   C. Variability

   D. Nature

7. Salary paid to an office supervisor is a part of:

   A. Direct expenses

   B. Administration cost

   C. Quality control cost

   D. Factory overheads

8. Audit fees paid to cost auditors is part of:

   A. Selling and distribution cost

   B. Production cost

   C. Administration cost

   D. Not recorded in the cost sheet

9. A company has set up a laboratory for testing of products for compliance with standards. Salary of this laboratory stuffs are part of:

   A. Direct expenses

   B. Quality control cost

   C. Works overheads

   D. Research and development cost

10. Canteen expenses for factory workers are part of:

    A. Administration cost

    B. Factory overheads

    C. Marketing cost

    D. None of the above

11. Which of the following does not form part of prime cost?

    A. GST paid on raw materials (input credit can be claimed)

    B. Cost of transportation paid to bring materials to factory

    C. Cost of packing

    D. Overtime premium paid to workers

12. A company pays royalty to State Government on the basis of production, it is treated as:
    A. Direct expenses
    B. Factory overheads
    C. Direct Material Cost
    D. Administration Cost

13. In Reconciliation Statements, expenses shown only in financial accounts are:
    A. Added to financial profit
    B. Deducted from financial profit
    C. Ignored
    D. Added to costing profit

14. In Reconciliation Statement, expenses shown only in cost accounts are:
    A. Added to financial profit
    B. Deducted from financial profit
    C. Ignored
    D. Deducted from costing profit

15. In Reconciliation Statement, transfers to reserves are:
    A. Added to financial profit
    B. Deducted from financial profit
    C. Ignored
    D. Added to costing profit

16. In Reconciliation Statement, incomes shown only in financial accounts are:
    A. Added to financial profit
    B. Deducted from financial profit
    C. Ignored
    D. Deducted from costing profit

17. In Reconciliation Statement, Closing Stock undervalued in Financial Accounts is
    A. Added to financial profit
    B. Deducted from financial profit
    C. Ignored
    D. Added to costing profit

18. Under non-integrated accounting system:

    A. Separate ledgers are maintained for cost and financial accounts

    B. Same ledger is maintained for cost and financial accounts by accountants

    C. (A) and (B) both

    D. None of the above

19. Under non-integrated accounting system, the account made to complete double entry is:

    A. Finished goods control account

    B. Work in progress control account

    C. Stores ledger control account

    D. General ledger adjustment account

20. Under non-integrated system of accounting, purchase of raw material is debited to

    A. Purchase account

    B. Material control account / stores ledger control account

    C. General ledger adjustment account

    D. None of the above

21. When costing loss is ₹ 5,600, administrative overheads under-absorbed being ₹ 600, the loss as per financial accounts should be _____ .

    A. ₹ 5,000

    B. ₹ 5,600

    C. ₹ 6,200

    D. None of the above

22. Which of the following items should be added to costing profit to arrive at financial profit?

    A. Income tax paid

    B. Over absorption of works overheads

    C. Interest paid on debentures

    D. All of the above

23. Integral accounts eliminate the necessity of operating _____ .

    A. Cost ledger control account

    B. Store ledger control account

    C. Overheads adjustment account

    D. None of the above

24. What is the primary goal of introducing integrated accounting?
    a. Maintaining separate records
    b. Streamlining cost analysis
    c. Increasing clerical efforts
    d. Reconciling accounts annually
25. Why is reconciliation important in accounting?
    a. To complicate financial reporting
    b. To identify differences in profits
    c. To avoid integration
    d. To discourage cost analysis
26. What characterizes a non-integrated cost accounting system?
    a. Unified ledger system
    b. Separate cost and financial accounts
    c. Sole reliance on cost principles
    d. Complex reconciliation processes
27. In a non-integrated system, what ledger is used for recording indirect costs?
    a. Cost ledger control account
    b. Overheads ledger
    c. Financial ledger
    d. General ledger
28. Which ledger records direct costs in a non-integrated system?
    a. General ledger
    b. Cost ledger control account
    c. Prime cost ledger
    d. Financial ledger
29. What is the primary purpose of the overheads ledger in a non-integrated system?
    a. Recording direct costs
    b. Managing general ledger entries
    c. Controlling indirect costs
    d. Maintaining financial transactions

30. How is the purchase of raw materials typically recorded in a non-integrated system?
    a. Credit to cash account
    b. Debit to general ledger
    c. Debit to stores control account
    d. Credit to sundry creditors
31. What entry is made to record wages paid in a non-integrated system?
    a. Credit entry
    b. Debit entry
    c. Contra entry
    d. No entry is made
32. What is a significant benefit of reconciling cost accounting records with financial accounts?
    a. Increased clerical efforts
    b. Improved transparency
    c. Limited financial reporting
    d. Reduced reconciliation complexity
33. When is the reconciliation of cost accounting records and financial accounts particularly important?
    a. Only in integrated systems
    b. During tax season
    c. At the end of the financial year
    d. In non-integrated systems
34. What defines an integrated accounting system?
    a. Separation of cost and financial records
    b. Streamlining reconciliation
    c. Sole reliance on financial principles
    d. Consolidation of cost and financial information
35. Why is an integrated accounting system considered cost-effective?
    a. Increased clerical workload
    b. Centralization of accounting functions
    c. Complexity of financial reporting
    d. Limited coordination between staff

36. A firm operates an integrated cost and financial accounting system.

    The accounting entries for an issue of direct materials to production would be

    a. DR work in progress control account; CR stores control account

    b. DR finished goods account; CR stores control account

    c. DR stores control account; CR work in progress control account

    d. DR cost of sales account; CR work in progress control account

37. A firm operates an integrated cost and financial accounting system. The accounting entries for direct wages transferred to WIP A/c would be:

    a. Debit Wages control account, Credit Work in progress account

    b. Debit Work in progress account, Credit Wages control account

    c. Debit Cost of sales account, Credit Work in progress account

    d. Debit Finished goods account, Credit Work in progress account

38. A firm operates an integrated cost and financial accounting system. The accounting entries for indirect wages incurred would be:

    a. Debit Wages control account Credit Overheads control account

    b. Debit Work in progress account Credit Wages control account

    c. Debit Overheads control account Credit Wages control account

    d. Debit Wages control account Credit Work in progress account

Answer:

1	**D**	**2**	**C**	**3**	**A**	**4**	**A**	**5**	**A**	**6**	**A**	**7**	**B**	**8**	**C**
9	**B**	**10**	**B**	**11**	**D**	**12**	**A**	**13**	**A**	**14**	**B**	**15**	**A**	**16**	**B**
17	**A**	**18**	**A**	**19**	**D**	**20**	**B**	**21**	**C**	**22**	**B**	**23**	**A**	**24**	**B**
25	**B**	**26**	**B**	**27**	**A**	**28**	**C**	**29**	**C**	**30**	**C**	**31**	**B**	**32**	**B**
33	**C**	**34**	**D**	**35**	**B**	**36**	**A**	**37**	**B**	**38**	**C**				

State True or False:

1. Total cost = Prime cost + All indirect costs.
2. Closing of work in progress should be valued on the basis of prime cost.
3. Closing stock of finished goods should be valued on the basis of cost of sales.
4. Production cost includes only direct costs related to the production.
5. Primary packaging cost is included in distribution cost.
6. Notional interest on owner's capital appears only in financial profit and loss account.
7. Goodwill written off appears only in cost accounts.
8. Overheads are taken on estimated basis in financial accounts.
9. Expenses which appear only in financial accounts and not in cost accounts, are generally notional items.
10. Need for Reconciliation arise in case of integrated system of accounts.
11. Cost ledger control account makes the cost ledger self-balancing.
12. Stock ledger contains the accounts of all items of finished goods.
13. The purpose of cost control accounts is to control the cost.
14. Cost control accounts are prepared on the basis of double entry system.
15. The balancing in costing profit and loss account represents under or over absorption of overheads.

Answer:

1	T	2	F	3	F	4	F	5	F	6	F	7	F	8	F
9	F	10	F	11	T	12	T	13	F	14	T	15	F		

⊙ **Fill in the Blanks**

1. Prime cost + Overheads = _____
2. Total cost + Profit = _____
3. _____ + Profit = Sales
4. Direct Material + _____ + Direct Expenses = Prime Cost
5. Salary paid to factory manager is an item of _____.
6. In Reconciliation Statements, income shown only in Financial Accounts are _____.
7. In Reconciliation Statements, expenses shown only in cost accounts are _____.
8. In Reconciliations Statements, overheads Over-Recovered in cost accounts are _____.
9. In Reconciliation Statements, overheads Under Recovered in cost accounts are _____.
10. Notional remuneration to owner is expense debited only in _____.
11. All the transactions relating to materials are recorded through _____.
12. The net balance of _____ represents net profit or net loss.
13. WIP ledger contains the accounts of all the _____ which are under _____.
14. The two traditional systems of accounting for integration of cost and financial accounts are the _____ and _____.
15. Under integrated accounting system, the accounting entry for payment of wages is to debit _____ and to credit cash

Answer:

1	**Total Cost**	**2**	**Selling price**
3	**Cost of sales**	**4**	**Direct Wages**
5	**Factory Overheads**	**6**	**Added to Costing Profit.**
7	**Deducted from Financial Profit / Added to Costing Profit**	**8**	**Deducted from financial profit / added to costing profit**
9	**Added to financial profit / deducted from costing profit.**	**10**	**Cost Accounts**
11	**Stores ledger control account**	**12**	**Costing Profit and Loss**
13	**Jobs or works in process, several job accounts**	**14**	**Double entry method, third entry method**
15	**Wages Control Accounts**		

Short answer type questions:

1. Mention six items which are not shown in preparation of cost sheet. Also state the reason for which they are not included in the cost sheet.
2. 'Maintaining of cost records, cost of audit of the same and reporting is mandatory for specified companies' – explain the statement with reference to the Companies Act 2013.
3. What is Non-integrated cost accounting? What are its basic features?
4. What are the reasons for difference in Profits of Cost Accounts and Financial Accounts?
5. What is integrated accounting system? What are the essential feature of such accounting system?

SECTION-B

Methods of Costing

Methods of Costing 5

This Module Includes

5.1 Job Costing

5.2 Batch Costing

5.3 Contract Costing

5.4 Process Costing – Normal and Abnormal Losses, Equivalent Production, Inter- process Profit, Joint and By Products

5.5 Operating Costing – Transport, Hotel and Healthcare

Methods of Costing

SLOB Mapped against the Module:

To appreciate various cost accumulation processes designed with due consideration to the nature of output. (CMLO 3b)

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand cost assimilation in specific order costing
- Understand the cost assimilation process in industries where process costing is followed.
- Understand the cost assimilation process in service industries

Job Costing

5.1

Methods of Costing – An Introduction

The main purpose of costing is to ascertain the cost of production, control costs, and improve efficiency rates. In this regard, the methods of costing used are of critical importance. Different industries use different methods of costing depending on their nature of work. The methods of costing refer to the various techniques and approaches employed by businesses to determine the cost of producing goods or services. These methods are crucial for accurate financial analysis, decision-making, and pricing strategies. Several costing methods exist, each tailored to suit different industries and production processes. As such, there are two specific methods of costing; specific order costing and operation costing (this is also referred as process costing). Specific order costing can be classified either as job costing, batch costing or contract costing. Figure 5.1 shows the classification of the methods of costing.

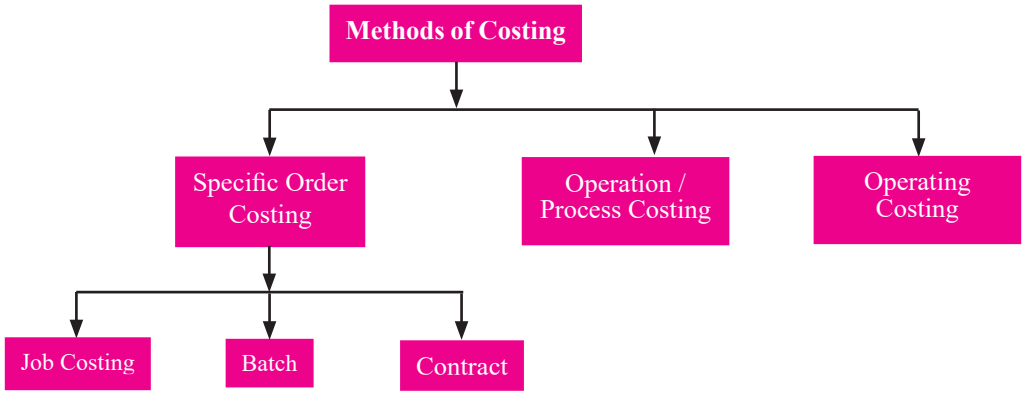


Figure 5.1: Methods of Costing

Specific Order Costing: Specific order costing is a cost accounting method used for unique, custom-made products or services, where costs are accumulated for each individual order or project. This approach ensures accurate cost tracking and pricing tailored to the specific requirements of each customer order.

CIMA official Terminology (2005) defines specific order costing as "the basic costing method applicable where work consists of separate contracts, jobs or batches, each of which is authorized by a special order or contract." Thus, if products are identified as individual units according to the terms of the Jobs, Contracts or Batches, Specific Order Costing is followed by the organisation concerned.

5.1.1 Job Costing

Job Costing is the accounting system that traces costs to individual units or to specific jobs, contracts, or batches of goods.The method is also known by various other names, such as specific order costing, production order costing, job lot costing or lot costing.

According to the terminology of CIMA London, Job Costing is "the basic costing method applicable where work consists of separate contracts, jobs or batches, each of which is authorized by a specific order or contract."

A job is simply a product or service that can be easily (in other words, at reasonable cost) distinguished from other products or services and for which the firm desires that a specific cost be recorded for the product or service. Firms that produce jobs are often called job shops. The record of the cost of the job kept in the accounting system is called job cost sheet or job cost cards.

> A job is a 'customer order or task of relatively short duration'.
>
> Job costing is a 'form of specific order costing where costs are attributed to individual jobs'.
>
> **CIMA Official Terminology**

Features of Job Costing

1. Each job maintains its separate identity throughout the production stage.
2. The job is meant for a specific customer and not meant for a mass market.
3. Production pattern is not repetitive and continuous.
4. Production begins only after getting order from the customer.
5. Each job is executed as per the requirement of the customer. Each job order is considered as a separate cost unit.
6. Duration of production cycle is usually short but a large order may extend beyond one year.
7. A Job Cost Sheet is prepared and Job Register is maintained to record particulars of the job like price, date of commencement, special requirement etc. Profit or Loss is calculated on the completion of the job.

Advantages of Job Costing

Job costing offers the following advantages:

(a) The cost of material, labour and overheads for every job or product in a department is available daily, weekly or as often as required while the job is still in progress.

(b) On completion of a job, the cost under each element is immediately ascertained. Costs may be compared with the selling prices of the products in order to determine their profitability and to decide which product lines should be pushed or discontinued.

(c) Historical costs for past periods for each product, compiled by orders, departments or machines, provide useful statistics for future production planning and for estimating the costs of similar jobs to be taken up in future. This assists in the prompt furnishing of price quotations for specific jobs.

(d) The adoption of predetermined overheads rates in job costing necessitates the application of a system of budgetary control of overheads with all its advantages.

(e) The actual overheads costs are compared with the overheads applied at predetermined rates; thus, at the end of an accounting period, overheads variances can be analysed.

(f) Spoilage and defective work can be easily identified with specific job or product

(g) Job costing is particularly suitable for cost plus and such other contracts where selling price is determined directly on the basis of costs.

Limitations of Job Costing

The limitations of job costing are:

(a) Job costing is comparatively more expensive as more clerical work is involved in identifying each element of cost with specific departments and jobs.

(b) With the increase in the clerical processes, chances of errors are enhanced.

(c) The cost as ascertained, even where they are compiled very promptly, are historical as they are compiled after incidence.

(d) The cost compiled under job costing system represents the cost incurred under actual conditions of operation. The system does not have any scientific basis.

5.1.2 Preparation of Job Cost Sheet

As discussed above, the objective of job costing is to ascertain the cost of a job that is produced as per the requirements of the customers. Hence it is necessary to identify the costs associated with the job and present it in the form of job cost sheet for showing various types of costs. The total cost of a job is recorded in the following manner.

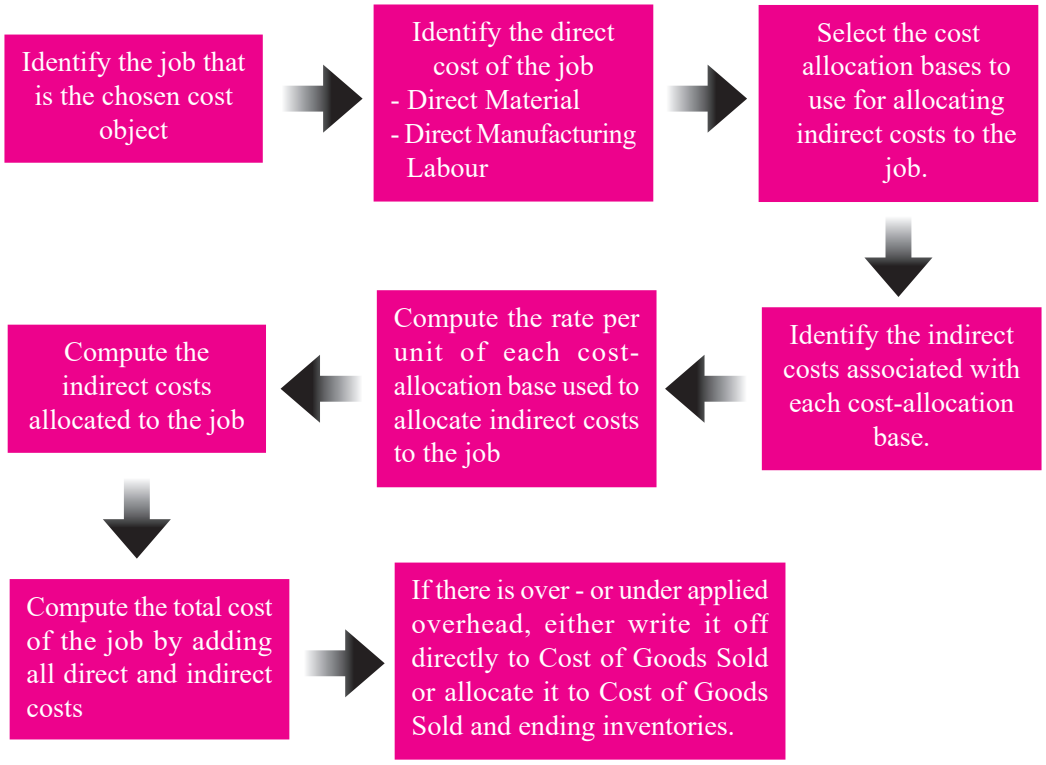


Figure 5.2: Steps in Preparation of Job Cost Sheet

The respective items of cost accumulation process in the job cost sheet are discussed below:

- **Direct Material Costs:** Material used during the production process of a job and identified with the job is the direct material. The cost of such material consumed is the direct material cost. Direct material cost is identifiable with the job and is charged directly. The source document for ascertaining this cost is the material requisition slip from which the quantity of material consumed can be worked out. Cost of the same can be worked out according to any method of pricing of the issues like first in first out (FIFO), last in first out (LIFO) or average method as per the policy of the organisation. The actual material cost can be compared with standard cost to find out any variations between the two. However, as each job may be different from the other, standardization is difficult but efforts can be made for the same.

- **Direct Labour Cost:** This cost is also identifiable with a particular job and can be worked out with the help of 'Job Time Tickets' which is a record of time spent by a worker on a particular job. The 'job time ticket' has the record of starting time and completion time of the job and the time required for the job can be worked out easily from the same. Calculation of wages can be done by multiplying the time spent by the hourly rate. Here also standards can be set for the time as well as the rate so that comparison between the standard cost and actual cost can be very useful.

- **Direct Expenses:** Direct expenses are chargeable directly to the concerned job. The invoices or any other document can be marked with the number of job and thus the amount of direct expenses can be ascertained.

- **Manufacturing Overheads:** This is really a challenging task as the overheads are all indirect expenses incurred for the job. Because of their nature, overheads cannot be identified with the job and so they are apportioned to a particular job on some suitable basis. Pre-determined rates of absorption of overheads are generally used for charging the overheads. This is done on the basis of the budgeted data. If the predetermined rates are used, under/over absorption of overheads is inevitable and hence rectification of the same becomes necessary.

$$\textbf{Budgeted manufacturing overheads rate} = \frac{\text{Budgeted manufacturing overheads}}{\text{Budgeted Quantity or cost for allocation}}$$

- **Work-in-progress:** On the completion of a job, the total cost is worked out by adding the overheads expenses in the direct cost. In other word, the overheads are added to the prime cost. The cost sheet is then marked as 'completed' and proper entries are made in the finished goods ledger. If a job remains incomplete at the end of an accounting period, the total cost incurred on the same becomes the cost of work-in-progress. The work-in-progress at the end of the accounting period becomes the closing work-in-progress and the same becomes the opening work-in-progress at the beginning of the next accounting period. A separate account for work-in-progress is maintained.

- **Completion of Jobs:** Postings of direct material, direct labour, direct expenses and manufacturing overheads costs to the cost sheet for a job or production order are made periodically throughout the run of the job or order. The completion report is an indication that the manufacturing operations are over and further

expenditure on the job should cease so as to ensure that the cost sheet is closed. On the completion of a particular job, total cost relating to the job as per job cost sheet is transferred to finished stock account by debiting finished stores control account and crediting work-in-progress control account.

- **Job Cost Card / Sheet:** Each job is dissimilar to other due to specific and customized requirements. In order to ascertain cost of a particular job, it is necessary to record all the expenditure related to a job separately. For this purpose, job cost card / sheet is used. Job cost card is a cost sheet, where the quantity of materials issued, hours spent by different class of employees, amount of other expenses and share of overheads are recorded. This is helpful in knowing the total cost, profitability etc. of a job. A format of job cost card / sheet is shown below.

Job Cost Sheet

Description: **Customer's No.:** **Reference No.:**				**Job No.:** **Quantity:** **Date of commencement:** **Date of delivery:** **Date of finishing:**							
Material				**Labour**				**Overheads**			
Date	**Deptt**	***MR No.**	**Amount (₹)**	**Date**	**Deptt**	***MR No.**	**Amount (₹)**	**Date**	**Deptt**	***MR No.**	**Amount (₹)**
Total				**Total**				**Total**			

Summary				
Cost	Estimated	Actuals	Variances	For the Job: Units Produced: Cost per Unit: Remarks: Prepared by: Checked by:
Direct Material				
Direct Wages				
Direct Expenses				
Prime Cost				
Factory Overheads				
Works Cost				
Administration Overheads				
Cost of Production				
Selling and Distribution Overheads				
Cost of Sales				

*MR No. – Material Requisition

Reports in Job Costing System - Basically, two types of reports are generated after preparation of the job cost sheet.

(i) Report on profits on completed jobs

A statement may be prepared monthly to indicate the gross profit earned on all jobs completed during the month. This statement is useful for the management for evaluating past performances. Net profit analysis may also be made in a similar manner if administration, selling and distribution overheads for the job are included in the statement.

(ii) Report on cost variances

If cost estimates are developed, a cost variance report showing the deviations of actual costs from the estimated costs may be prepared in order to indicate the significant differences and to carry out thorough investigation. The report may be prepared separately for a job, or for a department showing the variances in respect of all jobs undertaken by the department during a period.

Illustration 1

As a newly appointed Cost Accountant, you find that the selling price of Job No. 9669 has been calculated on the following basis:

Particulars	Amount (₹)
Materials	12.08
Direct Wages – 22 hours at 25 paise per hour	5.50
Department	
A – 10 hours	
B – 4 hours	
C – 8 hours	
Prime Cost	17.58
Plus 33% on Prime Cost	5.86
Total	23.44

An analysis of the previous year's Profit & Loss Account shows the following:

Particulars	Amount (₹)	Particulars	Amount (₹)
Materials Used	77,500	Factory Overheads:	
Direct Wages:		A	2,500
A	5,000	B	4,000
B	6,000	C	1,000
C	4,000	Selling Costs	30,000

You are required to:

(a) Calculate and enter the revised costs using the previous year's figures as a basis;

(b) Draw up a Job Cost Sheet;

(c) Add to the total job cost 10% for profit and give the final selling price.

Solution:

(a) In order to draw up Job Cost Sheet, the factory overheads rates of different departments and percentage of selling cost will have to be determined first on the basis of previous year's figures as follows:

Factory Overheads Recovery Rates based on Labour Hours

	Department A		Department B		Department C	
Direct Wages		₹ 5,000		₹ 6,000		₹ 4,000
∴ Labour Hours	$\frac{₹5,000}{₹0.25 \text{ per hour}}$	20,000	$\frac{₹ 6,000}{₹0.25 \text{ per hour}}$	24,000	$\frac{₹ 4,000}{₹0.25 \text{ per hour}}$	16,000
Factory Overheads		₹ 2,500		₹ 4,000		₹ 1,000
Factory Overheads Rate per Labour Hour	$\left(\frac{₹2,500}{20,000}\right)$	₹ 0.125	$\left(\frac{₹4,000}{24,000}\right)$	₹ 0.167	$\left(\frac{₹1,000}{16,000}\right)$	₹ 0.063

Cost Sheet of Previous Year

Particulars	Amount (₹)
Materials Used	77,500
Direct Wages (A = ₹ 5,000, B = ₹ 6,000, C = ₹ 4,000)	15,000
Prime Cost	92,500
Factory Overheads (A = ₹ 2,500, B = ₹ 4,000, C = ₹ 1,000)	7,500
Works Cost	1,00,000
Selling Cost	30,000
Cost of Sales	1,30,000

Percentage of Selling Cost on Works Cost = $\left(\frac{₹30,000}{₹1,00,0000}\right) \times 100 = 30\%$

(b) Job Cost Sheet of the Current Year (Job No. 9669) (Per unit)

Particulars	Workings	Amount (₹)
Materials		12.08
Direct Wages		
- Department A	10 hours × ₹ 0.25 = ₹ 2.50	
- Department B	4 hours × ₹ 0.25 = ₹ 1.00	
- Department C	8 hours × ₹ 0.25 = ₹ 2.00	5.50
Prime Cost		17.58
Factory Overheads		
- Department A	10 hours × ₹ 0.125 = ₹ 1.25	
- Department B	4 hours × ₹ 0.167 = ₹ 0.67	
- Department C	8 hours × ₹ 0.063 = ₹ 0.50	2.42

Particulars	Workings	Amount (₹)
Factory Cost		20.00
Selling Cost	₹ 20 × 30%	6.00
Cost of Sales		26.00
(c) Profit (10% × ₹ 26.00)		2.60
Selling Price		28.60

Illustration 2

A work order for 100 units of a commodity has to pass through four different machines of which the machine hour rates are:

Machine P - ₹ 1.25,

Machine Q - ₹ 2.50,

Machine R - ₹ 3 and

Machine S - ₹ 2.25.

Following expenses have been incurred on the work order – Materials ₹ 8,000 and Wages ₹ 500.

Machine – P has been engaged for 200 hours.

Machine – Q for 160 hours,

Machine – R for 240 hours and

Machine – S for 132 hours.

After the work order has been completed, materials worth ₹ 400 are found to be surplus and are returned to stores.

Office overheads used to be 40% of works costs, but on account of all round rise in the cost of administration, distribution and sale, there has been a 50% rise in the office overheads expenditure.

Moreover, it is known that 10% of production will have to be scrapped as not being upto the specification and the sale proceeds of the scrapped output will be only 5% of the cost of sale.

If the manufacturer wants to make a profit of 20% on the total cost of the work order, find out the selling price of a unit of commodity ready for sale.

Solution:

Computation of Selling Price per unit

Particulars	Workings	Amount (₹)
Material Used (₹ 8,000 - ₹ 400)		7,600
Direct Wages		500

Prime Cost		8,100
Works Overheads		
- Machine P	200 hours × ₹ 1.25 = ₹ 250	
- Machine Q	160 hours × ₹ 2.50 = ₹ 400	
- Machine R	240 hours × ₹ 3 = ₹ 720	
- Machine S	132 hours × ₹ 2.25 = ₹ 297	1,667
Works Cost		9,767
Office Overheads	60% × 9,767	5,860
Cost of Sale		15,627
Less: Sale proceeds of Scrap	5% × (10% × 15,627)	78
Total Cost of Work Order		15,549
Add: Profit	20% × 15,549	3,110
Selling Price		18,659
Selling Price per unit	₹ 18,659 / 100 units	186.59

Note: It was known before that 10% of production will have to be scrapped, therefore, inputs must have been made taking this factor into consideration. No other adjustment is necessary except deducting the value of scrap from the cost of production.

Illustration 3

The data pertaining to Heavy Engineering Ltd are as follows at the end of 31.3.2022. Direct material ₹ 9,00,000; Direct wages ₹ 7,50,000; Selling and Distribution overheads ₹ 5,25,000; Administration overheads ₹ 4,20,000; Factory overheads ₹ 4,50,000 and Profit ₹ 6,09,000.

(a) Prepare a Cost Sheet showing all the details.

(b) For 2022-23, the factory has received a work order. It is estimated that the direct materials would be ₹ 12,00,000 and direct labour cost ₹ 7,50,000. What would be the price of work order if the factory intends to earn the same rate of profit on sales, assuming that the selling and distribution overheads has gone up by 15%? The factory recovers factory overheads as a percentage of direct wages, administrative and selling and distribution overheads as a percentage of works cost, based on the cost rates prevalent in the previous year.

Solution:

(a) **Statement of Cost and Profit for the year 2021-2022**

Particulars	Amount (₹)
Direct Materials	9,00,000
Direct Wages	7,50,000
Prime Cost	16,50,000
Add: Factory Overheads	4,50,000
Works Cost	21,00,000
Add: Administration Overheads	4,20,000

Cost of Production / Cost of Goods Sold	25,20,000
Add: Selling & Distribution Overheads	5,25,000
Cost of Sales	30,45,000
Add: Profit	6,09,000
Sales	36,54,000

(b) **Estimated Cost Sheet for the Work Order**

Particulars		Amount (₹)
Direct Materials		12,00,000
Direct Wages		7,50,000
Prime Cost		19,50,000
Add: Factory Overheads	60% × 7,50,000	4,50,000
Works Cost		24,00,000
Add: Administration Overheads	20% × 24,00,000	4,80,000
Cost of Production / Cost of Goods Sold		28,80,000
Add: Selling & Distribution Overheads	40% × 24,00,000	9,60,000
Cost of Sales		38,40,000
Add: *Profit		7,68,000
Sales		46,08,000

Cost + Profit = Sales

or, 38,40,000 + $16\frac{2}{3}$ % × Sales = Sales

or, $83\frac{1}{3}$ % Sales = ₹ 38,40,000

or, Sales = $\frac{38,40,000}{83\frac{1}{3}\%}$ = ₹ 46,08,000

or, *Profit = ₹ 46,08,000 - ₹ 38,40,000 = ₹ 7,68,000

Workings:

(i) Percentage of Profit on Sales = $\frac{₹\ 6,09,000}{₹\ 36,54,000} \times 100 = 16\frac{2}{3}\%$

(ii) Percentage of Factory Overheads on Direct Wages = $\frac{₹\ 4,50,000}{₹\ 7,50,000} \times 100 = 60\%$

(iii) Percentage of Administration Overheads on Works Cost = $\frac{₹\ 4,20,000}{₹\ 21,00,000} \times 100 = 20\%$

(iv) Percentage of Selling and Distribution Overheads to Works Cost = $\frac{₹\ 5,25,000}{₹\ 21,00,000} \times 100 = 25\%$

∴ Revised Percentage of Selling and Distribution Overheads on Works Cost = 25% + 15% = 40%

Illustration 4

A manufacturing company is divided into three production departments – A, B and C. All production is against specific customers' orders only. All orders are dissimilar and they go through all the three departments.

Manufacturing Costs for a given period were as follows:

Particulars	Department A	Department B	Department C	Total
	(₹)	(₹)	(₹)	(₹)
Direct Material	-	-	-	1,80,000
Direct Labour	40,000	20,000	30,000	90,000
Indirect Manufacturing Costs	20,000	40,000	30,000	90,000

The cost of producing a particular order was determined as follows:

Particulars	Amount (₹)	Amount (₹)
Direct Material		1,000
Direct Labour:		
Department A	120	
Department B	280	
Department C	200	600
Indirect Manufacturing Costs		600
		2,200

The General Manager had a hazy idea that the jobs executed on orders of this nature are under - priced. So, the services of a firm of cost accountants, of which you are a member, have been acquired for a thorough investigation.

Can you identify, after carefully analysing the limited available information, the fundamental flaw in the company's method of assuming that direct labour cost is an acceptable basis for distributing indirect manufacturing costs?

Prepare a revised cost for order distributing indirect manufacturing costs in a manner you consider appropriate.

Solution:

The predominant fault is the adoption of a blanket rate for the distribution of the indirect manufacturing costs for all the three departments, i.e., 100% ($\frac{\text{Indirect Manufacturing Costs}}{\text{Direct Labour Cost}} \times 100$) of total direct labour cost. This has been done despite of the fact that there are glaring differences of the direct labour cost of three departments. For calculating the revised cost of jobs, departmental rates based on indirect manufacturing cost percentage to direct labour costs are calculated:

Particulars	Department A (₹)	Department B (₹)	Department C (₹)
Indirect Manufacturing Cost	20,000	40,000	30,000
Direct Labour	40,000	20,000	30,000
Percentage of Indirect Manufacturing Cost on Direct Labour	$\frac{20,000}{40,000} \times 100 = 50\%$	$\frac{40,000}{20,000} \times 100 = 200\%$	$\frac{30,000}{30,000} \times 100 = 100\%$

On the assumption that direct labour cost method is considered to be a reasonable method of absorption of overheads, it is quite possible that departmental application of overheads may be able to resolve the difficulty faced by the manager regarding the costing of the job given. On this basis the amended job cost sheet will be as under:

Revised Cost Sheet of Job

Particulars	Amount (₹)	Amount (₹)
Direct Materials		1,000
Direct Labour		
- Department A	120	
- Department B	280	
- Department C	200	600
Prime Cost		1,600
Add: Indirect Manufacturing Costs		
- Department A	50% × 120 = 60	
- Department B	200% × 280 = 560	
- Department C	100% × 200 = 200	820
Total Cost		**2,420**

Illustration 5

A shop floor supervisor of a small factory presented the following cost for Job no. 555 to determine selling price.

Particulars	(₹)
Materials	70
Direct Wages 18 hours @ ₹ 2.50 per hour	45
Department X – 8 hours	
Department Y – 6 hours	
Department Z – 4 hours	
Chargeable expenses (special stores items)	5
Prime Cost	120
Add: 33 ⅓ % for expenses	40
	160

Analysis of the Profit & Loss Account for 2022 shows the following:

Dr. **Cr.**

Particulars	(₹)	(₹)	Particulars	(₹)	(₹)
To Materials		1,50,000	To Sales		2,50,000
Direct Wages:					
Department X	10,000				
Department Y	12,000				
Department Z	8,000	30,000			
Special stores items		4,000			
Overheads:					
Department X	5,000				
Department Y	9,000				
Department Z	2,000	16,000			
Works Cost		2,00,000			
Gross Profit c/d		50,000			
		2,50,000			2,50,000
Selling expenses		20,000			
Net Profit c/d		30,000	Gross Profit b/d		50,000
		50,000			50,000

It is noted that average hourly rates for the 3 departments X, Y and Z are similar.

You are required to:

(a) Calculate Departmental Overheads Recovery Rates;

(b) Calculate the entire revised cost using 2022 actual figures as basis;

(c) Add 20% to total cost to determine selling price.

Solution:

(a) **Calculation of Departmental Overheads Recovery Rates**

Particulars	Department X	Department Y	Department Z
i. Direct Wages	₹ 10,000	₹ 12,000	₹ 8,000
ii. Rate of wages per hour	₹ 2.50	₹ 2.50	₹ 2.50
iii. Labour Hours	$\frac{₹10,000}{₹\ 2.50} = 4,000$	$\frac{₹12,000}{₹\ 2.50} = 4,800$	$\frac{₹8,000}{₹\ 2.50} = 3,200$
iv. Actual Overheads	₹ 5,000	₹ 9,000	₹ 2,000
iv. Overheads Recovery Rates per Labour Hour (iv/iii)	$\frac{₹5,000}{4,000 \text{ hours}} = ₹1.25$	$\frac{₹9,000}{4,800 \text{ hours}} = ₹1.875$	$\frac{₹2,000}{3,200 \text{ hours}} = ₹0.625$

(b) **Revised Job Cost Sheet**

Particulars	Workings	Amount (₹)
Materials		70.00
Direct Wages		
- Department X	8 hours × ₹ 2.5 = ₹ 20.00	
- Department Y	6 hours × ₹ 2.5 = ₹ 15.00	
- Department Z	4 hours × ₹ 2.5 = ₹ 10.00	45.00
Chargeable Expenses		5.00
Prime Cost		120.00
Add: Overheads		
- Department X	8 hours × ₹ 1.25 = ₹ 10.00	
- Department Y	6 hours × ₹ 1.875 = ₹ 11.25	
- Department Z	4 hours × ₹ 0.625 = ₹ 2.50	23.75
Works Cost		143.75
Selling Overheads (10% of Works Cost) [WN]		14.38
Total Cost		158.13
(c) Add: Profit	20% × 158.13	31.626
Selling Price		189.756

Working:

Selling Overheads are charged @ 10% on Works Cost as calculated below:

$$\frac{\text{Selling Overhead}}{\text{Works Cost}} = \frac{₹\ 20{,}000}{₹\ 2{,}00{,}000} \times 100 = 10\%$$

Illustration 6

In a factory, following the Job Costing Method, an abstract from the work in process as at 30th September, was prepared as under:

Job No.	Materials (₹)	Direct Labour (₹)	Factory Overheads Applied (₹)
115	1,325	400 hours@ ₹ 800	640
118	810	250 hours@ ₹ 500	400
120	765	300 hours@ ₹ 475	380
	2,900	1,775	1,420

Materials used in October were as follows:

Material requisitions No.	Job No.	Cost Amount (₹)
54	118	300
55	118	425
56	118	515
57	120	665
58	121	910
59	124	720
		3,535

A summary of labour hours deployed during October is as under:

Job No.	Number of Hours	
	Shop A	Shop B
115	25	25
118	90	30
120	75	10
121	65	-
124	20	10
	275	75
Indirect Labour:		
Waiting for material	20	10
Machine breakdown	10	5
Idle time	5	6
Overtime premium	6	5
	316	101

A shop credit slip was issued in October, that material issued under requisition No. 54 was returned back to stores as being not suitable. A material transfer note issued in October indicated that material issued under requisition No. 55 for Job 118 was directed to Job 124.

The hourly rate in shop A per labour hour is ₹ 3 while at shop B it is ₹ 2 per hour. The factory overheads is applied at the same rate as in September; Jobs 115, 118 and 120 were completed in October.

You are asked to compute the factory cost of the completed jobs of both the months. It is practice of the management to put a 10% on the factory cost to cover administration and selling overheads and invoice the jobs to the customer on a total cost plus 20% basis. What would be the invoice price of these three jobs 115, 118 and 120?

Solution:

Calculation of Selling Price of the Job

Job No.	Job No. 115		Job No. 118		Job No. 120	
		Amount (₹)		Amount (₹)		Amount (₹)
Costs in September:						
Material		1,325		810		765
Labour		800		500		475
Overheads		640		400		380
Total Cost of September (A)		2,765		1,710		1,620
Costs in October:						
Material		-		515#		665
Labour	25×3+25×2	125	90×3+30×2	330	75×3+10×2	245
Overheads	125 × 80%	100	330 × 80%	264	245 × 80%	196
Total Cost of October (B)		225		1,109		1,106
Factory Cost (A+B)		2,990.00		2,819.00		2,726.00
Add: Administration Overheads @ 10% of Factory Cost	2,990×10%	299.00	2,819×10%	281.90	2,726×10%	272.60
Cost of Sales		3,289.00		3,100.90		2,998.60
Add: Profit @20% on Cost of Sales		657.80		620.18		599.72
Selling Price		**3,946.80**		**3,721.08**		**3,598.32**

Note:

MR No. 54 was returned and MR No. 55 was directed to Job 124.So, MR No. 56 is taken for material used in Job 118.

Overheads Recovery Rate in September

Job No. 115 $= \frac{640}{800} \times 100 = 80\%$

118 $= \frac{400}{500} \times 100 = 80\%$

120 $= \frac{380}{475} \times 100 = 80\%$

(As a percentage of Labour Cost)

Batch Costing

5.2

Batch costing is a costing method that involves grouping and allocating costs to a specific quantity of products produced in a single batch or production run. It aims to calculate the cost per unit by spreading the total cost of the batch over the number of units produced within that batch. It is a valuable costing method for businesses engaged in batch production, helping them understand the cost dynamics of each production run and make informed decisions to enhance overall operational efficiency and profitability.

Batch costing is commonly employed in industries where products are produced in batches rather than continuously. It provides a more accurate reflection of the costs associated with each specific production run.

> Batch costing is a 'form of specific order costing where costs are attributed to batches of product (unit costs can be calculated by dividing by the number of products in the batch)'. CIMA Official Terminology

Essential features of Batch Costing

(a) Each batch is treated as a cost unit.

(b) All costs are accumulated and ascertained for each batch.

(c) A separate Batch Cost Sheet is used for each batch and is assigned a certain number by which the batch is identified.

(d) The cost per unit is ascertained by dividing the total cost of a batch by the number of items produced in that batch.

Applications of Batch Costing

Batch Costing is applied in those industries where the similar articles are produced in definite batches for internal consumption in the production of finished products or for sale to customers generally. It is generally applied in –

(a) Readymade Garments Manufacturing Industries.

(b) Pharmaceutical / Drug Industries.

(c) Spare parts and Components Manufacturing Industries.

(d) Toys Manufacturing Industries.

(e) Tyres and Tubes Manufacturing Industries.

Illustration

Epitome Pen Inc. and has the following budgeted overheads for the year, based on normal activity levels.

Production Departments	Budgeted Overheads (₹)	Budgeted activity
Welding	12,000	3,000 labour hours
Assembly	20,000	2,000 labour hours

Selling and administrative overheads are 25% of factory cost. An order for 500 Brazils made as Batch 38, incurred the following costs.

Materials ₹ 24,000

Labour 200 hours in the Welding Department at ₹5 per hour

400 hours in the Welding Department at ₹10 per hour

₹1,000 was paid for the hire of x-ray equipment for testing the accuracy of the welds.

Required

Calculae the cost per unit for Batch 38.

Solution:

The first step is to calculate the overhead absorption rate for the production departments.

Welding $= \frac{₹\ 12,000}{3,000} = ₹\ 4$ per labour hour

Assembly $= \frac{₹\ 20,000}{2,000} = ₹\ 10$ per labour hour

Total Cost - Batch 38

	₹	₹
Direct material		24,000
Direct expenses 200 × ₹ 5 =	1,000	1,000
Direct labour 400 × ₹ 10 =	4,000	5,000
Prime Cost		**30,000**
Overheads 200 × ₹ 4 =	800	
400 × ₹ 10 =	4,000	4,800
Factory Cost		**34,800**
Selling and administrative Cost (25% of factory cost)		8,700
Total Cost		**43,500**

Cost per unit $= \frac{₹\ 43,500}{500} = ₹\ 87$

5.2.1 Economic Batch Quantity (EBQ)

Economic Batch Quantity (EBQ) is a measure used in batch costing to determine the quantity of units that can be produced at the minimum average cost in a given batch or product run. It is also known as Optimum Batch Quantity (OBQ) and is a refinement of the Economic Order Quantity (EOQ) model. EBQ takes into account the set-up cost, annual demand, production time, and the carrying charge rate per year to calculate the most cost-effective batch size.

The formula for calculating EBQ is similar to EOQ, but with a notable difference in the denominator. The assumptions made for calculating EBQ are that demand is known and constant within a certain period of time, unit cost of the inventory item is constant, production time is known and constant, and set-up cost and constant cost per piece are considered. The importance of EBQ lies in its ability to help companies achieve a balance leading to improved efficiency, reduced costs, and increased profitability.

Setting up and Processing Costs

The setting up and processing costs refer to the costs incurred for setting up and processing operations before the start of production of a batch. There is an inverse relationship between batch size and set up and processing costs.

Large the Batch size : Lower the set-up costs because of few batches.

Smaller the Batch size : Higher the set-up costs because of more batches.

Carrying Costs

The carrying costs refer to the costs incurred in maintaining a given level of inventory. There is positive relationship between batch size and carrying costs.

Large the Batch size : Higher the carrying costs because of high average inventory.

Smaller the Batch size : Lower the carrying costs because of low average inventory.

The trade off

The optimum quantity of batch which should be produced at a point of time determined after achieving a tradeoff between set up costs and carrying costs. Such batch size is known as EBQ because annual total cost of set up and carrying is minimum at this batch size.

Economic Batch Quantity = $\sqrt{\frac{2AS}{C}}$

where, A = Annual Demand

S = Set up Cost per batch

C = Carrying Cost per unit per year

Illustration 7

From the following information, calculate Economic Batch Quantity for a company using batch costing:

Annual Demand for the components	2,400 units
Setting up cost per batch	₹ 100
Manufacturing cost per unit	₹ 200
Carrying cost per unit	6% p.a.

Solution:

$$EBQ = \sqrt{\frac{2AS}{C}}$$

where, EBQ = Economic Batch Quantity

A = Annual Demand = 2,400 units

S = Set up cost per batch = ₹ 100

C = Carrying cost per unit per year = 200 × 6% = ₹12

$$\therefore EBQ = \sqrt{\frac{2 \times 2,400 \times 100}{12}} = 200 \text{ units}$$

Illustration 8

A customer has been ordering 90,000 special design metal columns at the rate of ₹18,000 per order during the past years. The production cost comprises ₹ 120 for material, ₹ 60 for labour and ₹ 20 for fixed overheads. It costs ₹ 1,500 to set up for one run of 18,000 column and inventory carrying cost is 15% since this customer may buy at least 5,000 columns this year, the company would like to avoid making five different production runs. Find the most economic production run.

Solution:

$$\text{Economic Production Run} = \sqrt{\frac{2 \times \text{Annual Output} \times \text{Setup Cost per Production Run}}{\text{Inventory Carrying Cost per unit per annum}}}$$

$$= \sqrt{\frac{2 \times 90,000 \times 1,500}{15\% \times 200 \text{ (i.e. } 120 + 60 + 20)}} = 3,000 \text{ columns}$$

Illustration 9

AB Ltd is committed to supply 24,000 bearings per annum to CD Ltd on a steady basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the set-up cost per run of bearing manufacture is ₹ 324.

(a) What would be the optimum run size for bearing manufacture?

(b) What is the minimum inventory holding cost at optimum run size?

(c) Assuming that the company has a policy of manufacturing 6,000 bearing per run, how much extra costs would the company be incurring as compared to the optimum run suggested in (a)?

Solution:

(a) Optimum Production Run Size = $\sqrt{\frac{2AS}{C}}$

where, A = Number of units to be produced within one year = 24,000 bearings

S = Setup cost per production run = ₹ 324

C = Carrying cost per unit per annum = ₹ 0.10 × 12 months = ₹ 1.20

Optimum Production Run Size = $\sqrt{\frac{2 \times 24,000 \times 324}{1.20}}$ = 3,600 bearings

(b) Minimum Inventory holding cost at Optimum Production Run Size

= Average Inventory × Carrying Cost per unit per annum

= $\frac{3,600}{2}$ × 1.20 = ₹ 2,160

(c) **Statement showing Total Cost at Production Run size of 3,600 and 6,000 bearings**

Particulars	Production Run Size	
	3,600	6,000
i. Annual Requirements	24,000	24,000
ii. Number of Runs	$\frac{24,000}{3,600} \approx 7$ (approx)	$\frac{24,000}{6,000} = 4$
iii. Setup Cost per run	₹ 324	₹ 324
iv. Average Inventory	$\frac{3,600}{2} = 1,800$	$\frac{6,000}{2} = 3,000$
v. Carrying Cost per unit per annum	₹ 0.10 × 12months = ₹ 1.20	₹ 0.10 × 12 months = ₹ 1.20
	(₹)	(₹)
Total Set up Cost (ii × iii)	(7 × ₹ 324) = 2,268	(4 × ₹ 324) = 1,296
Total Carrying Cost (iv × v)	1,800 × 1.20 = 2,160	3,000 × 1.20 = 3,600
Total Cost	4,428	4,896

Extra Cost incurred, if run size is 6,000 bearings = ₹ 4,896 - ₹ 4,428 = ₹ 468

Illustration 10

Component 'Gold' is made entirely in cost centre 100. Material cost is 6 paise per component and each component takes 10 minutes to produce. The machine operator is paid 72 paise per hour, and machine hour rate is ₹ 1.50. The setting up of the machine to produce the component 'Gold' takes 2 hours 20 minutes.

On the basis of this information, prepare a cost sheet showing the production and setting up cost, both in total and per component, assuming that a batch of:

(a) 10 components,

(b) 100 components, and

(c) 1,000 components are produced.

Solution:

Cost Sheet of Component 'Gold'

Particulars	Batch Size					
	10 Components		100 Components		1,000 Components	
	p.u.	Total	p.u.	Total	p.u.	Total
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
A. Production Cost						
Material Cost	0.06	0.60	0.06	6.00	0.06	60.00
Machine Operators Wages (WN 1)	0.12	1.20	0.12	12.00	0.12	120.00
Overheads (WN 2)	0.25	2.50	0.25	25.00	0.25	250.00
Total Production Cost	**0.43**	**4.30**	**0.43**	**43.00**	**0.43**	**430.00**
B. Setting up Cost						
Machine Operator Wages (WN 3)	0.168	1.68	0.0168	1.68	0.00168	1.68
Overheads (WN 4)	0.350	3.50	0.035	3.50	0.0035	3.50
Total Setting up Cost	**0.518**	**5.18**	**0.0518**	**5.18**	**0.00518**	**5.18**
Total Cost	**0.948**	**9.48**	**0.4818**	**48.18**	**0.43518**	**435.18**

Working Notes:

Particulars	10 Components	100 Components	1,000 Components
Time taken to produce the Components @ 10 minutes per component	$(10 \times 10) = 100$ Minutes or, $\frac{100}{60}$ hours	$(100 \times 10) = 1{,}000$ Minutes or, $\frac{1{,}000}{60}$ hours	$(1000 \times 10) = 10{,}000$ Minutes or, $\frac{10{,}000}{60}$ hours
1. Machine Operators Wage @ ₹ 0.72 per hour	$\frac{100}{60} \times 0.72 =$ ₹ 1.20	$\frac{1{,}000}{60} \times 0.72 =$ ₹ 12	$\frac{10{,}000}{60} \times 0.72 =$ ₹ 120
2. Overheads @ ₹ 1.50 per hour	$\frac{100}{60} \times 1.50 =$ ₹ 2.50	$\frac{1{,}000}{60} \times 1.50 =$ ₹ 25	$\frac{10{,}000}{60} \times 1.50 =$ ₹ 250

Setting up Cost:

3. Machine Operators Wages = 2 hours 20 minutes × ₹ 0.72 = $2\frac{1}{3} \times 0.72 =$ ₹ 1.68

4. Overhead = 2 hours 20 minutes × ₹ 1.50 = $2\frac{1}{3} \times 1.50 =$ ₹ 3.50

Contract Costing

5.3

Contract costing is basically, a job costing system that is applied to relatively large cost units that take a considerable amount of time to complete, such as construction and civil engineering work.

It is a specific accounting method used to track and allocate costs associated with a particular contract or project. This method is particularly relevant in industries where work is undertaken on a project-by-project basis, such as construction, manufacturing, or consulting. The primary goal of contract costing is to determine the total cost of a specific contract and to allocate these costs appropriately. It provides a more accurate picture of the financial performance of individual contracts. It is particularly valuable in industries where each project varies significantly in terms of size, scope, and duration.

The key features of contract costing:

- Construction activities: Contract costing mainly consists of construction activities and is applied in industries such as building construction, shipbuilding, bridge construction etc.
- Identification of Contracts: Each project or contract is identified separately. This could be a construction project, the production of a specific product, or the provision of services for a particular client.
- Direct expenses: Most of the expenses in contract costing are direct nature, such as materials, labour, expenses, plant, and sub-contract charges. Only a small portion of the amount is charged as overheads, which are apportioned on a suitable basis
- Accumulation of Costs: All costs related to a specific contract are accumulated and recorded separately. These costs include direct materials, direct labour, and overheads costs that can be directly attributed to the contract.
- Cost Allocation: Costs are allocated to the contract based on a systematic and consistent method. Direct costs (those directly attributable to the contract) are easily identified, but indirect costs (overheads) may need to be allocated based on a predetermined rate or other allocation methods.
- Recording Revenue: Revenue recognition is aligned with the progress of the contract. In many cases, revenue is recognized as work on the contract is performed.
- Job Costing: Contract costing is a type of job costing where costs are tracked for a specific job or project (contract) instead of a particular product.
- Profit Measurement: The ultimate goal of contract costing is to determine the profitability of each contract. By comparing the total costs incurred with the revenue generated from the contract, businesses can assess the financial success of each project.
- Contracts may also include an escalation clause, under which the contractor is compensated for increases in costs due to inflation.
- Other features include part payments made depending on certificates issued by the architect, showing the value of work completed and retention money.

Types of contracts

There are three types of contracts

1. Fixed Price Contracts: In this type of contract, the contractor and the contractee agree upon a fixed price for the work to be undertaken. The agreed price is paid by the contractee to the contractor

   Example - a contractor quotes a fixed price of Rs10,000 for constructing a small building. The contractee agrees to this price, and both parties sign the contract. The contractor is then responsible for completing the construction work within the agreed price.

2. Contracts with Escalation Clause: These contracts have a provision that the fixed price may increase or decrease in certain situations. This is a safeguard against cost increases due to factors such as inflation or other unforeseen circumstances

   Example - a contractor and a contractee agree on a fixed price of Rs10,000 for a construction project (period of contract – One year). The contract includes an escalation clause that states the price will increase by 5% for every six months of delay in the project's completion. If the project takes 18 months to complete, the final price would be Rs11,500 (Rs 10,000 + 5% of Rs 10,000).

3. Cost Plus Contracts: Under a cost-plus contract, the value of the contract is ascertained by adding a fixed percentage of profit to the actual cost of the work. The contractor is assured of a certain percentage of profit in advance and is protected against the possibility of incurring any loss.

5.3.2 Accounting of Costs of Contract

The cost computation in case of a contract is done on the following basis.

(i) Material Cost: Direct Material required for a particular contract is debited to the Contract Account. There may be some quantity of material which is returned back to the store. In such cases, material returned note is prepared and is either credited to the Contract Account or deducted from the material debited to the Contract Account. Similar treatment is given to the material transferred from one contract to another one.

- All materials supplied from the stores or purchased directly for the contract are debited to the concerned contract account.

  Contract A/c (Contract No:) Dr

  To Stores Ledger Control A/c (issued from stores) or

  To Cost Ledger Control A/c (direct purchase)

- In the case of transfer of excess material from one contract to another, costs of these excess materials are adjusted on the basis of Material Transfer Note.

  Contract A/c (transferee contract no:) Dr

  To Contract A/c (transferor contract no:)

- In case the return of surplus materials appears uneconomical on account of high cost of transportation, the same is sold and the concerned contract account is credited with the price realized. Any loss or profit arising therefrom is transferred to the Costing Profit & Loss A/c.

  Cost Ledger Control A/c Dr

  Costing Profit & Loss A/c (loss) Dr

  To Contract A/c (cost of material)

  To Costing Profit & Loss A/c (profit)

- Any loss of materials due to theft or destruction etc. is transferred to the Costing Profit & Loss A/c.

Costing Profit & Loss A/c Dr

To Contract A/c

- If any stores items are used for manufacturing tools, the cost of such store items are charged to the Works Expenses A/c.

Works Expenses A/c Dr

To Stores Ledger Control A/c (with amount of stores used for works)

Contract A/c Dr

To Works Expenses A/c (with amount of works used in the contract)

- If the contractee has supplied some materials without affecting the contract price, no accounting entries will be made in the contract account, only a note may be given about it.

(ii) Employee (Labour) Cost: It is usual for direct labour on a contract site to be paid on an hourly basis. Employees who work on several contracts at the same time will have to record the time spent on each contract on time sheets. Each contract will then be charged with the cost of these recorded hours.

Contract A/c Dr

To Wages A/c

To Outstanding Wages A/c

(iii) Expenses: All expenses incurred for a particular contract should be charged to that contract. In case of any indirect expenses incurred for the organization as a whole, they should be charged to the contract on some suitable basis. Direct expenses can be charged directly to the contract.

- Direct expenses (such as architect's fees, hire charges of concrete mixer, electricity charges, cost of special tools etc) incurred and / or outstanding.

Contract A/c Dr

To Direct Expenses A/c

To Outstanding Direct Expenses A/c

- Indirect expenses (such as expenses of engineers, surveyors, supervisors, corporate office etc.) may be distributed over several contracts on certain reasonable basis as overheads.

Contract A/c Dr

To Overheads A/c

(iv) Cost of Plant: A feature of most contract work is the amount of plant used. Plant used on a contract may be owned by the company, or hired from a plant hire firm.

(a) If the plant is hired, the cost will be a direct expense of the contract.

(b) If the plant is owned, a variety of accounting methods may be employed.

- The value of the plant may be either debited to contract account and the written down value thereof at the end of the year entered on the credit side for closing the contract account.

  Contract A/c.....Dr.

  To Plant and Machinery A/c (with cost)

  Plant and Machinery A/c (with WDV) .....Dr.

  To Contract A/c

  Or

- Only a charge (depreciation) for use of the plant may be debited to the contract account.

  Contract A/c.....Dr.

  To Depreciation on Plant and Machinery A/c

(v) Cost of supervision and sub-contractors: The cost of supervision, which is usually a production overheads in unit costing, job costing and so on, will be a direct cost of a contract. On large contracts, much work may be done by sub-contractors. The invoices of sub-contractors will be treated as a direct expense to the contract. Sub-contract costs are also debited to the Contract Account

Contract A/c.....Dr.

To Cost of Sub-Contract A/c

In contract costing, as each contract may take a long period for completion, the question of computing of profit is to be solved with the help of a well defined and accepted method.

(vi) Extra Work: The extra work amount payable by the contractee should be added to the contract price. If extra work is substantial, it is better to treat it as a separate contract. If it is not substantial, then the amount should be debited to the contract account as "Cost of Extra Work".

5.3.3 Important Terminologies

1. Work-in-Progress in contract costing refers to the work which is not complete on the reporting date.

Value of the work-in-progress = the cost of work completed,both certified and uncertified + the cost of work not yet completed + amount of estimated/ notional profit.

In the Balance Sheet (prepared for management), the work-in-progress is usually shown under two heads, viz., certified and uncertified. The cost of work completed and certified and the profit credited will appear under the head 'certified' work-in- progress, while the completed work not yet certified, cost of material, employee and other expenses which has not yet reached the stage of completion are shown under the head "uncertified" work-in-progress.

2. Cost of Work Certified or Value of Work Certified: A contract is a continuous process and to know the cost or value of the work completed as on a particular date; assessment of the completion of work is carried out by an expert (it may be any professional like surveyor, architect, engineer etc.). The expert, based on his assessment, certifies the work completion in terms of percentage of total work. The cost or value of certified portion is calculated and is known as Cost of work certified or Value of work certified respectively.

   - Value of Work Certified = Value of Contract × Work certified (%)
   - Cost of Work Certified = Cost of work to date – (Cost of work uncertified+ Material in hand + Plant at site)

3. Cost of Work Uncertified: It represents the cost of the work which has been carried out by the contractor but has not been certified by the expert. It is always shown at cost price.

4. Retention Money: To have a cushion against any defect or undesirable work, the contractee retains some money payable to contractor. This security money retained by the contractee is known as retention money.

   Retention money = Value of work certified- Payment made to contractor

5. Notional Profit: It represents the difference between the value of work certified and cost of work certified.

   Notional profit = Value of work certified - (Cost of work to date - Cost of work not yet certified)

6. Estimated Profit: It is the excess of the contract price over the estimated total cost of the contract. [can be calculated and feasible to calculate only in case of contracts whose end has neared].

7. Cost- plus contract is a contract where the value of the contract is determined by adding an agreed percentage of profit to the total cost. These types of contracts are entered into when it is not possible to estimate the contract cost with reasonable accuracy due to unstable condition of factors that affect the cost of material, employees, etc.

8. Escalation clause in a contract empowers a contractor to revise the price of the contract in case of increase in the prices of inputs due to some macro-economic or other agreed reasons.

Profit on Incomplete contract - For the purpose of finding out the portion of the notional profit to be transferred to Profit and Loss Account, the contracts are divided in the following manner:

I. **Contracts which have just commenced:** In this case no portion of the notional profit shall be transferred to Profit and Loss Account and the entire amount is kept as reserve. There are no hard and fast rules to determine that a particular contract is just commenced or reasonably advanced or almost complete. However, as per general norms, the contracts in which less than 1/4th work is done are regarded as the contracts which have just commenced.

II. **Contracts which have reasonably advanced:** In this case the profit to be transferred to Profit and Loss Account out of notional profit is based on the degree of completion of the contract. The degree of completion of the contract can be found out by comparing work certified and the contract price.

   a. If the degree of completion of work is (> 1/4 and < 1/2), 1/3rd of the notional profit shall be transferred to Profit and Loss Account and the remaining amount would be kept as reserve.

b. If the degree of completion of work is more than or equal to 1/2, 2/3rd of the notional profit shall be transferred to Profit and Loss Account and the remaining amount would be kept as reserve.

The profit so arrived in the above manner shall further be reduced in the ratio of cash received to work certified. Thus, the formula is as follows:

$$(\text{Notional Profit} \times \frac{2}{3} \text{ or } \frac{1}{3} \text{ (as the case may be)} \times [\frac{\text{Cash received}}{\text{Work Certified}}]$$

III. Contracts which are almost complete: In this case the portion of the profit to be transferred to Profit and Loss Account is calculated by using the estimated total profit which is ascertained by subtracting the total cost to date and the additional estimated cost to complete the contract from the contract price. The different formulas for such computations of profit are as follows: -

(i) $\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract Price}}$

(ii) $\text{Estimated Profit} \times \frac{\text{Work certified}}{\text{Contract Price}} \times \frac{\text{Cash received}}{\text{Work Certified}}$

(iii) $\text{Estimated Profit} \times \frac{\text{Total cost to date}}{\text{Total Cost}}$

(iv) $\text{Estimated Profit} \times \frac{\text{Total cost to date}}{\text{Total Cost}} \times \frac{\text{Cash received}}{\text{Work Certified}}$

Illustration 11

A firm of Builders, carrying out large contracts kept in contract ledger, separate accounts for each contract on 30th June, 2022, the following were shown as being the expenditure in connection with Contract No. 555

	Amount (₹)
Materials purchased	1,16,126
Materials issued from stores	19,570
Plant, which has been used on other contracts	25,046
Additional Plant	7,220
Wages	1,47,268
Direct expenses	4,052
Proportionate establishment expenses	17,440

The contract which had commenced on 1st February, 2022 was for ₹ 6,00,000 and the amount certified by the architect, after deduction of 20% retention money, was ₹ 2,41,600 the work being certified on 30th June, 2022. The materials on site were ₹ 19,716. A contract plant ledger was also kept in which depreciation was dealt with monthly, the amount debited in respect of that account is ₹ 2,260. Prepare Contract Account showing Profit on the contract.

Solution:

Dr. **Contract A/c** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Materials Purchased A/c	1,16,126	By Materials at site c/d	19,716
To Materials Issued A/c	19,570	By Cost of Construction c/d (Bal. fig.)	2,87,000
To Depreciation A/c	2,260		
To Wages A/c	1,47,268		
To Direct Expenses A/c	4,052		
To Prop. Estab. Expenses A/c	17,440		
	3,06,716		**3,06,716**
To Cost of Construction b/d	2,87,000	By Work in Progress A/c	3,02,000
To Notional Profit c/d (Bal. fig.)	15,000	- Value of work certified [WN-1]	
	3,02,000		**3,02,000**
To Profit & Loss A/c [WN-2]	8,000	By Notional Profit b/d	15,000
To Work in progress A/c			
- Provision for Contingencies (Bal. fig.)	7,000		
	15,000		**15,000**

Working Notes:

1. Value of work certified = $\frac{₹\ 2,41,600}{(1\text{-}20\%)}$ = ₹ 3,02,000

2. Since, value of work certified is above 50% of contract value so amount transferred to

Profit & Loss A/c = $\frac{2}{3}$ × 15,000 × 80% = ₹ 8,000 ($\frac{2}{3}$ × Notional Profit × $\frac{\text{Cash Received}}{\text{Work Certified}}$)

Illustration 12

A contractor has undertaken a construction work at a price of ₹ 5,00,000 and begun the execution of work on 1st January 2022. The following are the particulars of the contract up to 31st December, 2022:

	(₹)		(₹)
Machinery	30,000	Overheads	8,252
Materials	1,70,698	Materials returned	1,098
Wages	1,48,750	Work certified	3,90,000
Direct expenses	6,334	Cash received	3,60,000
Uncertified work	9,000	Materials on 31.12.2021	3,766
Wages outstanding	5,380		
Value of Machinery on 31.12.2021	22,000		

It was decided that the profit made on the contract in the year should be arrived at by deducting the cost of work certified from the total value of the architect's certificate, that $\frac{1}{3}$rd of the profit so arrived at should be regarded as a provision against contingencies and that such provision should be increased by taking to the credit of Profit & Loss Account only such portion of the $\frac{2}{3}$rd profit, as the cash received to the work certified. Prepare the contract account for the year and show the amount taken to the credit of the Profit and Loss account.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Depreciation on Machinery A/c [WN-1]	8,000	By Materials (Returned) A/c	1,098
		By Materials at site c/d	3,766
To Materials A/c	1,70,698	By Cost of Construction c/d (Bal. fig.)	3,42,550
To Wages A/c	1,48,750		
To Outstanding Wages A/c	5,380		
To Direct Expenses A/c	6,334		
To Overheads A/c	8,252		
	3,47,414		**3,47,414**
To Cost of Construction b/d	3,42,550	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	56,450	- Value of work certified	3,90,000
		- Cost of uncertified work	9,000
	3,99,000		**3,99,000**
To Profit & Loss A/c [WN-2]	34,738	By Notional Profit b/d	56,450
To Work in progress A/c			
- Provision for Contingencies (Bal. fig.)	21,712		
	56,450		**56,450**

Working Notes

1. Depreciation on Machinery = ₹ 30,000 - ₹ 22,000 = ₹ 8,000

2. Since, degree of completion is above 50% so amount transferred to

Profit & Loss A/c = $\frac{2}{3} \times 56,450 \times \frac{3,60,000}{3,90,000}$ = ₹ 34,738

Illustration 13

A contractor commenced the work on a particular contract on 1st April, 2022. He usually closes his books of accounts for the year on 31st December of each year. The following information is revealed from his costing records on 31st December, 2022:

Particulars	Amount (₹)
Materials sent to site	43,000
Jr. Engineer	12,620
Labour	1,00,220

A machine costing ₹ 30,000 remained in use on site for $\frac{1}{5}$ th of year. Its working life was estimated at 5 years and scrap value at ₹ 2,000.

A supervisor is paid ₹ 2,000 per month and had devoted one half of his time on the contract.

All other expenses were ₹ 14,000, the materials on site were ₹ 2,500.

The contract price was ₹ 4,00,000. On 31st December, 2022 $\frac{2}{3}$rd of the contract was completed. However, the architect gave certificate only for ₹ 2,00,000. On which 80% was paid. Prepare Contract Account.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Materials A/c	43,000	By Materials at site c/d	2,500
To Jr. Engineer A/c	12,620	By Cost of Construction c/d (Bal. fig.)	1,77,460
To Labour A/c	1,00,220		
To Depreciation on Machine A/c [WN-1]	1,120		
To Supervisor A/c [WN-2]	9,000		
To Other Expenses A/c	14,000		
	1,79,960		**1,79,960**
To Cost of Construction b/d	1,77,460	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	66,905	- Value of work certified	2,00,000
		- Cost of uncertified work [WN-3]	44,365
	2,44,365		**2,44,365**
To Profit & Loss A/c [WN-4]	35,683	By Notional Profit b/d	66,905
To Work in progress c/d			
- Provision for Contingencies (Bal. fig.)	31,222		
	66,905		**66,905**

Working Notes:

1. Depreciation on Machine = $\frac{30,000 - 2,000}{5 \text{ years}} \times \frac{1}{5} = ₹ 1,120$

2. Amount paid to Supervisor = $\frac{₹2,000 \times 9 \text{ months}}{2} = ₹ 9,000$

3. Degree of Completion is $\frac{2}{3}$rd.

   So, Cost for Construction of $\frac{2}{3}$rd = ₹ 1,77,460

   Therefore, Expected Cost of Construction = $177,460 \times \frac{3}{2} = ₹ 2,66,190$

   Cost of Work Certified is 50% = 50% × 2,66,190= ₹ 1,33,095

   Cost of Work Uncertified = ₹ 1,77,460 - ₹ 1,33,095 = ₹ 44,365

4. Since, degree of completion is $\frac{2}{3}$rd, so amount transferred to

   Profit & Loss A/c = $\frac{2}{3} \times 66,905 \times 80\% = ₹ 35,683$

Illustration 14

The following figures are supplied to you by contractor for the year ending 31st December, 2021.

Particulars		Amount (₹)
Work in Progress on 31.12.2021	₹ 85,000	
Less: Cash received from Contractee	₹ 55,000	30,000
During the year 2022:		
Wages		8,500
Materials bought		6,000
Working expenses		1,500
Materials issued from stores		10,500
Administrative expenses (₹ 250 are chargeable to Profit & Loss Account)		1,250
Plant		2,500
Material returned to supplier		450
Material returned to stores		550
Work certified		15,000
Contracts finished		22,500
Profits taken upon contracts		11,500
Advances from contractee		40,000

Prepare Contract Account, the Contractee's Account and show the work in progress as it would appear in the Balance Sheet.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Work in Progress A/c	85,000	By Materials A/c (Returned to Supplier)	450
To Wages A/c	8,500	By Materials A/c (Returned to Stores)	550
To Materials A/c (Purchased)	6,000	By Cost of Construction c/d (Bal. fig.)	1,14,000
To Materials A/c (Issued)	10,500		
To Working Expenses A/c	1,500		
To Administrative Expenses A/c	1,000		
To Plant A/c	2,500		
	1,15,000		**1,15,000**
To Cost of Construction b/d	1,14,000	By Work in Progress A/c	
To Notional Profit c/d	11,500	- Value of work certified	15,000
		- Cost of uncertified work (Bal. fig.)	88,000
		By Contractee A/c	22,500
	1,25,500		**1,25,500**

Dr. Contractee Account Cr

Particulars	(₹)	Particulars	(₹)
To Contract A/c	22,500	By Balance b/d	55,000
To Balance c/d (Bal. fig.)	72,500	By Cash A/c	40,000
	95,000		**95,000**

Balance Sheet as on 31.12.2021 (Abstract)

Liabilities	(₹)	Assets		(₹)
		Work in Progress (15,000 + 88,000)	1,03,000	
		Less: Cash Received	72,500	30,500

Illustration 15

The information given under has been extracted from the books of a contractor relating to contract for ₹ 3,75,000.

	Year I	Year II	Year III
	Amount (₹)	Amount (₹)	Amount (₹)
Materials	45,000	55,000	31,500
Direct Expenses	1,750	6,250	2,250
Indirect expenses	750	1,000	-
Wages	42,500	57,500	42,500

	Year I	Year II	Year III
	Amount (₹)	Amount (₹)	Amount (₹)
Total work certified	87,500	2,82,500	3,75,000
Uncertified work	-	5,000	-
Plant	5,000	-	-

The value of plant at the end of Year I was ₹ 4,000 at the end of Year II ₹ 2,500 and at the end of Year III it was ₹ 1,000. It is customary to pay 90% in cash of the amount of work certified. Prepare the Contract Account and show how the figures would appear in the balance sheet.

Solution:

Dr. **Contract Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
Year I		By Cost of Construction c/d (Bal. fig.)	91,000
To Materials A/c	45,000		
To Direct Expenses A/c	1,750		
To Indirect Expenses A/c	750		
To Wages A/c	42,500		
To Depreciation on Plant A/c [WN-1]	1,000		
	91,000		**91,000**
To Cost of Construction b/d	91,000	By Work in Progress c/d	
		- Value of Work Certified	87,500
		By Profit & Loss A/c	
		Less (Bal. fig.)	3,500
	91,000		**91,000**
Year II		By Cost of Construction c/d (Bal. fig.)	2,08,750
To Work in Progress b/d			
- Value of work certified	87,500		
To Materials A/c	55,000		
To Direct Expenses A/c	6,250		
To Indirect Expenses A/c	1,000		
To Wages A/c	57,500		
To Depreciation on Plant A/c [WN-1]	1,500		
	2,08,750		**2,08,750**

Particulars	(₹)	Particulars	(₹)
To Cost of Construction b/d	2,08,750	By Work in Progress c/d	
To Notional Profit c/d (Bal. fig)	78,750	- Value of Work Certified	2,82,500
		- Cost of Uncertified Work	5,000
	2,87,500		**2,87,500**
To Profit & Loss A/c [WN-2]	47,250	By Notional Profit b/d	78,750
To Work in Progress c/d			
- Provision for Contingencies	31,500		
	78,750		**78,750**
Year III		By Work in Progress b/d	
To Work in Progress A/c		- Provision for Contingencies	31,500
- Value of work certified	2,82,500	By Cost of Construction c/d (Bal. fig)	3,33,750
- Cost of Uncertified Work	5,000		
To Materials A/c	31,500		
To Direct Expenses A/c	2,250		
To Wages A/c	42,500		
To Depreciation on Plant A/c [WN-1]	1,500		
	3,65,250		**3,65,250**
To Cost of Construction b/d	3,33,750	By Contractee's A/c	3,75,000
To Profit and Loss A/c	41,250		
	3,75,000		**3,75,000**

Working Notes:

1. Depreciation on Plant

   Year I = ₹ 5,000 – ₹ 4,000 = ₹ 1,000

   Year II = ₹ 4,000 – ₹ 2,500 = ₹ 1,500

   Year III = ₹ 2,500 – ₹ 1,000 = ₹ 1,500

2. Amount transferred to Profit & Loss A/c in

   Year I = Loss ₹ 3,500

   Year II = $\frac{2}{3} \times 78,750 \times 90\%$ = ₹ 47,250

   Year III = Profit ₹ 41,250

Illustration 16

A firm of engineers undertook three contracts beginning on 1st January, 1st May and 1st August 2022. Their accounts on 30th November, 2022 showed the following position:

Particulars	Contract I	Contract II	Contract III
	Amount (₹)	Amount (₹)	Amount (₹)
Contract Price	80,000	54,000	60,000
Materials	14,400	11,600	4,000
Wages	22,000	22,500	2,800
General expenses	800	550	200
Cash Received for Work Certified	30,000	24,000	5,400
Work certified	40,000	32,000	7,200
Work uncertified	1,200	1,600	400
Wages outstanding	700	750	350
General expenses outstanding	150	100	50
Plant installed	4,000	3,200	2,400
Materials on hand	800	800	800

On the respective dates of the contracts, the plant was installed, depreciation thereon being taken at 15% p.a. You are required to prepare accounts in the Contract Ledger.

Solution:

Dr. **Contract Account** **Cr.**

Particulars	Contract I	Contract II	Contract III	Particulars	Contract I	Contract II	Contract III
	(₹)	(₹)	(₹)		(₹)	(₹)	(₹)
To Materials A/c	14,400	11,600	4,000	By Materials on hand c/d	800	800	800
To Wages A/c	22,000	22,500	2,800				
To O/s Wages A/c	700	750	350	By Cost of Construction c/d (Bal. fig)	37,800	34,980	6,720
To Gen. Exp. A/c	800	550	200				
To O/s Gen. Exp. A/c	150	100	50				
To Depreciation on Plant A/c [WN-1]	550	280	120				
	38,600	**35,780**	**7,520**		**38,600**	**35,780**	**7,520**

Particulars	Contract I	Contract II	Contract III	Particulars	Contract I	Contract II	Contract III
	(₹)	(₹)	(₹)		(₹)	(₹)	(₹)
To Cost of Construction b/d	37,800	34,980	6,720	By Work in progress c/d			
To Notional Profit c/d (Bal. fig)	3,400	-	880	- Value of Work Certified	40,000	32,000	7,200
				- Cost of Uncertified Work	1,200	1,600	400
				By Profit & Loss A/c (Bal. fig.)	-	1,380	-
	41,200	**34,980**	**7,600**		**41,200**	**34,980**	**7,600**
To Profit & Loss A/c [WN-2]	1,700	-	-	By Notional Profit b/d	3,400	-	880
To Work in Progress A/c							
- Provision for Contingencies	1,700		880				
	3,400	-	880		3,400	-	880

Working Notes:

1. Depreciation on Plant for

   Contract I = $4,000 \times 15\% \times \frac{11}{12} = ₹\ 550$

   Contract II = $3,200 \times 15\% \times \frac{7}{12} = ₹\ 280$

   Contract III = $2,400 \times 15\% \times \frac{4}{12} = ₹\ 120$

2. Amount transferred to Profit & Loss A/c

   Work done more than 50% Contract I = Profit = $\frac{2}{3} \times 3,400 \times \frac{30,000}{40,000} = ₹\ 1,700$

   Contract II = Loss = ₹ 1,380

   Work done less than 25% Contract III = Nil

Illustration 17

The following is the Trial Balance of Premier Construction Company, engaged on the execution of Contract No. 747, for the year ended 31st December, 2022.

Contractee's Account	Amount (₹)	Amount (₹)
Amount received		3,00,000
Buildings	1,60,000	

Contractee's Account	Amount (₹)	Amount (₹)
Creditors		72,000
Bank Balance	35,000	
Capital Account		5,00,000
Materials	2,00,000	
Wages	1,80,000	
Expenses	47,000	
Plant	2,50,000	
	8,72,000	**8,72,000**

The work on Contract No. 747 was commenced on 1st January, 2022. Materials costing ₹ 1,70,000 were sent to the site of the contract but those of ₹ 6,000 were destroyed in an accident. Wages of ₹ 1,80,000 were paid during the year. Plant costing ₹ 50,000 was used on the contract all through the year. Plant with a cost of ₹ 2 lakhs was used from 1st January to 30th September and was then returned to the stores. Materials of the cost of ₹ 4,000 were at site on 31st December, 2022.

The contract was for ₹ 6,00,000 and the contractee pays 75% of the work certified. Work certified was 80% of the total contract work at the end of 2022. Uncertified work was estimated at ₹ 15,000 on 31st December, 2022.

Expenses are charged to the contract at 25% of wages. Plant is to be depreciation at 10% for the entire year.

Prepare Contract Account for the year 2022 and Balance Sheet as on 31st December, 2022 in the books of Premier Construction Company.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Materials A/c	1,70,000	By Costing Profit & Loss A/c	6,000
To Wages A/c	1,80,000	(loss due to accident)	
To Depreciation on Plant A/c [WN-1]	20,000	By Materials at Site	4,000
To Expenses A/c	45,000	By Cost of Construction c/d (Bal. fig.)	4,05,000
	4,15,000		**4,15,000**
To Cost of Construction b/d	4,05,000	By Work in Progress c/d	
To Notional Profit c/d (Bal. fig.)	90,000	- Value of Work Certified [WN-3]	4,80,000
		- Cost of Uncertified Work	15,000
	4,95,000		**4,95,000**
To Profit & Loss A/c	45,000	By Notional Profit b/d	90,000
To Work in Progress c/d			
- Provision for Contingencies (Bal. fig.)	45,000		
	90,000		**90,000**

Working Notes:

1. Depreciation on Plant = 2,00,000 × $\frac{10}{100}$ × $\frac{9}{12}$ + 50,000 × $\frac{10}{100}$ = 15,000 + 5,000 = ₹ 20,000
2. Expenses = 25% × 1,80,000 = ₹ 45,000
3. Value of Work Certified = 80% × 6,00,000 = ₹ 4,80,000
4. Amount to be transferred to Profit & Loss A/c = $\frac{2}{3}$ × 90,000 × 75% = ₹ 45,000

Dr. **Profit & Loss Account** **Cr**

Particulars	(₹)	Particulars	(₹)
To Contract A/c	6,000	By Contract A/c	45,000
To Depreciation on Plant A/c (2,00,000 × 10% × $\frac{3}{12}$)	5,000		
To Expenses A/c (47,000 – 45,000)	2,000		
To Net Profit c/d	32,000		
	45,000		**45,000**

Balance Sheet as on 31.12.2022

Liabilities	(₹)	Assets	(₹)	(₹)
Capital	5,00,000	Work in Progress		
Profit & Loss A/c	32,,000	- Value of Work Certified	4,80,000	
Creditors	72,000	- Cost of Uncertified Work	15,000	
			4,95,000	
		Less: Work in Progress		
		- Provision for Contingencies	45,000	
			4,50,000	
		Less: Cash Received	3,00,000	1,50,000
		Buildings		1,60,000
		Plant (2,50,000 – 25,000)		2,25,000
		Bank		35,000
		Stock of Materials (2,00,000 – 1,70,000) + 4,000		34,000
	6,04,000			**6,04,000**

Illustration 18

A company of builders took to a multi-storied structure for ₹ 40,00,000 estimating the cost to be ₹ 36,80,000. At the end of the year, the company had received ₹ 14,40,000 being 90% of the work certified; work done but not certified was ₹ 40,000. Following expenditure were incurred.

Particulars	(₹)
Materials	4,00,000
Labour	10,00,000
Plant	80,000

Materials costing ₹ 20,000 were damaged. Plant is considered as having depreciated at 25%.

Prepare Contract Account and show all the possible figures that can reasonably be credited to Profit & Loss Account. Estimated Profit being ₹ 3,20,000.

Solution:

Dr. Contract Account Cr

Particulars	(₹)	Particulars	(₹)
To Materials A/c	4,00,000	By Costing Profit & Loss A/c	20,000
To Labour A/c	10,00,000	(loss due to damage)	
To Depreciation on Plant A/c [WN-1]	20,000	By Cost of Construction c/d (Bal. fig.)	14,00,000
	14,20,000		**14,20,000**
To Cost of Construction b/d	14,00,000	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	2,40,000	- Value of Work Certified [WN-2]	16,00,000
		- Cost of Uncertified Work	40,000
	16,40,000		**16,40,000**
To Profit & Loss A/c [WN-3]	72,000	By Notional Profit b/d	2,40,000
To Work in Progress			
- Provision for Contingencies (Bal. fig.)	1,68,000		
	2,40,000		**2,40,000**

Working Notes:

1. Depreciation on Plant = 80,000 × 25% = ₹ 20,000
2. Value of Work Certified = $\frac{14,40,000}{90\%}$ = ₹ 16,00,000
3. Amount to be credited to Profit & Loss Account = $\frac{1}{3}$ × 2,40,000 × 90% = ₹ 72,000

Amount that may be credited to Profit & Loss Account

1. Estimated Profit × $\frac{\text{Work Certified}}{\text{Contract Price}}$ = 3,20,000 × $\frac{16,00,000}{40,00,000}$ × = ₹ 1,28,000
2. Estimated Profit × $\frac{\text{Work Certified}}{\text{Contract Price}}$ × $\frac{\text{Cash Received}}{\text{Work Certified}}$ = 3,20,000 × $\frac{16,00,000}{40,00,000}$ × 90% = ₹ 1,15,200
3. Estimated Profit × $\frac{\text{Total Cost to date}}{\text{Total Cost}}$ = 3,20,000 × $\frac{14,20,000}{36,80,000}$ = ₹1,23,478
4. Estimated Profit × $\frac{\text{Total Cost to date}}{\text{Total Cost}}$ × $\frac{\text{Cash Received}}{\text{Work Certified}}$ = 3,20,000 × $\frac{14,20,000}{36,80,000}$ × 90% = ₹ 1,11,130

Illustration 19

The following Trial Balance was extracted on 31st December, 2022 from the books of Swastik Co. Ltd contractors:

Particulars	Dr	Cr
	Amount (₹)	Amount (₹)
Share Capital:		
Shares of ₹ 10 each		3,51,800
Profit & Loss Account as on 1.1.2021		25,000
Provision for Depreciation on Machinery		63,000
Cash Received on account Contract - 7		12,80,000
Creditors		81,200
Land and Buildings (Cost)	74,000	
Machinery (Cost)	52,000	
Bank	45,000	
Contract 7:		
Materials	6,00,000	
Direct Labour	8,30,000	
Expenses	40,000	
Machinery on site (cost)	1,60,000	
	18,01,000	**18,01,000**

Contract 7 was begun on 1st January, 2022. The contract price is ₹ 24,00,000 and the customer has so far paid ₹ 12,80,000 being 80% of the work certified.

The cost of the work done since certification is estimated at ₹ 16,000. On 31st December, 2022, after the Trial Balance was extracted, machinery costing ₹ 32,000 was returned to stores, and materials then on site were value at ₹ 27,000.

Provision is to be made for direct labour due ₹ 6,000 and for depreciation of all machinery at 12.5% on cost.

You are required to prepare:

(a) Contract Account;

(b) Statement of Profit, if any, to be properly credited to profit and loss account for 2022 and

(c) Balance Sheet of Swastik Co. Ltd as on 31st December, 2022.

Solution:

Dr. Contract Account Cr.

Particulars	(₹)	Particulars	(₹)
To Materials A/c	6,00,000	By Materials at Site c/d	27,000
To Wages A/c	8,30,000	By Cost of Construction c/d (Bal. fig.)	14,69,000
To Outstanding Wages A/c	6,000		
To Expenses A/c	40,000		
To Depreciation on Machinery A/c [WN-1]	20,000		
	14,96,000		**14,96,000**
To Cost of Construction b/d	14,69,000	By Work in Progress c/d	
To Notional Profit c/d (Bal. fig.)	1,47,000	- Value of Work Certified [WN-2]	16,00,000
		- Cost of Uncertified Work	16,000
	16,16,000		**16,16,000**
To Profit & Loss A/c [WN-3]	78,400	By Notional Profit b/d	1,47,000
To Work in Progress c/d			
- Provision for Contingencies (Bal. fig.)	68,600		
	1,47,000		**1,47,000**

Working Notes:

1. Depreciation on Machinery charged to Contract A/c = 1,60,000 × 12.5% = ₹ 20,000
2. Value of Work Certified = $\frac{12,80,000}{80\%}$ = ₹ 16,00,000
3. Amount transferred to Profit & Loss A/c = $\frac{2}{3}$ × 1,47,000 × 80% = ₹ 78,400

Dr. Profit & Loss Account Cr

Particulars	(₹)	Particulars	(₹)
To Depreciation on Machinery A/c (52,000 × 12.5%)	6,500	By Balance b/d	25,000
To Net Profit (Bal. fig)	96,900	By Contract A/c	78,400
	1,03,400		**1,03,400**

Balance Sheet as on 31.12.2021

Liabilities	(₹)	Assets	(₹)	(₹)
Capital	3,51,800	Land & Buildings		74,000
Profit & Loss A/c	96,900	Machinery (at Cost) (1,60,000 + 52,000)	2,12,000	
Creditors	81,200	Less: Provision for Depreciation (63,000 + 26,500)	89,500	1,22,500
Outstanding Labour	6,000	Work in Progress		
		- Value of Work Certified	16,00,000	
		- Cost of Uncertified Work	16,000	
			16,16,000	

Liabilities	(₹)	Assets	(₹)	(₹)
		Less: Work in Progress		
		- Provision for Contingencies	68,600	
			15,47,400	
		Less: Cash Received	12,80,000	2,67,400
		Bank		45,000
		Stock of Materials		27,000
	5,35,900			**5,35,900**

Illustration 20

Kapur Engineering Company undertakes long term contract which involves the fabrication of pre stressed concrete block and the reaction of the same on consumer's life.

The following information is supplied regarding the contract which is incomplete on 31st March, 2022.

Cost Incurred	Amount (₹)
Fabrication cost to date:	
Direct Materials	2,80,000
Direct Labour	90,000
Overheads	75,000
	4,45,000
Erection cost to date	15,000
Total	4,60,000
Contract Price	8,19,000
Cash received on account	6,00,000
Technical estimate of work completed to date:	
Fabrication: Direct Materials	80%
Direct Labour and Overheads	75%
Erection	25%

You are required to prepare a statement for submission to the management indicating

(a) The estimated profit on the completion of the contract;

(b) The estimated profit to date on the contract.

Solution:

(a)

Statement showing computation of estimated profit on completion

Particulars	Cost incurred to date	Estimated cost to be incurred	Estimated total cost
	₹	₹	₹
Materials	2,80,000	$2,80,000 \times \frac{20\%}{80\%} = 70,000$	$\frac{2,80,000}{80\%} = 3,50,000$
Direct Labour	90,000	$90,000 \times \frac{25\%}{75\%} = 30,000$	$\frac{90,000}{75\%} = 1,20,000$
Overheads	75,000	$75,000 \times \frac{25\%}{75\%} = 25,000$	$\frac{75,000}{75\%} = 1,00,000$
Erection	15,000	$15,000 \times \frac{75\%}{25\%} = 45,000$	$\frac{15,000}{25\%} = 60,000$
Total Cost	**4,60,000**	**1,70,000**	**6,30,000**
Profit (Bal. fig.)			1,89,000
Contract Price			8,19,000

Therefore, Estimated Profit on completion = ₹ 1,89,000

(b) Estimated Profit to date = Estimated Profit on Completion $\times \frac{\text{Cash Received}}{\text{Contract Price}}$

$= 1,89,000 \times \frac{6,00,000}{8,19,000} = ₹\ 1,38,462$

Or

Estimated Profit to date = Estimated Profit on Completion $\times \frac{\text{Total Cost to Date}}{\text{Estimated Total Cost}}$

$= 1,89,000 \times \frac{4,60,000}{6,30,000} = ₹\ 1,38,000$

Illustration 21

The following particulars are obtained from the books of Vinay Construction Ltd as on March, 2022.

Plant and equipment at cost ₹ 4,90,000

Vehicles at cost ₹ 2,00,000

Details of contract remained incomplete as on 31.3.2022.

Particulars	Contract Nos		
	V.29	V.24	V.25
	₹ Lacs	₹ Lacs	₹ Lacs
Estimated final sales value	8.00	5.60	16.00
Estimated Cost	**6.40**	**7.00**	**12.00**
Wages	2.40	2.00	1.20
Materials	1.00	1.10	0.44
Overheads (excluding depreciation)	1.44	1.46	0.58

Particulars	Contract Nos		
	V.29	V.24	V.25
	₹ Lacs	₹ Lacs	₹ Lacs
	4.84	**4.56**	**2.22**
Value certified by architect	7.20	4.20	2.40
Progress payments received	5.00	3.20	2.00

Depreciation of plant and equipment and vehicles should be charged at 20% to the three contracts in proportion to work certified. You are required to prepare statements showing contract wise and total.

(a) Profit / Loss to be taken to the Profit & Loss Account for the year ended 31st March, 2022.

(b) Work in progress as would appear in the Balance Sheet as at 31.3.2022.

Solution

Dr. **Contract Account** **Cr.**

Particulars	V.29 ₹ in lacs	V.24 ₹ in lacs	V.25 ₹ in lacs	Particulars	V.29 ₹ in lacs	V.24 ₹ in lacs	V.25 ₹ in lacs
To Expenses other than Depreciation	4.84	4.56	2.22	By Cost of Construction c/d (Bal. fig.)	5.56	4.98	2.46
To Depreciation [WN-1]	0.72	0.42	0.24				
	5.56	4.98	2.46		5.56	4.98	2.46
To Cost of Construction b/d	5.56	4.98	2.46	By Work in Progress A/c			
To Notional Profit c/d (Bal. fig.)	1.64	-	-	- Value of Work Certified	7.20	4.20	2.40
				By Profit & Loss A/c (Bal. fig.)	-	0.78	0.06
	7.20	**4.98**	**2.46**		**7.20**	**4.98**	**2.46**
To Profit & Loss A/c [WN-2]	1.025	-	-	By Notional Profit b/d	1.64	-	-
To Work in Progress							
- Provision for contingencies	0.615	-	-				
	1.64	**-**	**-**		**1.64**	**-**	**-**

Working Notes:

1. Depreciation for Contract V.29 = (4,90,000+2,00,000) × 20% × $\frac{7.20}{7.20+4.20+2.40}$ = ₹ 72,000

   Contract V.24 = 6,90,000 × 20% × $\frac{4.20}{7.20+4.20+2.40}$ = ₹ 42,000

   Contract V.25 = 6,90,000 × 20% × $\frac{2.40}{7.20+4.20+2.40}$ = ₹ 24,000

2. Amount to be transferred to Profit & Loss = Estimated Profit × $\frac{\text{Cash Received}}{\text{Contract Price}}$ = 1.64 × $\frac{5.00}{8.00}$ = ₹ 1.025 lacs

Illustration 22

A company is manufacturing building bricks and fire bricks. Both the products require two processes-Brick forming and Heat treating. The requirements for the two types of bricks are:

	Building Bricks	Fire Bricks
Forming per 100 bricks	3 hrs	2 hrs
Heat treatment per 100 bricks	2 hrs	5 hrs

Total costs of two departments in one month were:

Forming	₹ 21,200
Heat Treatment	₹ 48,800

Production during the month was:

Building Bricks	1,30,000 Nos
Fire Bricks	70,000 Nos

Prepare statement of manufacturing costs for the two varieties of bricks.

Solution:

Statement Showing Number of Hours

Particulars	Building Bricks		Fire Bricks		Total
		Hours		Hours	Hours
Brick Forming	$\frac{1,30,000}{100} \times 3$	3,900	$\frac{70,000}{100} \times 2$	1,400	5,300
Heat Treatment	$\frac{1,30,000}{100} \times 2$	2,600	$\frac{70,000}{100} \times 5$	3,500	6,100

Cost of Forming per hour $= \frac{₹21,200}{5,300 \text{ hours}} = ₹ 4$ per hour

Cost of Heat Treatment $= \frac{₹48,800}{6,100 \text{ hours}} = ₹ 8$ per hour

Statement Showing Computation of Manufacturing Cost for two variety of Bricks

Particulars	Building Bricks		Fire Bricks		Total
		(₹)		(₹)	(₹)
Brick Forming	3,900 × 4	15,600	1,400 × 4	5,600	21,200
Heat Treatment	2,600 × 8	20,800	3,500 × 8	28,000	48,800
Total		**36,400**		**33,600**	**70,000**

Illustration 23

Deluxe Limited undertook a contract for ₹ 5,00,000 on 1st July 2021. On 30th June 2022, when the accounts were closed, the following details about the contract were gathered:

Particulars	Amount (₹)
Materials purchased	1,00,000
Wages paid	45,000
General expenses	10,000
Plant purchased	50,000
Materials on hand 30.6.2022	25,000
Wages accrued 30.6.2022	5,000
Work certified	2,00,000
Cash received	1,50,000
Depreciation of Plant	5,000
Work uncertified	15,000

The above contract contained an escalator clause which read as follows:

"In the event of prices of materials and rates of wages increase by more than 5% the contract price would be increased accordingly by 25% of the rise in the cost of materials and wages beyond 5% in each case".

It was found that since the date of signing the agreement the prices of materials and wage rates increased by 25%. The value of the work certified does not take into account the effect of the above clause.

Prepare the Contract Account.

Solution:

Dr. **Contract Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Materials A/c (Purchased)	1,00,000	By Materials at Site c/d	25,000
To Wages A/c	45,000	By Cost of Construction c/d (Bal. fig.)	1,40,000
To Outstanding Wages A/c	5,000		
To General Expenses A/c	10,000		
To Depreciation on Plant A/c	5,000		
	1,65,000		**1,65,000**
To Cost of Construction b/d	1,40,000	By Work in Progress A/c	
To Notional Profit c/d (Bal. fig.)	80,000	- Value of Work Certified	2,00,000
		- Escalation [WN-1]	5,000
		- Cost of Uncertified Work	15,000
	2,20,000		**2,20,000**
To Profit & Loss A/c [WN-2]	20,000	By Notional Profit b/d	80,000
To Work in Progress A/c			
- Provision for Contingencies (Bal. fig.)	60,000		
	80,000		**80,000**

Working Notes:

1. Increase in Contract Price due to Escalation in the Prices of Materials and Labour

   Cost of Materials and Labour incurred = 1,00,000 + 45,000 + 5,000 – 25,000 = ₹ 1,25,000

   Increase in prices of Materials and Labour by 25%

   So, Cost of Materials and Labour before increase in Prices = $1,25,000 \times \frac{100}{125}$ = ₹ 1,00,000

   Increase in Contract Price (beyond 5% increase) = $\frac{25}{100} \times (1,25,000 - 1,00,000 \times \frac{105}{100})$

   $= \frac{25}{100} \times (1,25,000 - 1,05,000)$

   = ₹ 5,000

2. Amount to be transferred to Profit & Loss A/c = $\frac{1}{3} \times 80,000 \times \frac{1,50,000}{2,00,000}$ = ₹ 20,000

Process Costing – Normal and Abnormal Losses, Equivalent Production, Inter-process Profit, Joint and By Products

5.4

Process costing is a method of costing used mainly in manufacturing where units are continuously mass-produced through one or more processes. In process costing, it is the process that is costed (unlike job costing where each job is costed). The method used is to take the total cost of the process and average it over the units of production. It is a method used to determine the cost of producing a product in a continuous production process. It is used when large quantities of identical items are manufactured in a continuous first-out basis. Process costing involves recording product costs for each manufacturing department (or process) as items enter production in batches rather than individually.

> Process costing is a 'form of costing applicable to continuous processes where process costs are attributed to the number of units produced. This may involve estimating the number of equivalent units in stock at the start and end of the period under consideration.'
>
> **CIMA Official Terminology**

Process costing is used where there is a continuous flow of identical units. Process Costing is a method of Costing which is used in the following industry

- Oil refining
- The manufacture of soap
- Paint manufacture
- Food and drink manufacture

Process costing Vs Job/Batch costing

A comparison between process costing and job/batch costing is presented below;

Aspect	Process Costing	Job/Batch Costing
Nature of Production	Continuous and Mass Production	Intermittent and Customized Production
Identifiability of Units	Indistinguishable Units (Homogeneous Products)	Distinguishable Units (Heterogeneous Products)
Cost Accumulation	Accumulates costs by production process or stage	Accumulates costs by job or batch
Cost Assignment	Average Cost per Unit is calculated for each process	Actual Cost per Unit is calculated for each job
Application	Used in industries with standardized production	Commonly applied in industries with customization

Industries	Chemical manufacturing, food processing	Custom furniture manufacturing, construction
Timing of Costing	Applied throughout continuous production processes	Applied to specific, distinct jobs or batches
Calculation of Unit Cost	Total costs of a process divided by total units	Total costs of a job or batch divided by quantity

Features of Process Costing

1. The output of one process becomes the input to the next until the finished product is made in the final process.
2. The continuous nature of production in many processes means that there will usually be closing work in progress which must be valued. In process costing it is not possible to build up cost records of the cost per unit of output or the cost per unit of closing inventory because production in progress is an indistinguishable homogeneous mass.
3. There is often a loss in process due to spoilage, wastage, evaporation and so on.
4. Output from production may be a single product, but there may also be a by-product (or by-products) and/or joint products.

5.4.1 Preparation of Process Account

A process account has two sides, and on each side there are two columns – one for quantities (of raw materials, work in progress and finished goods) and one for costs.

(a) On the left-hand side of the process account i.e. Debit side, we record the inputs to the process and the cost of these inputs. So, we might show the quantity of material input to a process during the period and its cost, the cost of labour and the cost of overheads.

(b) On the right-hand side of the process account i.e. Credit side, we record what happens to the inputs by the end of the period.

  (i) Some of the input might be converted into finished goods, so we show the units of finished goods and the cost of these units.

  (ii) Some of the material input might evaporate or get spilled or damaged, so there would be losses. So, we record the loss units and the cost of the loss.

  (iii) At the end of a period, some units of input might be in the process of being turned into finished units so would be work in progress (WIP). We record the units of WIP and the cost of these units

The objective of process costing is to work out the cost of each process, transfer the same to the subsequent process and finally ascertain the total cost of production. Therefore, it is necessary to charge various costs to each process. For this, the factory is divided into distinct processes or operations and an account is kept of each process to which all the costs are debited.

Elements of Process Cost

The following are the elements of process cost, which are shown in the process accounts

- **Materials:** Raw materials required for each process is drawn from stores against material requisitions. Proper procedure like preparing and authorizing the requisition, pricing of the issues, return of materials to the stores, transfer of material from one process to another should be followed while issuing the materials. Cost of materials consumed should be computed as per the method employed for pricing of the issues and the cost should be debited to the process account.
- **Labour:** Wages paid to workers and supervisory staff should be charged to the particular process if they can be identified with it. If workers work on two or more processes, proper allocation should be made according to some basis like time spent on each process.
- **Direct Expenses:** If expenses are identifiable with a particular process, they should be charged to that process. For example, cost of electricity, depreciation may be charged directly to a process if they are identifiable with it.
- **Overheads:** By nature, overheads are indirect expenses and hence cannot be identified with a particular process. These expenses can be apportioned on some suitable basis and charged to the process.

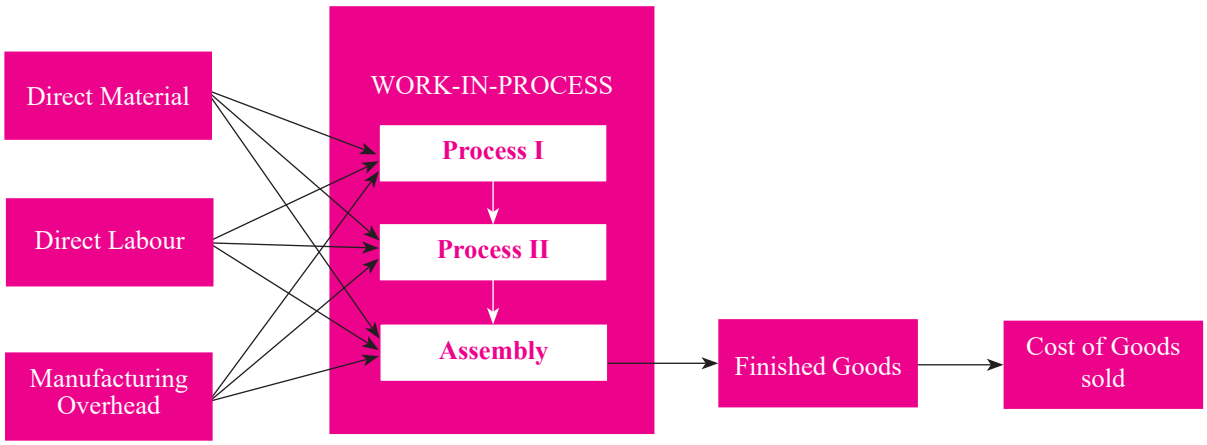


Figure 5.6: Preparation of Process Accounts

5.4.2 Losses in Process costing

Losses may occur in process. If a certain level of loss is expected, this is known as normal loss. If losses are greater than expected, the extra loss is abnormal loss. If losses are less than expected, the difference is known as abnormal gain. The following is one simple definition of the three important items

- Normal loss is the loss expected during a process.
- Abnormal loss is the extra loss resulting when actual loss is greater than normal or expected loss.
- Abnormal gain is the gain resulting when actual loss is less than the normal or expected loss.

[9] Normal loss has the effect of increasing the cost of the product as it is charged to the good units

Details of the above are given in the next few lines;

- **Losses:** During a production process, a loss may occur. If a certain level of loss is expected, this is known as normal loss. If losses are greater than expected, the extra loss is abnormal loss. If losses are less than expected, the difference is known as abnormal gain.
- **Normal Loss:** It is the loss which is unavoidable on account of inherent nature of production process. Such loss can be estimated in advance on the basis of past experience or available data. The normal process loss is recorded only in terms of quantity and the cost per unit of usable production is increased accordingly. Where scrap possesses some value as a waste product or as raw material for an earlier process, the value thereof is credited to the process account. This reduces the cost of normal output; process loss is shared by usable units.
- **Abnormal Loss:** Any loss caused by unexpected or abnormal conditions such as plants breakdown, sub-standard materials, carelessness, accident etc., or loss in excess of the margin anticipated for normal process loss should be regarded as abnormal process loss. Abnormal Loss Account is credited with realizable scrap value, if any. The balance is written off to Costing Profit and Loss Account.

  The units of abnormal loss or gain are calculated as under:

  $$\text{Abnormal loss (or gain)} = \text{Total Loss} - \text{Normal Loss}$$

  The valuation of abnormal loss should be done with the help of the formula below:

  $$\text{Value of Abnormal Loss} = \frac{\text{Total Cost incurred in the process - Scrap value of Normal loss units}}{\text{Input units - Normal loss units}} \times \text{Abnormal Loss Unit (ALU)}$$

> Abnormal loss is 'any loss in excess of the normal loss allowance'.
>
> CIMA Official Terminology

- **Abnormal Gain:** Normal loss is an estimate which is based on expectation in process industries in normal condition but slight differences are bound to occur between the actual and the anticipated losses of a process. These differences will not always represent increased loss, on occasions the actual loss will be less than that expected. Thus, when actual loss in a process is less than the expected, it results in an abnormal gain. The value of the gain will be calculated in similar manner to an abnormal loss. The Abnormal Gain Account is to be debited for the loss of income on account of less quantity of sale of scrap available as a result of Abnormal gain and Normal Process Loss Account credited accordingly. The balance is transferred to Costing Profit and Loss Account as abnormal gain.

  The valuation of abnormal gain should be done with the help of the formula below:

  $$\text{Value of Abnormal Gain} = \frac{\text{Total Cost incurred in the process - Scrap value of Normal loss units}}{\text{Input units - Normal loss units}} \times \text{Abnormal Gain Unit (AGU)}$$

> Abnormal gain is 'improvement on the accepted or normal loss associated with a production activity'.
>
> CIMA Official Terminology

Example: Abnormal Losses and Gains

Suppose the input to a process is 1,000 units at a cost of ₹4,500. Normal loss is 10% and there is no opening or closing inventories. Determine the accounting entries for the cost of output and the cost of the loss if actual output was

(i) 860 units (so that actual loss is 140 units)

(ii) 920 units (so that actual loss is 80 units)

Solution:

Before we demonstrate the use of the 'four-step framework' we will summarise the way that the losses are dealt with.

(a) Normal loss is given no share of cost.

(b) The cost of output is therefore based on the expected units of output, which in our example amount to 90% of 1,000 (Normal loss being 10%) = 900 units.

(c) Abnormal loss is given a cost, which is written off to the income statement via an abnormal loss/gain account.

(d) Abnormal gain is treated in the same way, except that being a gain rather than a loss, it appears as a debit entry in the process account (as it is a sort of input, being additional unexpected units), whereas a loss appears as a credit entry in this account (as it is a sort of output)

(i) Output is 860 units

Step 1 - Determine output and losses

If actual output is 860 units and the actual loss is 140 units:

	Units
Actual loss	140
Normal loss (10% of 1,000)	100
Abnormal loss	40

Step 2 - Calculate cost per unit of output and losses :

The cost per unit of output and the cost per unit of abnormal loss are based on expected output.

$$= \frac{\text{Cost Incurred}}{\text{Expected Output}} = \frac{₹\ 4,500}{900 \text{ units}} = ₹5 \text{ per unit}$$

Step 3 - Calculate total cost of output and losses

Normal loss is not assigned any cost.

	(₹)
Cost of output (860 × ₹ 5)	4,300
Normal loss	0
Abnormal loss (40 × ₹ 5)	200
Total Cost	4,500

Step 4 - Preparation of necessary accounts

Dr. Process Account Cr.

	Units	(₹)		Units	(₹)
To, Cost incurred	1,000	4,500	By Normal loss By Output (finished goods a/c) By Abnormal loss	100 860 40	0 4,300 200
	1,000	**4,500**		**1,000**	**4,500**

Dr. Abnormal Loss Account Cr.

	Units	(₹)		Units	(₹)
To, Process a/c	40	200	By P/L A/c	40	200

(ii) Output is 920 units

Step 1- Determine output and losses

If actual output is 920 units and the actual loss is 80 units:

	Units
Actual loss	80
Normal loss (10% of 1,000)	100
Abnormal gain	20

Step 2- Calculate cost per unit of output and losses:

The cost per unit of output and the cost per unit of abnormal gain are based on expected output.

$$= \frac{\text{Cost Incurred}}{\text{Expected Output}} = \frac{₹\,4,500}{900 \text{ units}} = ₹5 \text{ per unit}$$

(Whether there is abnormal loss or gain does not affect the valuation of units of output. The figure of ₹ 5 per unit is exactly the same as in the previous paragraph, when there were 40 units of abnormal loss.)

Step 3- Calculate total cost of output and losses

	(₹)
Cost of output (920 × ₹ 5)	4,600
Normal loss	0
Abnormal gain (20 × ₹ 5)	(100)
	4,500

Step 4- Preparation of necessary accounts

Dr. Process Account Cr.

	Units	(₹)		Units	(₹)
To Cost incurred	1,000	4,500	By Normal loss	100	0
To Abnormal gain a/c	20	100	By Output (finished goods a/c)	920	4,600
	1,020	4,600		1,020	4,600

Dr. Abnormal Gain Account Cr.

	Units	(₹)		Units	(₹)
To P/L A/c	20	100	By Process a/c	20	100

Illustration: 24

A Product Passes through three Processes A, B and C. The details of expenses incurred on the three Processes during the year 2023 were as under:

Process	A	B	C
Unit issued / introduced	10,000		
Cost per unit ₹ 100	₹	₹	₹
Sundry Materials	10,000	15,000	5,000
Labour	30,000	80,000	65,000
Direct Expenses	6,000	18,150	27,200
Selling Price per unit of output	120	165	250

Management expenses during the year were ₹ 80,000 and selling expenses were ₹ 50,000. These are not allocable to the Processes.

Actual output of the three Processes was:

A – 9,3000 units, B – 5,400 units and C – 2,100 units. Two-thirds of the output of Process A and one-half of the output of process B was passed on to the next Process and the balance was sold. The entire output of Process C was sold.

The normal loss of the three Processes, calculated on the input of every Process was:

Process A – 5%; B – 15% and C – 20%.

The loss of Process A was sold at ₹2 per unit, that of B at ₹5 per unit and of Process C at ₹10 per unit.

Prepare the Three Process Accountants and the Profit and Loss Account.

Solution:

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Units introduced	10,000	100	10,00,000	By normal loss (5% of 10,000 units)	500	2	1,000
To Sundry Materials			10,000	By Abnormal Loss	200	110	22,000
To Labour			30,000	By Output transferred to Process B A/c	6,200	110	6,82,000
To Direct expenses			6,000	To P & L A/c	3,100	110	3,41,000
	10,000		10,46,000		10,000		10,46,000

$$\text{Cost per unit} = \frac{\text{Total Cost - Value of Normal Loss}}{\text{Input Quantity - Normal Loss Quantity}} = \frac{10,16,000 - 1000}{10,000 - 500} = ₹110$$

This rate is to be applied to abnormal loss and output.

Process B Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Output from A' A/c	6,200	110	6,82,000	By normal loss (15% of 6,200 units)	930	5	4,650
To Sundry Materials			15,000	By Output transferred to Process C A/c	2,700	150	4,05,000
To Labour			80,000	To P & L A/c	2,700	150	4,05,000
To Direct expenses			18,150				
	6,200		7,95,150				
To abnormal gain	130	150	19,500				
	6,330		8,14,650		6,330		8,14,650

$$\text{Cost per unit} = \frac{7,95,150 - 4,650}{6,200 - 930} = ₹150$$

This rate is to be applied to abnormal gain and output.

Process C Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Output from B	2,700	150	4,05,000	By normal loss (20% of 2,700 units)	540	10	5,400
To Sundry Materials			5,000	By Abnormal loss	60	230	13,800
To Labour			65,000	To P&L A/c	2,100	230	4,83,000
To Direct expenses			27,200				
	2,700		5,02,200		27,000		5,02,200

$$\text{Cost per unit} = \frac{5,02,200 - 5,400}{2,700 - 540} = \frac{4,96,800}{2,160} = ₹230$$

Profit and Loss Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Process A	3,100	110	3,41,000	By Sales			
To Process B	2,700	150	4,05,000	Process A	3,100	120	3,72,000
To Process C	2,100	230	4,83,000	Process B	2,700	165	4,45,500
To Management Exp.			80,000	Process C	2,100	250	5,25,000
To Selling Expenses			50,000	By Abnormal gain (Note 2)			18,850
To Abnormal loss A/c (Note:1)			34,800	By Net loss			32,450
	7,900		13,93,800		7,900		13,93,800

Abnormal Loss Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Process A	200	110	22,000	By Sales	200	2	400
To Process C	60	230	13,800	By Sales	60	10	600
				By P & L A/c			34,800
	260		35,800		260		35,800

Abnormal Loss Account

Particulars	Units	Rate	Amount	Particulars	Units	Rate	Amount
			₹				₹
To Normal Loss	130	5	650	By Process	130	150	19,500
To P & L A/c			18,850	By Sales			
	130		19,500		130		19,500

5.4.3 Inter Process Profits

The output of one process is transferred to the subsequent process at cost price. However sometimes, the transfer is made at cost plus certain percentage of profit. This is done when each process is treated as a profit center. In such case, the difference between the debit and credit side of the process account represents profit or loss and is transferred to the Profit and Loss Account. The stocks at the end and at the beginning contain an element of unrealized profits, which have to be written back in this method. If the profit element contained in the closing inventory is more than the profit element in the opening inventory, profit will be overstated and vice versa. Profit is realized only on the goods sold, thus to obtain the actual profit the main task would be to calculate the profit element contained in the inventories. In order to compute the profit element, in closing inventory and to obtain the net realized profit for a period, three columns have to be shown in the ledger for showing the cost, unrealized profit and the transfer price.

In certain instances, the output of a particular process is conveyed to the subsequent process by incorporating a specific percentage of profit, termed as inter-process profit. The fundamental rationale behind this approach is to bill the next process not at the transferor's cost but at its market selling price. This methodology aids in evaluating the profitability of each product. Conversely, it introduces challenges in assessing the value of closing stock and unrealized profit.

The determination of the provision for unrealized profit on closing stock for each process can be accomplished through a straightforward formula.

$$= \text{Value of Closing Stock} \times \frac{\text{Total Profit on the Process}}{\text{Total Cost to the Process}}$$

Illustration 25

The following illustration will be helpful to understand how to calculate the inter process profit.

A Product Passes through three Processes before it is transferred to Finished Stock. The following details for January 2023 are available:

Particulars	I	II	III	Finished Stock
Opening Stock	20,000	24,000	16,000	60,000
Direct Material	40,000	42,000	60,000	-
Direct Wages	30,000	30,000	32,000	-
Production Overheads	28,000	12,000	80,000	-
Closing Stock	10,000	12,000	8,000	30,000
Profit on Cost Sales	331/3%	25%	25%	-
Sales	-	-	-	7,00,000
Inter-Process Profit for Opening Stock	-	4,000	4,000	22,000

Stock in Process are valued at Prime Cost and Finished Stock at the Price at which it is received from Process III.

Find out the amount of Provision to be made to offset the inter-process profits added.

Solution:

Process I A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	20,000	-	20,000	By Process II A/c	1,08,000	36,000	1,44,000
To D/M	40,000	-	40,000				
To D/W	30,000	-	30,000				
	90,000		90,000				
Less: Closing Stock	10,000	-	10,000				
Prime cost	80,000	-	80,000				
To Production Overhead	28,000		28,000				
Total Cost	1,08,000		1,08,000				
Profit $33^{1}/_{3}$% on cost	-	36,000	36,000				
	1,08,000	36,000	1,44,000		1,08,000	36,000	1,44,000

Process II A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	20,000	4,000	24,000	By Process III A/c	2,02,000	98,000	3,00,000
To Process I	1,08,000	36,000	1,44,000				
To D/M	42,000	-	42,000				
To D/W	30,000	-	30,000				
	2,00,000	40,000	2,40,000				
Less: Closing Stock	10,000	2,000	12,000				
Prime Cost	1,90,000	38,000	2,28,000				
Production Overheads	12,000	-	12,000				
Total Cost	2,02,000	38,000	2,40,000				
Profit		60,000	60,000				
	2,02,000	98,000	3,00,000		2,02,000	98,000	3,00,000

Note: Profit on Closing Stock: $\frac{40,000}{2,40,000} \times 12,000 = 2,000$

Process III A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	12,000	4,000	16,000	By Process III A/c	3,80,000	2,20,000	6,00,000
To Process II	2,02,000	98,000	3,00,000				
To D/M	60,000	-	60,000				
To D/W	32,000	-	32,000				
	3,06,000	1,02,000	4,08,000				
Less: Closing Stock	6,000	2,000	8,000				
Prime Cost	3,00,000	1,00,000	4,00,000				
Production Overheads	80,000	-	80,000				
Total Cost	3,80,000	1,00,000	4,80,000				
Profit (25% on Cost)	-	1,20,000	1,20,000				
	3,80,000	2,20,000	6,00,000		3,80,000	2,20,000	6,00,000

Finished Stock A/c

Dr. Cr.

Particulars	Cost ₹	Profit ₹	Total ₹	Particulars	Cost ₹	Profit ₹	Total ₹
To Opening Stock	38,000	22,000	60,000	By Sales	3,99,000	3,01,000	7,00,000
To Process III	3,80,000	2,20,000	6,00,000				
	4,18,000	2,42,000	6,60,000				
Less: Closing Stock	19,000	11,000	30,000				
Total Cost	3,99,000	2,31,000	6,30,000				
Profit		70,000	70,000				
	3,99,000	3,01,000	7,00,000		3,99,000	3,01,000	7,00,000

Profit on Closing Stock = $\frac{2,42,000}{6,60,000} \times 30,000 = ₹11,000$

Statement showing the amount of provision to be made to offset the inter-process profits added

Process	Provision to be made
I	Nil
II	2,000
III	2,000
Finished stock	11,000
	15,000

Illustration 26

In a manufacturing unit, raw material passes through four processes, I, II, III, and IV and the output of each process is the input for the subsequent process. The losses in the four processes are 5%, 20%, 20% and 16 ⅔ % respectively. If the product at the end of the IV process is 40,000 kg, what is the quantity of raw material required at the beginning of Process I and the cost of the same is at ₹5 per kg?

Solution:

Suppose the output in Process I is 100 kg.

Statement of Production in Different Processes Based on Input of 100 kg in Process I

Particulars	Process I	Process II	Process III	Process IV
Input	100 Kg	75 Kg	60 Kg	48 Kg
Loss (%)	25	20	20	16 ⅔
Loss in kg	25	15	12	8
Output in kg (Input -Loss in kg)	75	60	48	40

If output in process IV is 40 kg, input in process I = 100 kg

If output in process IV is 40,000 kg, input in process I = [40,000 × 100]/40 = 1,00,000 kg

Cost of raw material required = 1,00,000 kg × ₹5 = ₹5,00, 000

Effect: The input is 2.5 times of the final output ($\frac{100\ kg}{40\ kg}$).

Therefore, for variation of every rupee in the cost of raw material the final effect will be ₹2.50

Equivalent Production:

Equivalent units are conceptual complete units that serve as a representation of unfinished work, facilitating the allocation of costs between work in progress and finished output. In other words, equivalent units are notional whole units which represent incomplete work, and which are used to apportion costs between work in process and completed output,

CIMA defines equivalent units as notional whole units representing uncompleted work. Used to apportion costs between work in progress and completed output, and in performance assessment.

The term 'equivalent production' represents a technique through which incomplete units are expressed (notionally) as completed units. As the incomplete units do not bear the same cost as completed units, it requires to be converted into their equivalent completed units for finding out the cost of process-both finished and unfinished units.

For example, if out of 3,000 units of closing stock, 1,000 units arc of 100% completion stage and the remaining 2.000 units are of 50% completion stage, the total closing stock should be calculated as:

Input (units)	Output	Units	Degree of completion	Equivalent Production (units)
(1)	(2)	(3)	(4)	(5) = (3) x (4)
3,000	Completely Processed	1,000	100%	1,000
	Incompleted units (i.e, W.I.P.)	2,000	50%	1,000
3,000	Total	3,000		2,000

Thus, though there are 3,000 incomplete units of closing stock, it should be treated as 2,000.

equivalent completed units for the purpose of evaluation. So, it represents the production of a process in terms of completed units.

Procedure of Evaluation

For transferring the number of units and its related cost the following steps are necessary:

- Step I. Ascertain the number of units introduced and finished.
- Step II. Convert the production into equivalent units after taking into consideration the process losses, opening/ closing work-in-progress with their degree of completion.
- Step III. Find out the total cost of material, labour and overheads.
- Step IV. Determine the cost per unit of equivalent production separately elementwise, by dividing each element of cost by its respective equivalent units.
- Step V. Finally, ascertain the cost of production including the cost of work-in-progress.

Thus, for solving the practical problem, three statements are required to be prepared

1. Statement of equivalent production.
2. Statement of Cost, and
3. Statement of Evaluation.

Methods of Calculation

To solve for equivalent production, the weighted average method or the first-in first-out method is generally used. The weighted average method does not take into account any inventory that might have been started in an earlier period and finished during the time period relevant to the calculations. The process involves several steps, including determining the number of units introduced and finished, converting the production into equivalent units, and ascertaining the cost of production, which includes the cost of work-in-progress. The equivalent units of production can be calculated by multiplying the total number of units to be produced by the percentage that has been produced. Additionally, the evaluation of equivalent production is usually made by preparing three statements: the statement of equivalent production, the statement of cost per equivalent unit, and the statement of evaluation.

- **Average Cost Method:** This approach combines the costs of opening inventory with the costs incurred in the current period, disregarding work completed in earlier periods. The objective is to treat all units finished during the period as if they were initiated and completed within the same timeframe. The cost of closing work-in-progress from the preceding period is added to the current period's cost, resulting in an average rate. This method is particularly useful when prices are fluctuating.

- **First-in-First-Out Method (FIFO):** According to this method, the work that commenced first is assumed to be completed first. It implies that the opening work-in-progress is completed and transferred before completing the current year's production. The cost of opening stock carried over from the previous period and the cost of units started and completed in the current period are calculated separately. This method distinguishes between work completed in the current and previous periods. Any closing stock of work-in-progress includes only units within the current year's production. To determine the total and unit costs for carried-over units at the beginning, the additional cost incurred to complete these units is added to the cost of the opening stock.

Illustration 27

From the following particulars, prepare the following in the books of X Ltd.

(i) Statement of equivalent production

(ii) Statement of apportionment of cost

(iii) Process Account

(a) Opening stock as on 1st August: 200 units @ ₹4 per unit

(b) Degree of completion: Materials 100%, Labour and Overheads: 40%

(c) Units introduced during August: 1,050 units & Output transferred to the next process: 1,100 units

(d) Closing stock: 150 units

(e) Degree of completion: Materials 100%, Labour and Overheads: 70%

(f) Other relevant information regarding the process,

(i) Materials: ₹3,150

(ii) Labour: ₹4,500

(iii) Overheads: ₹2,250

Solution:

Statement of Equivalent Production

Input Units	Particulars	Output Units	Material E. Units	% of Completion	Labor & Overheads E. Units	% of Completion
200	Opening Stock					
1,050	Units Introduced					
	Output					
	Completion of work on opening stock	200	-	-	120	60
	Units introduced and completed	900	900	100	900	100
	Closing stock	150	150	100	105	70
1,250		**1,250**	**1,050**		**1,125**	

*E. Units = Equivalent units

Statement of Cost of Each Element

Elements of Cost	Cost ₹	Equivalent Production	*Cost Per Unit ₹
Material	3,150	1,050	3
Labour	4,500	1,125	4
Overheads	2,250	1,125	2
Total	**9,900**		**9**

*Cost ÷ Equivalent units

Statement of Apportionment of Cost

Particulars	Elements	Equivalent Production	Cost Per Unit ₹	Cost ₹	Total ₹
1. Cost incurred to complete the work on Opening Stock	Material	-			
	Labour	120	4	480	720
	Overheads	120	2	240	
2. Units introduced and completed	Material	900	3	2,700	8,100
	Labour	900	4	3,600	
	Overheads	900	2	1,800	
3. Closing Stocks	Material	150	3	450	1,080
	Labour	105	4	420	
	Overheads	105	2	210	
					9,900

Dr. **Process Account** **Cr.**

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
To Opening Stock	200	800	By Transfer to next Process *	1,100	9,620

Particulars	Units	Amount (₹)	Particulars	Units	Amount (₹)
Units Introduced	1,050		Closing Stocks	150	1,080
Material		3,150			
Labour		4,500			
Overheads		2,250			
Total	**1,250**	**10,700**	**Total**	**1,250**	**10,700**

* Transfer to next process is calculated as shown under

- Cost incurred on opening stock already: ₹ 800
- Cost incurred to complete the opening work in progress [stock]: ₹ 720
- Cost of completion of units introduced in this process: ₹8,100. Total ₹ 9,620 (800 + 720 + 8100)

Illustration 28

The following particulars for Process II are given:

Particulars	Units	Amount (₹)
Transfer to Process II at cost	4,000	9,000
Direct Wages		2,000
Direct Material		3,000
Transfer to Finished Stock	3,240	

Factory overheads in process are absorbed at a rate of 400% of direct material. Allowance for Normal Loss is 20% of units worked. Scrap value of ₹ 5 per unit.

Evaluate the cost of transfer to finished stock. Using the information supplied above, show the amount of gain or loss in the process to be taken to Costing Profit and Loss Account.

Solution:

Dr. Process II Account Cr.

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process I A/c	4,000	2.25	9,000	By Normal Loss A/c	800	5	4,000
To Direct Wages A/c			2,000	(4,000 × 20%)			
To Direct Materials A/c			3,000	By Balance c/d			
To Factor Overheads A/c (400% × ₹ 3,000)			12,000	($\frac{₹22,000}{3,200 \text{ units}}$ = ₹ 6.875)	3,200 (Bal. fig)	6.875	22,000
	4,000		**26,000**		**4,000**		**26,000**
To Balance b/d	3,200	6.875	22,000	By Finished Stock A/c	3,240	6.875	22,275
To Abnormal Gain A/c (Bal. fig)	40	6.875	275				
	3,240		**22,275**		**3,240**		**22,275**

Dr. **Abnormal Gain Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Normal Loss A/c	40	5	200	By Process II A/c	40	6.875	275
To Costing Profit & Loss A/c (Bal. fig)			75				
	40		**275**		**40**		**275**

Illustration 29

Product X is obtained after it passes through three distinct processes. You are required to prepare Process Account from the following information:

		Processes		
	Total	I	II	III
	Amount (₹)	Amount (₹)	Amount (₹)	Amount (₹)
Material	15,084	5,200	3,960	5,924
Direct Wages	18,000	4,000	6,000	8,000
Production Overheads	18,000	-	-	-

1,000 units @ ₹ 6 per unit was introduced in Process I. Production overheads to be distributed at 100% on direct wages.

Actual Output	Units	Normal Loss	Value of Scrap (₹ per unit)
Process I	950	5%	4
Process II	840	10%	8
Process III	750	15%	10

Prepare Process Account for I, II and III, Normal Loss Account, Abnormal Loss Account and Abnormal Gain Account

Solution:

Dr. **Process I Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material A/c (Introduced)	1,000	6	6,000	By Normal Loss A/c	50	4	200
To Material A/c			5,200	(1,000 × 5%)			
To Direct Wages A/c			4,000	By Process II A/c	950	20	19,000
To Production Overheads A/c (100% × Direct wages)			4,000	$(\frac{₹19,000}{950 \text{ units}} = ₹ 20)$ (Bal. fig.)			
	1,000		**19,200**		**1,000**		**19,200**

Dr. **Process II Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process I A/c	950	20	19,000	By Normal Loss A/c	95	8	760
To Material A/c			3,960	(950 × 10%)			
To Direct Wages A/c			6,000	By Balance c/d	855	40	34,200
To Production Overheads A/c			6,000	(₹34,000 / 855 units = ₹ 40)			
	950		**34,960**		**950**		**34,960**
To Balance b/d	855	40	34,200	By Process III A/c	840	40	33,600
				By Abnormal Loss A/c (Bal. fig.)	15	40	600
	34,200		**34,200**		**855**		**34,200**

Dr. **Process III Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process II A/c	840	40	33,600	By Normal Loss A/c	126	10	1,260
To Material A/c			5,924	(840 × 15%)			
To Direct Wages A/c			8,000	By Balance c/d			
To Production Overheads A/c			8,000	(₹54,264 / 714 units = ₹ 76)	714	76	54,264
	840		**55,524**		**840**		**55,524**
To Balance b/d	714	76	54,264	By Finished Stock A/c	750	75	57,000
To Abnormal Gain A/c (Bal. fig.)	36	76	2,736				
	750		**57,000**		**750**		**57,000**

Dr. **Normal Loss Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process I A/c	50	4	200	By Cash A/c	50	4	200
To Process II A/c	95	8	760	By Cash A/c	95	8	760
To Process III A/c	126	10	1,260	By Cash A/c (Bal. fig.)	90	10	900
				By Abnormal Gain A/c	36	10	360
	271		**2,220**		**271**		**2,220**

Dr. **Abnormal Loss Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process II A/c	15	40	600	By Cash A/c	15	8	120
				By Costing Profit & Loss A/c			480
	15		**600**		**15**		**600**

Dr. **Abnormal Gain Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Normal Loss A/c	36	10	360	By Process III A/c	36	76	2,736
To Costing Profit & Loss A/c (Bal. fig.)			2376				
	36		**2,736**		**36**		**2,736**

Illustration 30

A product passes through three Processes – A, B and C. 10,000 units at a cost of ₹ 1.10 were issued to Process A. The other direct expenses were as follows:

	Process – A Amount (₹)	Process – B Amount (₹)	Process – C Amount (₹)
Sundry materials	1,500	1,500	1,500
Direct Labour	4,500	8,000	6,500
Direct Expenses	1,000	1,000	1,503

The wastage of Process – A was 5% and in Process – B was 4%.

The wastage of Process A was sold at ₹ 0.25 per unit and that of Process B at ₹ 0.50 per unit and that of Process C at ₹ 1.00.

The overheads charges were 160% of direct labour. The final product was sold at ₹ 10 per unit fetching a profit of 20% on sales. Find out the percentage of wastage in Process C.

Solution:

Dr. **Process A Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material (Introduced) A/c	10,000	1.10	11,000	By Normal Loss A/c	500	0.25	125
To (Additional) Material A/c			1,500	(10,000 × 5%)			
To Direct Labour A/c			4,500	By Process B A/c	9,500	2.64	25,075
To Direct Expenses A/c			1,000	($\frac{₹25,075}{9,500 \text{ units}}$ =₹ 2.64)			
To Overheads A/c (160% × 4,500)			7,200	(Bal. fig.)			
	10,000		**25,200**				**25,200**

Dr. **Process B Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process A A/c	9,500	2.64	25,075	By Normal Loss A/c	380	0.50	190
To Material A/c			1,500	(9,500 × 4%)			
To Direct Labour A/c			8,000	By Process C A/c	9,120	5.28	48,185
To Direct Expenses A/c			1,000	($\frac{₹48,185}{9,120 \text{ units}}$ =₹ 5.28)			
To Overheads A/c (160% × 8,000)			12,800	(Bal. fig.)			
	9,500		**48,375**		**9,500**		**48,375**

Dr. **Process C Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process B A/c	9,120	5.28	48,185	By Normal Loss A/c	696	1	696
To Material A/c			1,500	(WN 1) [9120×7.63%]			
To Direct Labour A/c			6,500	By Finished Stock A/c	8,424	8	67,392
To Direct Expenses A/c			1,503	(₹97,392 / 8,424 units = ₹ 8) (Bal. fig.)			
To Overheads A/c (160% × 6,500)			10,400				
	9,120		**68,088**		**9,120**		**68,088**

Computation of percentage of waste in Process C

	(₹)
Sales Price per unit	10
Less: Profit @ 20%	2
Cost Price p.u	8

Let the number of units of normal loss in Process C be x

∴ Value of Scrap of Process C = x × 1 = ₹ x

or, Total Cost = Value of Scrap + Value of Finished Goods

or, Total Cost = Value of Scrap + (Units Introduced-Normal Loss in units) × 8

or, 68,088 = x + (9,120 - x) × 8

or, 68,088 = x + 72,960 - 8x

or, $x = \frac{4,872}{7} = 696$

∴ Percentage of Normal Loss = $\frac{696}{9,120} \times 100 = 7.63\%$

Illustration 31

	Degree of completion	
Opening stock	1,600 units	Material 70% Labour 60% Overheads 60%
Transfer from Process I Transfer to next process Units scrapped	10,200 units 9,200 units 800 units	
Normal Loss 10% of Input Closing stock	1,800 units	Material 60% Labour 40% Overheads 40%

Prepare a Statement of Equivalent Production.

Solution:

Statement of Equivalent Production.

Inputs		Output		Equivalent Production Units					
Items	Units	Items	Units	Material		Labour		Overheads	
				% Completion	Units	% Completion	Units	% Completion	Units
Op. WIP	1,600	Op. WIP	1,600	30	480	40	640	40	640
Units Introduced	10,200	Normal Loss	1,000	-	-	-	-	-	-
		Finished Goods (Introduced & Completed)	7,600	100	7,600	100	7,600	100	7,600
		Cl. WIP	1,800	60	1,080	40	720	40	720
			12,000		**9,160**		**8,960**		**8,960**
		Less: Abnormal Gain	200	100	200	100	200	100	200
	11,800		**11,800**		**8,960**		**8,760**		**8,760**

Normal Loss = $\frac{10}{100}$ × (Op.WIP + Units Introduced - Cl.WIP) = $\frac{10}{100}$ × (1,600 + 10,200 -1,800) = 1,000 units

Transfer to Next Process = 9,200 units (given)

Work done on Op. WIP and Completed = 1,600 units

Work done on units introduced and completed (9,200 – 1,600) = 7,600 units

Illustration 32

From the following information compute (i) Equivalent Production (ii) Statement of apportionment of cost, (iii) Prepare Process Account.

	Stage of completion
Work in progress (opening) 200 units @ ₹ 4 per unit	100% Material 40% Labour and Overheads
Units introduced 1,050 Transfer to next process 1,100 units Closing stock 150 units	100% Material 70% Labour and Overheads

Other information	Amount (₹)
Material Cost	1,050
Labour	2,250
Production Overheads	1,125
	4,425

Solution:

(i) Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
Items	Units	Items	Units	Material		Labour		Overheads	
				% Completion	Units	% Completion	Units	% Completion	Units
Op. WIP	200	Op. WIP	200	-	-	60	120	60	120
Units Introduced	1,050	Finished Goods (Introduced & completed)	900	100	900	100	900	100	900
		Cl. WIP	150	100	150	70	105	70	105
	1,250		**1,250**		**1,050**		**1,125**		**1,125**

Transfer to Next Process = 1,100 units (given)

Work done on Op. WIP and Completed = 200 units

Work done on units introduced and completed (1,100 – 200) = 900 units

(ii) Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material	1,050	1,050	1
Labour	2,250	1,125	2
Production Overheads	1,125	1,125	1

Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	150	1	150
Labour	105	2	210
Production Overheads	105	1	105
			465

(iii) Dr. Process Account Cr.

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock A/c	200	4	800	By Closing Stock, A/c	150	$\frac{465}{150}$ =3.10	465
To Material A/c	1,050	1	1,050				
To Labour A/c			2,250			$\frac{4,760}{1,100}$ = 4.33	4,760
To Production Overheads A/c			1,125	By Finished Stock A/c	1,100		
	1,250		**5,225**		**1,250**		**5,225**

Working Note:

Checking the transfer value of the Finished Stock

Element	Units	Cost per unit (₹)	Total Cost (₹)
Op. Stock Material	200	4	800
Work done on Op. WIP			
Labour	120	2	240
Production Overheads	120	1	120
Units Introduced and Completed			
Material	900	1	900
Labour	900	2	1,800
Production Overheads	90	1	900
			4,760

Illustration 33

From the following information prepare Process Account.

Opening Stock		Degree of Completion
800 units @ ₹ 6 per unit	₹ 4,800	Material I – 100% Material II – 60% Labour and Overheads – 40%
Transfer from Process – I 12,000 units costing Transfer to next Process	 ₹ 16,350 9,700 units	
Normal Process Loss Closing stock	10% 1,800 units	

Degree of completion: For units scrapped: Material - 100%, Labour and Overheads – 50%.

For closing stock: Material I – 100%, Material II - 60%, Labour and Overheads – 50%

Scrap realized ₹ 1.00 per unit.

Other information: Material ₹ 10,500, Labour ₹ 20,760, Overheads ₹ 16,670.

Solution:

Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
				Material I		Material II		Labour & Overheads	
Items	Units	Items	Units	% Completion	Units	% Completion	Units	% Completion	Units
Op. WIP	800	Op. WIP	800	-	-	40	320	60	480
Units Introduced	12,000	Normal Loss	1,100	-	-	-	-	-	-
		Finished Goods (Introduced & Completed)	8,900	100	8,900	100	8,900	100	8,900
		Cl. WIP	1,800	100	1,800	60	1,080	50	900
			12,600		**10,700**		**10,300**		**10,280**
		Abnormal Loss (Bal. fig.)	200	100	200	100	200	50	100
	12,800		**12,800**		**10,900**		**10,500**		**10,380**

Normal Loss $= \frac{10}{100} \times$ (Op.WIP+Units Introduced - Cl.WIP) $= \frac{10}{100} \times$ (800+12,000 - 1,800)

= 1,100 units

Transfer to Next Process = 9,700 units (given)

Work done on Op. WIP and Completed = 800 units

Work done on units introduced and completed (9,700 – 800) = 8,900 units

Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material I	16,350	10,900	1.50
Material II	10,500	10,500	1.00
Labour	20,760	10,380	2.00
Overheads (16,670 - 1,100)	15,570	10,380	1.50

Cost of Overheads	₹ 16,670
Less: Scrap Realised	₹ 1,100
	₹ 15,570

Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material I	1,800	1.50	2,700
Material II	1,080	1.00	1,080
Labour	900	2.00	1,800
Overheads	900	1.50	1,350
			6,930

Valuation of Abnormal Loss

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material I	200	1.50	300
Material II	200	1.00	200
Labour	100	2.00	200
Overheads	100	1.50	150
			850

Dr. **Process Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock	800	6	4,800	By Normal Loss A/c	1,100	1	1,100
To Material I A/c	12,000		16,350	By Closing Stock A/c	1,800	$\frac{6,930}{1,800} = 3.85$	6,930
To Material II A/c			10,500	By Abnormal Loss A/c	200	$\frac{850}{200} = 4.25$	850
To Labour A/c			20,760	By Finished Stock A/c	9,700	$\frac{60,200}{9,700} = 6.206$	60,200
To Overheads A/c			16,670				
	12,800		**69,080**		**12,800**		**69,080**

Illustration 34

SM Ltd., furnished you the following information relating to Process B for the month of October, 2021.

(i) Opening work in progress – Nil

(ii) Units introduced – 10,000 units @ ₹ 3 per unit

(iii) Expenses debited to the process: Direct Materials - ₹ 14,650; Labour - ₹ 21,148; Overheads - ₹ 42,000

(iv) Finished output – 9,500 units

(v) Closing work in progress – 350 units; Degree of completion: Material – 100%, Labour and Overheads – 50%

(vi) Normal Loss in process – One percent of input

(vii) Degree of completion of Abnormal Loss: Material – 100%, Labour and Overheads – 80%

(viii) Units scrapped as normal loss were sold at ₹ 1 per unit

(ix) All the units of abnormal loss were sold at ₹ 2.50 per unit

Prepare:

(a) Statement of Equivalent Production

(b) Statement of Cost

(c) Process B Account

(d) Abnormal Loss Account

Solution:

(a) Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
				Material		Labour		Overheads	
Items	Units	Items	Units	% Completion	Units	% Completion	Units	% Completion	Units
Units Introduced	10,000	Normal Loss	100	-	-	-	-	-	-
		Finished Goods (Transferred)	9,500	100	9,500	100	9,500	100	9,500
		Cl. WIP	350	100	350	50	175	50	175
			9,950		**9,850**		**9,675**		**9,675**
		Abnormal Loss	50	100	50	80	40	80	40
	10,000		**10,000**		**9,900**		**9,715**		**9,715**

Normal Loss = 1% × 10,000 = 100 units

(b)

Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material	44,550	9,900	4.50
Labour	21,148	9,715	2.1768
Overheads	42,000	9,715	4.3232
			11

Particulars	Amount (₹)
Material Introduced (1,000 × 3)	30,000
Additional Material	14,650
	44,650
Less: Scrap Realised from Normal Loss (100 × 1)	100
	44,550

(c)

Dr. **Process B Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material (Introduced) A/c	10,000	3	30,000	By Normal Loss A/c	100	1	100
To Material (Additional) A/c			14,650	By Closing Stock A/c	350	$\frac{2,713}{350} = 7.75$	2,713
To Labour A/c			21,148	By Abnormal Loss A/c	50	$\frac{485}{50} = 9.70$	485
To Overheads A/c			42,000	By Finished Stock A/c	9,500	$\frac{1,04,500}{9,500} = 11$	1,04,500
	10,000		**1,07,798**		**10,000**		**1,07,798**

Working Notes:

1. Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	350	4.50	1,575.00
Labour	175	2.1768	380.94
Overheads	175	4.3232	756.56
			2,712.50
			≈ 2,713

2. Valuation of Abnormal Loss

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	50	4.50	225.000
Labour	40	2.1768	87.072
Overheads	40	4.3232	172.928
			485.000

Illustration 35

AB Ltd is engaged in process Engineering Industry. During the month of April, 2022, 2,000 units were introduced in Process X. The normal loss was estimated at 5% of input. At the end of the month 1,400 units had been produced and transferred to Process Y. 460 incomplete units and 140 units after passing through fully the entire process, had to be scrapped. The incomplete units had reached the following stage of completion.

Material	75% completed
Labour	50% completed
Overheads	50% completed

Following are the further information on the Process X

	Amount (₹)
Cost of the 2,000 units	58,000
Additional Direct Material	14,400
Direct Labour	33,400
Overheads	16,700

Units scrapped realized ₹ 10 each. Prepare Statement of Equivalent Production, Statement of Cost, Statement of Evaluation and the Process X Account.

Solution:

Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
				Material		Labour		Overheads	
Items	Units	Items	Units	% Completion	Units	% Completion	Units	% Completion	Units
Units Introduced	2,000	Normal Loss	100	-	-	-	-	-	-
		Finished Goods (Transferred)	1,400	100	1,400	100	1,400	100	1,400
		Cl. WIP	460	75	345	50	230	50	230
			1,960		**1,745**		**1,630**		**1,630**
		Abnormal Loss	40	100	40	80	40	100	40
	2,000		**2,000**		**1,785**		**1,670**		**1,670**

Normal Loss = 5% × 2,000 = 100 units

Statement of Cost per unit

Particulars	Amount (₹)	Equivalent Units	Cost per unit (₹)
Material	71,400	1,785	40
Labour	33,400	1,670	20
Overheads	16,700	1,670	10

Particulars	Amount (₹)
Material Introduced	58,000
Additional Material	14,400
	72,400
Less: Scrap Realised from Normal Loss (100 x 10)	1,000
	71,400

Valuation of Closing Stock

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	345	40	13,800
Labour	230	20	4,600
Overheads	230	10	2,300
			20,700

Valuation of Abnormal Loss

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material	40	40	1,600
Labour	40	20	800
Overheads	40	10	400
			2,800

Dr. **Process X Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material	2,000	29	58,000	By Normal Loss A/c	100	10	1,000
(Introduced) A/c				By Closing Stock A/c	460	$\frac{20,700}{460} = 45$	20,700
To Material			14,400				
(Additional) A/c				By Abnormal Loss A/c	40	$\frac{2,800}{40} = 70$	2,800
To Direct Labour			33,400	By Finished Stock A/c	1,400	$\frac{98,000}{1,400} = 70$	98,000
A/c							
To Overheads A/c			16,700				
	2,000		1,22,500		2,000		1,22,500

Illustration 36

The product of a manufacturing unit passes through two distinct processes. From the past experience the incidence of wastage is ascertained as under:

Process A 2%

Process B 10%

In each case the percentage of wastage is computed on the number of units entering the process concerned. The sales realisation of wastage in Process A and Process B are ₹ 25 per 100 units and ₹ 50 per 100 units respectively.

The following information is obtained for the month of April, 2022; 40,000 units of crude material were introduced in Process A at a cost of ₹ 16,000.

Particulars	Process A	Process B
	Amount (₹)	Amount (₹)
Other Materials	16,000	5,000
Direct Labour	9,000	8,000
Direct Expenses	8,200	1,500
	Units	**Units**
Output	39,000	36,500
Finished Product Stock:		
April 1	6,000	5,000
April 30	5,000	8,000
Value of stock per unit on April 1st	₹ 1.20	₹ 1.60

Stocks are valued and transferred to subsequent process at weighted average costs. Prepare respective Process Accounts and Stock Accounts.

Solution:

Dr. **Process A Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material (Introduced) A/c	40,000	0.40	16,000	By Normal Loss A/c	800	0.25	200
To Material (Additional) A/c			16,000	(40,000 × 2%)			
To Direct Labour A/c			9,000				
To Direct Expenses A/c			8,200	By Balance c/d	39,200	1.25	49,000
				$(\frac{₹49,000}{39,200} = ₹1.25)$			
	40,000		**49,200**				**49,200**
To Balance b/d	39,200	1.25	49,000	By Abnormal Loss A/c	200	1.25	250
				By Process A Finished Stock A/c	39,000	1.25	48,750
	39,200		**49,000**		**39,200**		**49,000**

Dr. **Process A Finished Stock Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock A/c	6,000	1.20	7,200	By Process B A/c	40,000	1.243	49,733
To Process A A/c	39,000	1.25	48,750	$(\frac{₹55,950}{45,000} = ₹1.243)$			
				By Closing Stock A/c	5,000	1.243	6,217
	45,000		55,950				55,950

Dr. **Process B Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Process A Finished Stock A/c	40,000	1.243	49,733	By Normal Loss A/c	4,000	0.50	2,000
To Other Material A/c			5,000	(40,000 × 10%)			
To Direct Labour A/c			8,000	By Balance c/d	36,000	1.7287	62,233
To Direct Expenses A/c			1,500	($\frac{₹62,233}{36,000}$ = ₹1.7287)			
	40,000		**64,233**		**40,000**		**64,233**
To Balance b/d	36,000	1.7287	62,233	By Process B Finished Stock A/c	36,500	1.7287	63,097
To Abnormal Gain A/c	500	1.7287	864				
	36,500		**63,097**		**36,500**		**63,097**

Dr. **Process B Finished Stock Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Opening Stock A/c	5,000	1.60	8,000	By Finished Stock A/c (or transfer to next process)	33,500	1.713	57,392
To Process B A/c	36,500	1.7287	63,097	($\frac{₹71,097}{41,500 \text{ Units}}$ = ₹1.713)			
				By Closing Stock A/c	8,000	1.713	13,705
	41,500		**71,097**		**41,500**		**71,097**

Illustration 37

The following information is obtained in respect of Process III of the month of August:

Opening Stock	1,000 units
Value	Direct Material I - ₹ 390; Direct Material II - ₹ 75;
	Direct Labour - ₹ 112; Production Overheads - ₹ 118
Process II transfer	6,000 units at ₹ 2,360
Process IV transfer	4,700 units
Direct Material added in process	₹ 520
Direct Labour employed	₹ 1,036
Production Overheads	₹ 1,541
Units scrapped	300 units
Degree of completion	Direct Material - 100%
	Direct Labour – 80%
	Production Overheads – 60%

Closing Stock	2,000 units
Degree of completion	Direct Material – I 100%
	Direct Material - II 60%
	Direct Labour - 50%
	Production Overheads - 40%

Normal Loss: 5% of Production; units scrap realized ₹ 0.20 each

Prepare Process Account on Weighted Average Method.

Solution:

Statement of Equivalent Production

Inputs		Output		Equivalent Production Units							
Items	Units	Items	Units	Material I		Material II		Labour		Overheads	
Items	Units	Items	Units	%C	Units	% C	Units	%C	Units	%C	Units
Op. WIP	1,000	Normal Loss*	250	-	-	-	-	-	-	-	-
Transfer from		Transfer to Process IV	4,700	100	4,700	100	4,700	100	4,700	100	4,700
Process II	6,000	Cl. WIP	2,000	100	2,000	60	1,200	50	1,000	40	800
			6,950		**6,700**		**5,900**		**5,700**		**5,500**
		Abnormal Loss	50	100	50	100	50	80	40	60	30
	7,000		**7,000**		**6,750**		**5,950**		**5,740**		**5,530**

% C - % Completion

*Normal Loss = 5% × Production = 5% x (Op. WIP + Transfer from Process I – Cl. WIP)

= 5% × (1,000 + 6,000 – 2,000) = 5% × 5,000 = 250 units

Statement of Cost per unit

Particulars	Amount (₹) Op. WIP + Introduced	Equivalent Units	Cost per unit (₹)
Material – I	390 + 2,360 – 50 = 2,700	6,750	0.40
Material – II	75 + 520 = 595	5,950	0.10
Labour	112 + 1,036 = 1,148	5,740	0.20
Overheads	118 + 1,541 = 1,659	5,530	0.30

	₹
Material I (390 + 2,360)	2,750
Less: Scrap Realised from Normal Loss (250 × 0.20)	50
	2,700

Dr. **Valuation of Closing Stock** **Cr.**

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material – I	2,000	0.40	800
Material – II	1,200	0.10	120
Labour	1,000	0.20	200
Overheads	800	0.30	240
			1,360

Dr. **Valuation of Abnormal Loss** **Cr.**

Particulars	Units	Cost per unit (₹)	Total Cost (₹)
Material – I	50	0.40	20
Material – II	50	0.10	5
Labour	40	0.20	8
Overheads	30	0.30	9
			42

Process III Account

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Op. Stock A/c (390 + 75+ 112+118)	1,000	0.695	695	By Normal Loss A/c	250	0.20	50
To Process II A/c (Transfer)	6,000	0.393	2,360	By Closing Stock A/c	2,000	$\frac{1,360}{2,000}$ = 0.68	1,360
To Material A/c			520	By Abnormal Loss A/c	50	$\frac{42}{50}$ = 0.84	42
To Labour A/c			1,036				
To Overheads A/c			1,541	By Finished Stock A/c or, (Transfer to Next process)	4,700	$\frac{4,700}{4,700}$ = 1	4,700
	7,000		**6,152**		**7,000**		**6,152**

5.4.4 Joint Product and By-Product

Joint products are two or more products separated in a process each of which has a significant value compared to the other.

Joint products are two or more products which are output from the same processing operation, but which are indistinguishable from each other up to their point of separation.

> Joint products are 'two or more products produced by the same process and separated in processing, each having a sufficiently high saleable value to merit recognition as a main product'.
>
> CIMA Official terminology

Joint products:

Joint products are two or more products that are simultaneously produced from a common input or set of inputs, and they typically share common production processes up to a certain point. These products emerge as distinct and

identifiable items during the manufacturing or processing of a particular raw material. The key features of joint products include:

- Common Inputs: Joint products arise from the same raw materials or inputs. These inputs undergo a common production process until a certain stage, after which they diverge into separate products.
- Simultaneous Production: Joint products are produced at the same time and within the same production process. They are not produced sequentially or separately.
- Independent Identity: Each joint product has its own independent identity and can be sold as a separate and distinct product.
- Separable and Marketable: Joint products must be separable from each other, meaning they can be identified and quantified independently. Additionally, each product must be marketable, meaning there is a demand for it in the market.
- Common Costs Up to Split-off Point: Joint products share common costs up to a specific point in the production process known as the "split-off point." Beyond this point, the products become distinct, and any further processing costs are specific to each product.

Example

In the refining process, crude oil is processed up to a certain point known as the split-off point, where the different products become identifiable and can be separated. Each of these products has its own distinct characteristics, uses, and market demand, making them separate and marketable entities. The costs incurred in the common refining process up to the split-off point are considered joint costs. The primary joint products, in this case, include:

- Gasoline: This is a fuel used in internal combustion engines, such as those found in cars and motorcycles.
- Diesel: Diesel fuel is used in diesel engines, commonly found in trucks, buses, and some cars.
- Jet Fuel: Used for powering aircraft.
- Lubricants: Oils and greases that are used for lubricating engines and machinery.
- Petroleum Gas (Propane and Butane): Used for heating, cooking, and as fuel for certain vehicles.

By-products:

A by-product is an incidental product from a process which has an insignificant value compared to the main product(s). It may be said to be a supplementary or secondary product (arising as the result of a process) whose value is small relative to that of the principal product.

> A by-product is 'output of some value produced incidentally while manufacturing the main product'.
>
> CIMA Official terminology

A by-product is a product which is similarly produced at the same time and from the same common process as the 'main product' or joint products. The distinguishing feature of a by-product is its relatively low sales value in comparison to the main product. In the timber industry, for example, by-products include sawdust, small offcuts and bark.

Joint product and By product – a contrast

Feature	Joint Product	By-Product
Definition	Two or more products derived from a common input or production process.	A secondary product that is produced alongside the main product but is not the primary focus of production.

Simultaneous Production	Produced at the same time within the same production process.	Produced concurrently but may not share the exact same production process.
Independence of Identity	Each product has its own independent identity and can be sold separately.	The primary product is the main focus, and the by-product is typically of lesser importance.
Separability	Products are separable and can be identified and quantified independently.	Main product is the primary focus, and the by-product may not be easily separable or marketable.
Value Independence	The value of one product is independent of the quantities of other products.	The value of the by-product may be dependent on the main product's production.
Examples	Products from oil refining (gasoline, diesel, jet fuel).	Sawdust from lumber milling, which is a by-product when producing lumber.

Accounting for joint products

The point at which joint and by-products become separately identifiable is known as the split-off point or separation point. Costs incurred up to this point are called common costs or joint costs. Common or joint costs need to be allocated (apportioned) in some manner to each of the joint products. In the following sketched example, there are two different split-off points. A pictorial representation is given below:

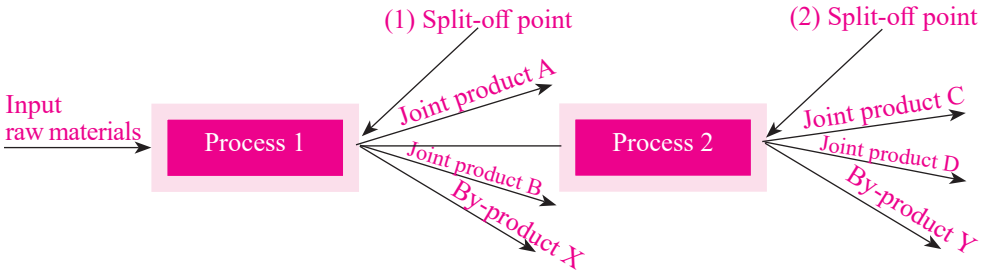


Figure 5.7: Joint Products & By-products

Methods for allocation of joint cost

In case of joint products, the main objective of accounting of the cost is to apportion the joint costs incurred up to the split off point. The manufacturing process is same up to a certain stage and after crossing that stage, each product has distinct manufacturing process. The total cost of production of the joint product will be cost incurred up to the split off point duly apportioned plus the cost incurred after the split off point. The cost after the split off point can be identified easily. The following methods are adopted for apportionment of joint cost:

(i) **Physical Quantity Method:** Under this method, cost apportionment is made in proportion to the volume of production. These physical measures may be units, pounds, litres, kilos, tonnes, gallons etc. The following example will clarify the point:

Product	Quantity – kg	Production to total	Cost allocated	Cost per kg
A	30,000	1/2	₹1,80,000	₹6
B	20,000	1/3	₹1,20,000	₹6
C	10,000	1/6	₹60,000	₹6
Total	**60,000**		**₹3,60,000**	**₹6**

(ii) Average Unit Cost Method: Under this method, the joint cost is apportioned to the joint products by computing the average unit cost of the product units. The average unit cost is computed by dividing the total manufacturing cost by the total number of units produced of all products. This method is useful where all the products produced are uniform with each other in all the respects. This method will not be useful if the production units are not similar with each other.

(iii) Weighted Average Method: Under this method, weights are assigned to each unit based upon size of the units, difference in type of labour employed, material consumption, market share, efforts of labour required and so on. The joint cost is apportioned on the basis of the weights assigned to each product. This method is highly useful if the weights assigned are on objective basis. If subjective element creeps in, the method may not give accurate results.

(iv) Selling Price Method: Under this method, the joint cost is apportioned on the basis of sales value at the split off point. The logic is that a product should bear the share of the joint cost according to its sale price. If sales price is higher than that of the other products, more share of joint cost should be charged to that product and if it is comparatively less than that of other products, less share of joint cost should be charged to the same. Though logically this method seems to be sound, in practice, charging higher share of joint cost to the product with higher sales value may not be justified due to the fact that lesser efforts are required for manufacturing of the same.

Accounting for by-products

Despite the fact that the by-product has a small value relative to that of the main product, it does have some commercial value and its accounting treatment usually consists of one of the following:

(a) Income (minus any post-separation further processing or selling costs) from the sale of the by-product may be added to sales of the main product, thereby increasing sales revenue for the period.

(b) The sales of the by-product may be treated as a separate, incidental source of income against which are set only post-separation costs (if any) of the by-product. The revenue would be recorded in the income statement as 'other income'.

(c) The sales income of the by-product may be deducted from the cost of production or cost of sales of the main product.

(d) The net realisable value of the by-product may be deducted from the cost of production of the main product. The net realisable value is the final saleable value of the by-product minus any post-separation costs.

The choice of method will be influenced by the circumstances of production and ease of calculation, as much as by conceptual correctness. The most common method is Net Realisable Value. Notice that this method is the same as the accounting treatment of a normal loss which is sold for scrap.

Illustration 38

XY Ltd manufacturers Product A which yields two By-Products B and C. The actual joint expenses of manufacturing for a period were ₹ 8,200. The profits on each product as a percentage of sales are $33\frac{1}{3}$%, 25% and 15% respectively. Subsequent expenses are as follows:

Particulars	Products		
	'A' Amount (₹)	'B' Amount (₹)	'C' Amount (₹)
Material	100	75	25
Direct Labour	200	125	50
Overheads	150	125	75
	450	**325**	**150**
Sales	6,000	4,000	2,500

Apportion the joint expenses.

Solution:

Statement Showing Apportionment of Joint Expenses

Particulars	'A' Amount (₹)	'B' Amount (₹)	'C' Amount (₹)	Total ₹
	Products	By Products	By Products	
Sales	6,000	4,000	2,500	12,500
Less: Profit	$33\frac{1}{3}\% \times 6,000 = 2,000$	$25\% \times 4,000 = 1,000$	$15\% \times 2,500 = 375$	3,375
Total Cost	4,000	3,000	2,125	9,125
Less: Separate Expenses	450	325	150	925
Share of Joint Cost	**3,550**	**2,675**	**1,975**	**8,200**

Illustration 39

A chemical process yields 60% of the material introduced as main Product A and By-Product B - 15%, By-Product C - 20% and 5% being the wastage.

The ratio of absorption of Raw Material and Labour in the process products is as follows:

(i) One unit of Product C requires half the raw material required for one unit of Product B; one unit of Product A requires $1\frac{1}{2}$ time the raw material required for Product B.

(ii) Product A requires double the time needed for the production of one unit of Product B and one unit of Product C.

(iii) Product C requires half the time required for the production of one unit of Product B.

(iv) Overheads are to be absorbed in the ratio of 6 : 1 : 1.

(v) Cost Data: Input 1,000 units of cost ₹ 4,600
Direct Labour ₹ 4,100
Overheads ₹ 6,000

Calculate cost of distribution between the above products.

Solution:

Production of Main Product A = 1,000 × 60% = 600 units

Production of By-Product B = 1,000 × 15% = 150 units

Production of By-Product C = 1,000 × 20% = 200 units

Wastage = 1,000 × 5% = 50 units

Statement Showing Apportionment of Joint Cost

Element of Cost	Basis of Apportionment	Total	Main Product A	By-Product B	By-Product C
Material	*18 : 3 : 2	4,600	3,600	600	400
Labour	#36 : 3 : 2	4,100	3,600	300	200
Overheads	6 : 1 : 1	6,000	4,500	750	750

Working Note:

***Basis of Apportionment of Material**

Let By-Product B requires x units of material

then Main Product A requires 1.5x units of material

and By-Product C requires 0.5x units of material

∴ Ratio of apportionment for each unit = 1.5x : x : 0.5x or,3:2:1

∴ Ratio of apportionment for total units of production = 600 × 3 : 150 × 2 : 200 × 1

= 1,800 : 300 : 200 or, 18 : 3 : 2

#Basis of Apportionment of Labour

Let By-Product B requires y hours of labour

then By-Product C requires 0.5y hours of labour

and Main Product A requires 2 × (y + 0.5y) = 3y

∴ Ratio of apportionment for each unit = 3y:y:0.5y

or,6:2:1

∴ Ratio of apportionment for total units of production = 600 × 6 : 150 × 2 : 200 × 1

= 3,600 : 300 : 200 or, 36 : 3 : 2

Illustration 40

The following data have been extracted from the books of M/s. Southern Coke Co. Ltd

Joint Products	Yield in kg of Recovered Products Per Tonne of Coal
Coke	1,420
Coal Tar	120
Benzol	22
Sulphate of Ammonia	26
Gas	412
	2,000

The price of coal is ₹ 80 per tonne. The direct labour and overheads costs to the point of split-off are ₹ 40 and ₹ 60 respectively per tonne of coal. Calculate the material, labour and total cost of each product on the basis of weight.

Solution:

Statement Showing Calculation of Material, Labour and Overheads Cost of Each Product

Element	Total ₹ / tonne	Coke = $\frac{1,420}{2,000}\times100$ =71%	Coal Tar = $\frac{120}{2,000}\times100$ = 6%	Benzol = $\frac{22}{2,000}\times100$ = 1.1%	Sulphate = $\frac{26}{2,000}\times100$ = 1.3%	Gas = $\frac{412}{2,000}\times100$ = 20.6%
Material	80.00	56.80	4.80	0.88	1.04	16.48
Labour	40.00	28.40	2.40	0.44	0.52	8.24
Overheads	60.00	42.60	3.60	0.66	0.78	12.36
Total	**180.00**	**127.80**	**10.80**	**1.98**	**2.34**	**37.08**

Illustration 41

A factory engaged in the production of Chemical X and in the course of manufacture in a By-Product – Y is produced which after a separate process has a commercial value. Following are the information for the month of March:

	Joint Expenses	Separate Expenses	
	₹	X ₹	Y ₹
Materials	10,000	2,000	2,800
Labour	4,000	2,500	2,500
Overheads	2,500	1,400	1,000

The output for the month was 150 quintals of X and 50 quintals of Y. the selling price of product Y is ₹ 200 per quintal. The profit on product Y is $33\frac{1}{3}\%$ on cost price. Prepare an Account to show the cost of X per quintal.

Solution:

	Joint Expenses	Separate Expenses	
	₹	X ₹	Y ₹
Materials	10,000	2,000	2,800
Labour	4,000	2,500	2,500
Overheads	2,500	1,400	1,000
	16,500	5,900	6,300
			₹
Sales Price of Product Y (50 quintals × ₹ 200)			10,000
Less: Profit $\left(10,000 \times \frac{33\frac{1}{3}\%}{133\frac{1}{3}\%}\right)$			2,500
Cost			7,500
Less: Separate Expense of Y			6,300
Share of Joint Expense of Y			1,200

∴ Share of Joint Expense of Product X = ₹ 16,500 - ₹ 1,200 = ₹ 15,300

Dr. **Joint Expense Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Material A/c	10,000	By Product X A/c	15,300
To Labour A/c	4,000	By Product Y A/c	1,200
To Overheads A/c	2,500		
	16,500		16,500

Dr. **Product X Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Material A/c	2,000	By Cost of Production A/c	21,200
To Labour A/c	2,500	(@ ₹ 21,200 / 150 quintals = ₹ 141.33)	
To Overheads A/c	1,400		
To Joint Expense A/c	15,300		
	21,200		21,200

Dr. **Product Y Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Material A/c	2,800	By Cost of Production A/c	7,500
To Labour A/c	2,500	(@ ₹ 7,500 / 50 quintals = ₹ 150)	
To Overheads A/c	1,000		
To Joint Expense A/c	1,200		
	7,500		7,500

Illustration 42

In manufacturing the main Product 'A', a company processes the resulting waste material into two By-Products B and C. Using reversal cost method of By-Products, prepare a comparative profit and loss statement of the three products from the following data:

(i) Total cost up to separation point was ₹ 68,000

	A	B	C
(ii) Sales (all production)	₹ 1,64,000	₹ 16,000	₹ 24,000
(iii) Estimated net profit % to Sale Value	-	20%	30%
(iv) Estimated Selling Expenses as % of Sales Value	20%	20%	20%
(v) Costs after separation	-	₹ 4,800	₹ 7,200

Solution:

Allocation of Joint Cost to Product B and Product C

	Product B (₹)	Product C (₹)
Sales	16,000	24,000
Less: Profit	20% × 16,000 = 3,200	30% × 24,000 = 7,200
Total Cost	12,800	16,800
Less: Selling Expenses	20% × 16,000 = 3,200	20 % × 24,000 = 4,800
	9,600	**12,000**
Less: Cost after Separation	4,800	7,200
Share in Joint Cost	**4,800**	**4,800**

∴ Share in Joint Cost of Product A = 68,000 – (4,800 + 4,800) = ₹ 58,400

Comparative Profit and Loss Statement

Particulars	Product A (₹)	Product B (₹)	Product C (₹)	Total (₹)
Sales (A)	1,64,000	16,000	24,000	2,04,000
Joint Cost	58,400	4,800	4,800	68,000
Cost After Separation	-	4,800	7,200	12,000
Selling Expenses	32,800	3,200	4,800	40,800
Total Cost (B)	91,200	12,800	16,800	1,20,800
Profit (A – B)	72,800	3,200	7,200	83,200

Selling Expense of Product A = 20% × 1,64,000 = ₹ 32,800

Illustration 43

The progressive manufacturing company manufactures one main product and two By-Products. Data for a month are shown below:

Particulars	Main Product	By-Product A	By-Product B
Sales	1,50,000	12,000	7,000
Manufacturing Cost:			
(a) Before separation	75,000	-	-
(b) After separation	23,000	2,200	1,800
Administration Cost	12,000	1,500	1,000
Ratio of Distribution of Selling Cost	85%	10%	5%
Net Profit in Sales	20%	15%	10%

Assuming no beginning and ending inventories, apportion the joint cost among Main Product and the By-Products.

Solution:

Calculation of Selling Expenses

Particulars		₹
Total Sales (1,50,000+12,000+7,000)		1,69,000
Less: Profit (1,50,000 × 20%+12,000 × 15%+7,000 × 10) (30,000 + 1,800 + 700)		32,500
Total Cost		1,36,500
Less: Administration Cost (12,000 + 1,500 + 1,000)	14,500	
After Separation (23,000 + 2,200 + 1,800)	27,000	
Joint Cost (Before seperation)	75,000	1,16,500
Selling Expenses		20,000

Selling Expenses of Product A $= \frac{85}{100} \times 20{,}000 =$ ₹ 17,000

Selling Expenses of By-Product B $= \frac{10}{100} \times 20{,}000 =$ ₹ 2,000

Selling Expenses of By-Product C $= \frac{5}{100} \times 20{,}000 = ₹\ 1{,}000$

Statement Showing Apportionment of Joint Cost

Particulars	Main Product (₹)	By-Product A (₹)	By-Product B (₹)	Total (₹)
Sales	1,50,000	12,000	7,000	1,69,000
Less: Profit	30,000	1,800	700	32,500
Total Cost	1,20,000	10,200	6,300	1,36,500
Less: Administration Cost	12,000	1,500	1,000	14,500
Selling Expenses	17,000	2,000	1,000	20,000
Cost after Separation	23,000	2,200	1,800	27.000
Share of Joint Cost	68,000	4,500	2,500	75,000

Illustration 44

In a factory producing joint products of two varieties, the following data are extracted from the books:

	Total (₹)
Sales of products X and Y	7,50,000
Direct Material	2,25,000
Direct Labour	1,10,000
Variable Overheads (150% on Labour)	1,65,000
Fixed Overheads	2,00,000

The analysis of sales reveals that the percentage of sale of product X is $66\frac{2}{3}\%$. Management contemplates to process further joint products so that they could be sold at higher rates. Facilities for this are available. The additional expenditure for the further process and total sales anticipated at higher selling prices are given below. Make recommendations presenting the effect of the proposal.

Particulars	Product X Amount (₹)	Product Y Amount (₹)	Total Amount (₹)
Sales after further processing	6,00,000	3,00,000	9,00,000
Additional Material	50,000	20,000	70,000
Additional Direct Labour	20,000	8,000	28,000

Solution:

Particulars	Product X Amount (₹)	Product Y Amount (₹)	Total Amount (₹)
Sales after further processing	6,00,000	3,00,000	9,00,000
Sales at split off point	$66\frac{2}{3}\% \times 7{,}50{,}000 = 5{,}00{,}000$	$33\frac{1}{3}\% \times 7{,}50{,}000 = 2{,}50{,}000$	7,50,000
Incremental Sales (A)	1,00,000	50,000	1,50,000

Incremental Cost			
Material	50,000	20,000	70,000
Labour	20,000	8,000	28,000
Variable Overheads (150% on Labour)	30,000	12,000	42,000
Total Incremental Cost (B)	1,00,000	40,000	1,40,000
Incremental Profit (A – B)	Nil	10,000	10,000

It is recommended to further process Product Y because there is incremental profit of ₹ 10,000 whereas Product X need not be further processed because there is no incremental profit.

Product Y sales $= 100\% - 66\frac{2}{3}\%$

$= 33\frac{1}{3}\%$

Illustration 45

A vegetable oil refining company obtains four products whose cost details are:

Joint costs of the four products: ₹ 8,29,600

Outputs: A – 5,00,000 litres; B – 10,000 litres; C – 5,000 litres and D – 9,000 kgs

Further processing costs: A - ₹ 2,40,000; B - ₹ 48,000; C – Nil and D - ₹ 8,030.

The products can be sold as intermediates i.e., at split-off point without further processing. The sale prices are:

	As Finished Product	As Intermediate
A ₹ per litre	1.84	1.20
B ₹ per litre	8.00	4.00
C ₹ per litre	6.40	6.40
D ₹ per kg	26.67	24.00

(a) Calculate the product-wise profit allocating joint costs on Net Realisable Value (NRV)

(b) Compare the profitability in selling the products with and without further processing.

Solution:

(a) Statement showing Computation of Profit after further Processing

Particulars	A	B	C	D	Total
Output	5,00,000 litres	10,000 litres	5,000 litres	9,000 kg	
Selling Price p.u.	₹ 1.84	₹ 8.00	₹ 6.40	₹ 26.67	
Sales after further Processing (₹)	9,20,000	80,000	32,000	2,40,030	12,72,030
Less: Post Separation Cost	2,40,000	48,000	Nil	8,030	2,96,030
Net Realisable Value (NRV)	6,80,000	32,000	32,000	2,32,000	9,76,000
Less: Joint Cost (WN 1)	5,78,000	27,200	27,200	1,97,200	8,29,600
Profit	1,02,000	4,800	4,800	34,800	1,46,400

(b) Statement Showing Computation of Profit before further Processing

Particulars	A	B	C	D	Total
Output	5,00,000 litres	10,000 litres	5,000 litres	9,000 kg	
Selling Price p.u.	₹ 1.20	₹ 4.00	₹ 6.40	₹ 24.00	
Sales before further Processing (₹)	6,00,000	40,000	32,000	2,16,000	8,88,000
Less: Joint Cost (WN 1) (₹)	5,78,000	27,200	27,200	1,97,200	8,29,600
Profit (₹)	22,000	12,800	4,800	18,800	58,400

Statement of the profitability in selling the products with and without further processing.

	Particulars	A	B	C	D	Total
i.	Profit after further Processing (₹)	1,02,000	4,800	4,800	34,800	1,46,400
ii.	Profit before further Processing (₹)	22,000	12,800	4,800	18,800	58,400
iii.	Incremental Profit / (Loss) (i. – ii.) (₹)	80,000	(8,000)	Nil	16,000	88,000

Product A and Product D should be further processed, because there is incremental profit whereas Product B and Product C should not be further processed.

Working Note

1. Allocation of Joint Cost on NRV basis

$$\text{Share of Joint Cost for Product A} = \frac{6,80,000}{9,76,000} \times 8,29,600 = ₹\ 5,78,000$$

$$\text{Share of Joint Cost for Product B} = \frac{32,000}{9,76,000} \times 8,29,600 = ₹\ 27,200$$

$$\text{Share of Joint Cost for Product C} = \frac{32,000}{9,76,000} \times 8,29,600 = ₹\ 27,200$$

$$\text{Share of Joint Cost for Product D} = \frac{2,32,000}{9,76,000} \times 8,29,600 = ₹\ 1,97,200$$

Illustration 46

T Ltd., in the course of refining crude oil obtains four joints products A, B, C and D. The total cost till the split off point was ₹ 97,600. The output and sales in the year 2021 were as follows:

Product	Output (units)	Sales Amount (₹)	Separate Costs Amount (₹)
A	5,00,000	1,15,000	30,000
B	10,000	10,000	6,000
C	5,000	4,000	-
D	9,000	30,000	1,000

You are required:

(a) Calculate the net income for each of the products if the joint costs are apportioned on the basis of net realisable value of the different products.

(b) What would be the net income of the company from each product if it decides to sell the products at the spit off point itself A @ 15 paise, B @ 50 paise, C @ 80 paise and D @ 3 per unit.

(c) In case the company expects to operate at the same level of production and sales in the year 2022 could the company increase the net income by altering its processing decision? If so, what would be the expected overall net income? Which product should be sold at split off? Assume that all costs incurred after split off are variable.

Solution:

(a) Statement showing Computation of Profit after further Processing

Particulars	A	B	C	D	Total
Sales after further Processing (₹)	1,15,000	10,000	4,000	30,000	1,59,000
Less: Post Separation Cost	30,000	6,000	Nil	1,000	37,000
Net Realisable Value (NRV)	85,000	4,000	4,000	29,000	1,22,000
Less: Joint Cost (WN 1)	68,000	3,200	3,200	23,200	97,600
Profit / (Loss)	17,000	800	800	5,800	24,400

(b) Statement Showing Computation of Profit before further Processing

Particulars	A	B	C	D	Total
Output	5,00,000 units	10,000 units	5,000 units	9,000 units	
Selling Price p.u.	₹ 0.15	₹ 0.50	₹ 0.80	₹ 3.00	
Sales before further Processing (₹)	75,000	5,000	4,000	27,000	1,11,000
Less: Joint Cost (WN 1)	68,000	3,200	3,200	23,200	97,600
Profit / (Loss)	7,000	1,800	800	3,800	13,400

Statement of the profitability in selling the products with and without further processing.

	Particulars	A	B	C	D	Total
i.	Profit after further Processing (₹)	17,000	800	800	5,800	24,400
ii.	Profit before further Processing (₹)	7,000	1,800	800	3,800	13,400
iii.	Incremental Profit / (Loss) (i. – ii.)	10,000	(1,000)	Nil	2,000	11,000

Product A and Product D should be further processed, because there is incremental profit whereas Product B and Product C should not be further processed.

(c) Computation of Profit after implementing the decision

	(₹)
Product A (Profit after further processing)	17,000
Product B (Profit before further processing)	1,800
Product C (Profit before further processing)	800
Product D (Profit after further processing)	5,800
Overall Profit	25,400

Working Note

1. Allocation of Joint Cost based on Net Realisable Value

$$\text{Share of Joint Cost for Product A} = \frac{85,000}{1,22,000} \times 97,600 = ₹\ 68,000$$

$$\text{Share of Joint Cost for Product B} = \frac{4,000}{1,22,000} \times 97,600 = ₹\ 3,200$$

$$\text{Share of Joint Cost for Product C} = \frac{4,000}{1,22,000} \times 97,600 = ₹\ 3,200$$

$$\text{Share of Joint Cost for Product D} = \frac{29,000}{1,22,000} \times 97,600 = ₹\ 23,200$$

Illustration 47

Beauty soap, company manufactures four different brands of soaps namely Komal, Lovely, Makeup and Nice. The data on production and sale of these brands during 2022 is reproduced below:

Brand Name	Komal	Lovely	Makeup	Nice
Production & Sales (units)	3,00,000	5,00,000	70,000	40,000
Sale Value (₹) in lakhs	15	31	2.8	1.2

All the above soaps are manufactured jointly up to a particular process. At split off point they are formed into cake-sand packed. The annual cost data were as under.

Direct Material Cost ₹ 30 lakhs

Value added ₹ 20 lakhs

(Sales includes profit at 25% on total cost)

Out of the above brands, Makeup is sold in unpacked condition without further processing while the other 3 brands further processed at an additional cost as follows:

Komal ₹ 1,20,000

Lovely ₹ 1,30,000

Nice ₹ 50,000

You are required to:

(a) Work out the profit and cost of each brand of soap after allocating joint cost on the basis of Net Realisable value at split up point. (per unit cost not required).

(b) Find out revised cost and profit on each brand if the company decides to sell all soaps at split up point at following prices; Komal ₹ 4.50; Lovely ₹ 6.00; Makeup ₹ 4.00 and Nice ₹ 1.50 per unit.

Assume that for allocation of joint cost Net Realisable Value Method is used.

(c) With the working results in (a) and (b) above, advice Beauty Soap Company about the processing decision as to which soap to be sold at split off point and which to be processed further so as to maximise profit. Substantiate your decision with suitable costing technique.

Solution:

Calculation of Joint Cost

Particulars	Amount (₹)
Sales	
- Komal	15,00,000
- Lovely	31,00,000
- Makeup	2,80,000
- Nice	1,20,000
Total Sales	50,00,000
Less: Profit = $50,00,000 \times \frac{25}{125}$	*10,00,000
Total Cost	40,00,000
Less: Post Separation Cost (1,20,000 + 1,30,000 + 50,000)	3,00,000
Joint Cost	37,00,000

or, *Cost + Profit = Sales

or, Cost + $\frac{25}{125}$ × Cost = 50,00,000

or, $\frac{100 \text{ Cost} + 25 \text{ Cost}}{100} = 50,00,000$

or, Cost = $50,00,000 \times \frac{100}{125}$ = ₹ 40,00,000

and, Profit = 50,00,000 – 40,00,000 = ₹ 10,00,000

(a) Statement showing Computation of Profit after further Processing

Particulars	Komal	Lovely	Makeup	Nice	Total
Sales after further Processing (₹)	15,00,000	31,00,000	2,80,000	1,20,000	50,00,000
Less: Post Separation Cost	1,20,000	1,30,000	-	50,000	3,00,000

Net Realisable Value (NRV)	13,80,000	29,70,000	2,80,000	70,000	47,00,000
Less: Joint Cost (WN 1)	10,86,383	23,38,085	2,20,426	55,106	37,00,000
Profit	2,93,617	6,31,915	59,574	14,894	10,00,000

(b) Statement Showing Computation of Profit before further Processing

Particulars	Komal	Lovely	Makeup	Nice	Total
Output	3,00,000 units	5,00,000 units	70,000 units	40,000 units	
Selling Price p.u.	₹ 4.50	₹ 6.00	₹ 4.00	₹ 1.50	
Sales before further Processing (₹)	13,50,000	30,00,000	2,80,000	60,000	46,90,000
Less: Joint Cost (WN 1)	10,86,383	23,38,085	2,20,426	55,106	37,00,000
Profit	2,63,617	6,61,915	59,574	4,894	9,90,000

(c) Statement of the profitability in selling the products with and without further processing.

	Particulars	Komal	Lovely	Makeup	Nice	Total
i.	Profit after further Processing (₹)	2,93,617	6,31,915	59,574	14,894	10,00,000
ii.	Profit before further Processing (₹)	2,63,617	6,61,915	59,574	4,894	9,90,000
iii.	Incremental Profit / (Loss) (i. – ii.)	30,000	(30,000)	Nil	10,000	10,000

Product Komal and Product Nice should be further processed, because there is incremental profit whereas Product Lovely and Product Makeup should not be further processed.

Working Note

1. Allocation of Joint Cost based on Net Realisable Value

$$\text{Share of Joint Cost for Product Komal} = \frac{13,80,000}{47,00,000} \times 37,00,000 = ₹\ 10,86,383$$

$$\text{Share of Joint Cost for Product Lovely} = \frac{29,70,000}{47,00,000} \times 37,00,000 = ₹\ 23,38,085$$

$$\text{Share of Joint Cost for Product Makeup} = \frac{2,80,000}{47,00,000} \times 37,00,000 = ₹\ 2,20,426$$

$$\text{Share of Joint Cost for Product Nice} = \frac{70,000}{47,00,000} \times 37,00,000 = ₹\ 55,106$$

Illustration 48

In the course of manufacture of the Main Product 'P' By-Products 'A' and 'B' also emerge. The joint expenses of manufacture amount to ₹ 1,19,550. All the three products are processed further after separation and sold as per details given below:

	Main Product	By-Products	
	P	A	B
Sales	₹ 90,000	₹ 60,000	₹ 40,000
Cost incurred after separation	₹ 6,000	₹ 5,000	₹ 4,000
Profit as percentage of sales (%)	25	20	15

Total fixed selling expenses are 10% of total cost of sales which are apportioned to the three products in the ratio of 20 : 40 : 40.

(a) Prepare a statement showing the apportionment of joint costs to the Main Product and the two By-Products.

(b) If the By-Product A is not subjected to further processing and is sold at the point of separation for which there is a market, at ₹ 58,500 without incurring any selling expenses. Would you advise its disposal at this stage? Show the workings.

Solution:

(a) Statement showing apportionment of Joint Costs

Particulars	Main Product 'P'	By-Product 'A'	By-Product 'B'	Total
	(₹)	(₹)	(₹)	(₹)
Sales	90,000	60,000	40,000	1,90,000
Less: Profit (WN – 1)	22,500	12,000	6,000	40,500
Cost of Sales	67,500	48,000	34,000	1,49,500
Less: Selling Expenses (WN – 2)	2,990	5,980	5,980	14,950
Post Separation Cost	6,000	5,000	4,000	15,000
Share of Joint Cost	58,510	37,020	24,020	1,19,550

(b) Statement showing Profit of By-Product 'A' if sold at split of point

	(₹)
Sale Price of By-Product 'A' at split off point	58,500
Less: Share of Joint Cost of By-Product A	37,020
Profit of By-Product 'A' if sold at spit off point	21,480

Profit of By-Product 'A' if sold at split off point ₹ 21,480

Profit of By-Product 'A' if sold after further processing ₹ 12,000

It is better to sell By-Product 'A' at split off point because it gives more profit ₹ 21,480 against profit after processing ₹ 12,000.

Working Notes:

1. Calculation of Profit

Particulars	Main Product 'P'	By-Product 'A'	By-Product 'B'
	(₹)	(₹)	(₹)
Profit	25% × 90,000 = 22,500	20% × 60,000 = 12,000	15% × 40,000 = 6,000

2. Calculation of Selling Expense

Total Selling Expense = 10% × Cost of Sales = 10% × 1,49,500 = ₹ 14,950

∴ Selling Expense of Main Product 'P' = $\frac{20}{100}$ × 14,950 = ₹ 2,990

Selling Expense of By-Product 'A' = $\frac{40}{100}$ × 14,950 = ₹ 5,980

Selling Expense of By-Product 'B' = $\frac{40}{100}$ × 14,950 = ₹ 5,980

Illustration 49

"If the products are truly joint products the cost of the process can be applied to these products".

(i) On the basis of the weight or other physical quantity of each product.

(ii) In respect of the marginal cost of the process on the basis of physical quantities and in respect of fixed costs of the process on the basis of the contribution made by the various products.

(iii) On the basis of selling values of the different products.

Illustrate the above statement by using the following figures in respect of joint production of A and B for a month.

Total Cost:	Direct Material			₹ 5,000
	Direct Labour			₹ 3,000
	Variable Overheads			₹ 2,000
	Fixed Overheads			₹ 2,000
	Sales	A	100 Quintals	@ ₹ 80 per quintal
	Sales	B	150 Quintals	@ ₹ 40 per quintal

Solution:

(i)

Computation of Profit after distributing Joint Cost on the basis of weight

Particulars	Product A ₹	Product B ₹	Total ₹
Sales	100 Qtls × ₹ 80 = 8,000	150 Qtls × ₹ 40 = 6,000	14,000
Less: Joint Cost	$\frac{100 \text{ Qtls}}{250 \text{ Qtls}}$ × ₹12,000 = 4,800	$\frac{150 \text{ Qtls}}{250 \text{ Qtls}}$ × ₹12,000 = 7,200	12,000
Profit / (Loss)	3,200	(1,200)	2,000

(ii)

Computation of Profit after distributing Marginal Cost on the basis of Weight and Fixed Cost on the basis of Contribution

Particulars	Product A ₹	Product B ₹	Total ₹
Sales	100 Qtls × ₹ 80 = 8,000	150 Qtls × ₹ 40 = 6,000	14,000
Less: Variable Cost ₹ (5,000+3,000+2,000)	$\frac{100\ Qtls}{250\ Qtls} \times 10,000 = 4,000$	$\frac{150\ Qtls}{250\ Qtls} \times 10,000 = 6,000$	10,000
Contribution	4,000	Nil	4,000
Less: Fi × ed Cost	$\frac{4000}{4000} \times 2000 = 2,000$	$\frac{0}{4000} \times 2000 = 0$	2,000
Profit	2,000	Nil	2,000

(iii)

Computation of Profit after distributing Joint Cost on the basis of Sales

Particulars	Product A ₹	Product B ₹	Total ₹
Sales	100 Qtls × ₹ 80 = 8,000	150 Qtls × ₹ 40 = 6,000	14,000
Less: Joint Cost	$\frac{8,000}{14,000} \times 12,000 = 6,857$	$\frac{6,000}{14,000} \times 12,000 = 5,143$	12,000
Profit	1,143	857	2,000

Operating Costing – Transport, Hotel and Healthcare

5.5

Through Cost Accounting is traditionally associated with manufacturing companies, it is applicable for service companies as well. In the modern competitive market, with the increased importance of service sector[1], the need for cost accounting has also increased. The costing method applied in these (service) industries is known as 'Operating Costing'.

The term service costing or operating costing refers to the computation of the total operational cost incurred per unit unit of the intangible product. These intangible products or services can be either in the form of internal services that are carried out by industries as supporting activities for the manufacturing of goods, or in the way of external services that are offered as a significant product to the customers by the service sector companies.

> Operating costing is that form of operation costing which applies where standardized services are provided either by an undertaking or by a service cost centre within an undertaking.
>
> CIMA Terminology

5.5.1 What are service organisations?

Service organizations are entities that primarily engage in the delivery of intangible products or services rather than tangible goods. Unlike manufacturing or product-oriented businesses, service organizations focus on providing services to meet the needs and demands of their clients or customers. These organizations play a crucial role in various sectors of the economy, including finance, healthcare, education, hospitality, consulting, and more.

Examples of service organizations include banks, insurance companies, healthcare, schools, consulting firms, hotels, and transportation services. The success of service organizations often depends on the quality of the customer experience, effective communication, and the ability to meet or exceed customer expectations.

Key characteristics of service organizations:

The following are the peculiar characteristics of service costing.

1. Intangibility: Services are intangible, meaning they cannot be touched, felt, or seen before they are consumed. This characteristic poses challenges in terms of marketing and quality assurance.
2. Inseparability: Services are often produced and consumed simultaneously. In many cases, the customer is involved in the service delivery process, making the provider and the consumer inseparable during the service encounter.
3. Perishability: Unlike physical goods, services cannot be stored or inventoried for future use. They are perishable in the sense that they must be consumed at the time of production.

1 Within a short span of 50 years since independence, the contribution of the service sector in India to the country's GDP is a lion's share of over 60%. Service Sector in India – Statistics and Overview | Invest India

4. Heterogeneity: Services are variable and can differ from one service encounter to another. Factors such as the service provider, the customer, and the context can influence the quality and nature of the service.
5. Lack of Ownership: Customers do not own services; they are essentially purchasing the benefits or outcomes of the service. This lack of ownership distinguishes services from tangible products.

Service costing Vs job/batch/contract/process costing

This table provides a concise overview of the key differences between service costing and job/batch/contract/process costing in terms of the nature of output, unit of measurement, costing method, and customization. The key differences between service costing and job/batch/contract/process costing are presented below;

Aspect	Service Costing	Job/Batch/Contract/Process Costing
Nature of Output	Intangible services	Tangible goods
Unit of Measurement	Time (e.g., per hour, per consultation)	Physical units (e.g., products, batches, contracts)
Costing Method	Focuses on costs of providing services	Allocates costs to specific jobs, batches, contracts, or processes
Customization	Services are often customized	Goods may be standardized or customized

Unit Cost Measure

Service costing involves determining unit costs for different business elements in the service industry. The primary challenge associated with service costing lies in the complexity of defining a practical cost unit that accurately reflects the value of the service rendered. Often, the adoption of a composite cost unit may be considered more suitable. These cost units can range from "Per Bed-Day" for hospitals to "Per Passenger-Kilometer" for passenger transport. The unique and specialized nature of services offered by different organizations contributes to the complexity of ascertaining the cost per unit in service costing.

The following table summarizes the difference between cost unit and composite cost unit.

Cost Unit: A cost unit is a standard measure used in cost accounting to quantify and analyze costs associated with a specific product, service, or activity. It represents the basis for calculating the cost of production or delivery. The choice of a cost unit depends on the nature of the business and the specific context of cost analysis.

Example of Cost Unit:

- In a manufacturing setting, the cost unit could be the cost per unit of a product, the cost per batch, or the cost per production run.
- In a service industry, the cost unit might be the cost per service hour, cost per transaction, or cost per project. The following table specifies various cost unit in various service organisations

Service	Cost Unit
Road, rail and air transport services	Passenger/mile or kilometer, ton/mile, tonne/kilometer
Hotels	Occupied bed-night
Education	Full-time student
Hospitals	Patient
Catering establishment	Meal served

Composite Cost Unit:

A composite cost unit is an aggregate measure that combines various cost elements into a single unit for comprehensive cost analysis. It provides a holistic view by incorporating all relevant costs associated with a particular product, service, or activity.

- In manufacturing, a composite cost unit for a product might include direct materials, direct labor, and overheads costs.
- In a service industry, a composite cost unit might involve combining labor costs, material costs, and overheads costs associated with providing a specific service. (in the above table, the cost unit in respect of transport and hotels are composite cost unit).

Examples of composite cost units used in service costing are as follows:

- The cost per room per day. This is a useful unit cost in the hotel services industry.
- The cost per passenger mile or the cost per passenger kilometer (= the average cost of transporting a passenger for one mile or one kilometer). This unit measure of cost is used by transport companies that provide bus or train services.

  This may be computed in two ways.
  - Absolute (Weighted Average) basis
  - Commercial (Simple Average) basis

In both bases of computation of service cost unit, weightage is also given to qualitative factors rather quantitative (which are directly related with variable cost elements) factors alone.

Weighted Average or Absolute basis – It is summation of the products of qualitative and quantitative factors.

Examples

- The cost per patient/day (= the average cost of treating one patient for one day) or the cost per hospital bed/day (= the cost of maintaining one hospital bed in a hospital for one day). These costs are used by health service providers.
- The cost per man day. This unit cost is widely used in professional services, such as auditing, legal services and consultancy services

Simple Average or Commercial basis –It is the product of average qualitative and total quantitative factors.

For example, in case of goods transport, Commercial Ton-Km is arrived at by multiplying total distance km., by average load quantity.

The formula to compute cost unit under service costing is:

$$\text{Average cost per unit of service} = \frac{\text{Total costs incurred in the period}}{\text{Number of service units supplied in the period}}$$

Example

Lorry starts with a load of 20 MT of Goods from Station 'A'. It unloads 8 MT in Station 'B' and balance goods in Station 'C'. On return trip, it reaches Station 'A' with a load of 16 MT, loaded at Station 'C'. The distance between A to B, B to C and C to A are 80 Kms, 120 Kms and 160 Kms, respectively. Compute "Absolute MT- Kilometer" and "Commercial MT – Kilometer"

Solution

- Absolute basis: MT-Kilometer: = (20MT × 80 Kms) + (12 MT× 120 Kms) + (16 MT×160 Kms)
  = 1,600 + 1,440 + 2,560
  = 5,600 MT-Kilometer
- Commercial basis: MT-Kilometer: = [{(20+12+16)/3} MT × {(80+120+160) Kms]
  = 16 MT×360 Kms
  = 5,760 MT–Kilometer

Calculating the cost per unit of service

The cost of a service unit is (or composite cost unit) is calculated as follows.

$$\text{Cost per unit of service} = \frac{\text{Total costs of the service}}{\text{Number of units of service}}$$

Total costs are the costs of direct materials, direct labour and direct expenses, plus a charge for overheads (unless marginal costing is used to cost the services). This is summed as

a. Fixed or standing charges

b. Variable or running charges

c. Semi variable charges (this is to be segregated into fixed or standing charges and variable or running charges)

Example

A hotel has 80 standard twin-bedded rooms. The hotel is fully-occupied for each of the 350 days in each year that it is open. The total costs of running the hotel each year are ₹ 33,60,000. What would be a useful measure of the cost of providing the hotel services?

Answer

A useful unit cost is the cost per room/day. This is the average cost of maintaining one room in the hotel for one day.

Rooms per day per year = 80 rooms × 350 days = 28,000

$$\text{Cost per room per day} = \frac{₹\ 33,60,000}{28000} = ₹\ 120.$$

Example

A train company operates a service between two cities, Kolkata and Siliguri. The distance between the cities is 400 Kilometer. During the previous year, the company transported 200,000 passengers from Kolkata to Siliguri and 175,000 passengers from Siliguri to Kolkata. The total costs of operating the service were ₹ 60 million.

What would be a useful measure of the cost of providing the train service between the two cities?

Answer

A useful unit cost is the cost per passenger/mile. This is the average cost of transporting one passenger for one kilometer.

Passenger per Kilometre per year = (2,00,000 × 400) + (1,75,000 × 400) = 150 million.

$$\text{Cost per passenger per kilometre} = \frac{₹\ 6,00,00,000}{150000000} = ₹\ 0.40.$$

The methods of computing costs in service organisations is discussed here with special reference to Transport, Hotel and Hospital Sectors:

5.5.2 Transport Sector

Transport undertakings include goods transport organisations as well as passenger transport organisations. The cost unit is either ton kilometer or passenger kilometer. The meaning is cost of carrying one ton over a distance of one kilometer or cost of carrying one passenger for a distance of one kilometer. The costs are shown under the following heads:

I. **Standing Charges or Fixed Costs:** These are the fixed costs, which remain constant irrespective of the distance travelled. These costs include the following costs:

(a) License fees and insurance
(b) Salaries of drivers, cleaners and conductors
(c) Garage costs which include garage rent and other relevant expenses
(d) Depreciation of the vehicle and other assets
(e) Taxes applicable
(f) Any other fixed charge like administrative expenses etc.

II. **Variable Costs or Running Costs:** These costs include:
(a) Petrol and diesel
(b) Lubricating oil
(c) Grease
(d) Any other variable costs

III. **Maintenance Charges:** These charges include expenses like repairs and maintenance, tyre, and other charges connected with maintenance like servicing of the vehicles etc.

Illustration 50

A transport service company is running five buses between two towns, which are 50 kilometers apart. Seating capacity of each bus is 50 passengers. The following particulars are obtained from their books for April 2022.

Particulars	Amounts ₹
Wage of drivers, conductors and cleaners	2,40,000
Salaries of office staff	1,00,000
Diesel oil and other oil	3,50,000
Repairs and maintenance	80,000
Taxation, insurance etc.	1,60,000
Depreciation	2,60,000
Interest and other expenses	2,00,000
Total	13,90,000

Actually, passengers carried were 75% of seating capacity. All buses ran on all day of the month. Each bus made one round trip per day. Find out the cost per passenger kilometer.

Solution:

Operating Cost Statement for the month of April 2022

Particulars	Amounts ₹	Amounts ₹
A. Standing Charges		
• Wages of drivers, conductors and cleaners.	2,40,000	
• Salaries of office staff	1,00,000	
• Taxation, insurance etc.	1,60,000	
• Interest and other expenses	2,00,000	
• Depreciation	2,60,000	
• Total standing charges		9,60,000

B. Running and Maintenance Charges		
• Repairs and maintenance	80,000	
• Diesel oil and other oil	3,50,000	
• Total running and maintenance charges		4,30,000
C. Total cost [A+B]		13,90,000
D. Cost per passenger kilometre* ₹13,90,000 / 5,62,500 passenger kilometers		2.471

Working:

* Passenger kilometers are computed as below:

= Number of buses × Distance in one round trip × Seating capacity available × Percentage of seating capacity actually used × Number of days in a month × No. of trips

= 5 buses × 50 kilometers × 2 × 50 passengers × 75% × 30 days = 5,62,500 passenger-kms

5.5.3 Hotel Sector

Service costing is an effective tool in respect of hotel industry which run on commercial basis. Hence, it is necessary to compute the cost in order to determine the price of various services by the hotel and to find out the profit or loss at the end of a particular period.

In this case, the costs associated with different services offered may be identified and cost per unit may be worked out. The cost unit may be Guest - day or Room – day. For calculation of cost per guest day or room day, estimated occupancy rates at different point of time are taken into account, for example, peak season or lean season.

Illustration 51

A lodging home is being run in a small hill station with 50 single rooms. The home offers concessional rates during six off- season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March 2022. [Assume a month to be of 30 days].

1. Occupancy during the season is 80% while in the off- season it is 40% only.
2. Expenses:
   - Staff salary [Excluding room attendants] ₹ 2,75,000
   - Repairs to building ₹ 1,30,500
   - Laundry and linen: ₹ 40,000
   - Interior and tapestry: ₹ 87,500
   - Sundry expenses: ₹ 95,400
3. Annual depreciation is to be provided for buildings @ 5% and on furniture and equipments @ 15% on straight-line basis.
4. Room attendants are paid ₹5 per room day on the basis of occupancy of the rooms in a month.
5. Monthly lighting charges are ₹120 per room, except in four months in winter when it is ₹30 per room and this cost is on the basis of full occupancy for a month.
6. Total investment in the home is ₹100 lakhs of which ₹80 lakhs relate to buildings and balance for furniture and equipments.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Solution:

Computation of Estimated Cost for the year Ending 31st March 2022

Particulars	Amounts ₹
Salary	2,75,000
Repairs	1,30,500
Laundry and linen	40,000
Interior decoration	87,500
Depreciation: 5% on ₹80 lakhs: ₹4,00,000 15% on ₹20lakhs: ₹3,00,000	7,00,000
Miscellaneous Expenses	95,400
Total costs	13,28,400

Workings:

1. Number of room days in a year:
   - Occupancy during season for 6 months @ 80% = [50×0.80×6×30] = 7200
   - Off-season occupancy for 6 months @ 40% = [50×0.4×6×30] = 3600
   - Total number of room days during a year = 10,800
2. Attendant's salary
   - For 10,800 room days @ ₹5 per day = ₹54,000
3. Light charges for 8 months @ ₹120 per month i.e. ₹120/30 = ₹4 per room day Light charges for 4 months @ ₹30 per month, i.e. ₹30/30 = ₹1 per room day
   - Total lighting charges:
     - During season @ ₹4 for 7200 days = ₹28,800
     - During off season 2 months @ ₹4 for 1200 days [2/6 × 3600 × 4] = ₹4,800
     - During 4 months of winter @ ₹1 for 2, 400 days [4/6 × 3600 × 1] = ₹2,400
     - Total lighting charges: ₹36,000 [28,800 + 4,800 + 2,400)

Note: It is given in the example that during four months of winter, the lighting is ₹30 per room, which is 1/4th of the lighting charges during the remaining period of the year. Hence the rate of room day which is ₹4 will also be 1/4th for winter period and so it is taken as ₹1 per room day.

Statement of Total Estimated Cost

Particulars	Amounts ₹
Expenses as shown in I above	13,28,400
Attendant's salary as shown in III above	54,000
Lighting charges as shown in IV above	36,000
Total cost	14,18,400

Computation of Total Full Room Days

- During season: 7,200
- During off-season: 1,800 [Equivalent to 50% rate of 3,600 days]
- Total Full Room Days: 7,200 + 1,800 = 9,000

Computation of Room Rent

- Cost per room day: ₹14,18,400 /9,000 = ₹157.60
- Add: Profit margin at 20% of rent or 25% of cost = ₹39.40
- Room Rent = ₹197.00

Thus, during season, room rent of ₹197 is to be charged while in the off-season room rent of ₹ 98.50 is to be charged.

5.5.4 Hospitals

Hospitals provide various medical services to the patients. Hospital costing is applied to determine the cost of these services. A hospital may have different departments catering to many services to the patients – such as:

- Outdoor – Patient
- Admitted – Patient
- Medical services like X – Ray, Scanning, etc.
- General services like Catering, Laundry, Power house, etc.
- Miscellaneous services like Transport, Pharmacy, etc.

Unit of Cost

Common unit of Costs of various departments are as follows:

- Outdoor – Patient – Per Out – Patient
- Admitted – Patient – Per Room Day, Per Bed Day
- Scanning – Per Case
- Laundry – Per 100 items laundered

Segregation of Cost

The costs of hospital can be divided into fixed costs and variable costs.

Fixed costs are based on timelines and irrespective of services rendered. For example, Staff Salaries, Depreciation on Building and Equipment, etc.

Variable costs vary with the level of services rendered. For example, Laundry Charges, Cost of Food supplied to patients, Power etc.

Illustration 52

Zenith Hospital runs a Critical Care Unit (CCU) in a hired building. CCU consists of 35 beds and 5 more beds can be added, if required.

Rent per month: ₹75,000

Supervisors - 2 persons @ ₹25,000 per month each

Nurses - 4 persons @ ₹20,000 per month each

Ward Boys - 4 persons @ ₹5,000 per month each

Doctors were paid ₹2,50,000 per month on the basis of number of patients attended and the time spent by them.

Other expenses for the year are as follows:

Repairs (fixed) – ₹81,000

Food to patients (variable) – ₹8,80,000

Other services to patients (variable) – ₹3,00,000

Laundry charges (variable) – ₹6,00,000

Medicines (variable) – ₹7,50,000

Other fixed expenses – ₹10,80,000

Administration expenses allocated – ₹10,00,000

It was estimated that for 150 days in a year, 35 beds are occupied and 25 beds are occupied for 80 days only.

The hospital hired 750 beds at a charge of ₹100 per bed per day to accommodate the flow of patients. However, this does not exceed more than 5 extra beds over and above the normal capacity of 35 beds on any day.

You are required to –

(a) Calculate profit per Patient day, if the hospital recovers on an average ₹2,000 per day from each patient

(b) Find out Break-even point for the hospital.

Solution:

Working Notes:

Calculation of number of patient days

35 Beds × 150 days	5,250
25 Beds × 80 days	2,000
Extra beds	750
Total	8,000

Profitability Statement

Particulars	(₹)	(₹)
Income for the year (₹ 2,000 per patient per day × 8,000 patient days)		1,60,00,000
Less: Variable Costs:		
Doctor Fees (₹ 2,50,000 per month × 12months)	30,00,000	
Food to Patients (variable)	8,80,000	

Particulars	(₹)	(₹)
Other services to patients (variable)	3,00,000	
Laundry charges (variable)	6,00,000	
Medicines (variable)	7,50,000	
Bed Hire Charges (₹100 × 750 beds)	75,000	
Total variable costs		56,05,000
Contribution		1,03,95,000
Less: Fixed Costs:		
Rent (₹75,000 per month × 12 months)	9,00,000	
Supervisor (2 persons × ₹25,000 × 12months)	6,00,000	
Nurses (4 persons × ₹20,000 × 12months)	9,60,000	
Ward Boys (4 persons × ₹5,000 × 12months)	2,40,000	
Repairs (fixed)	81,000	
Other fixed expenses	10,80,000	
Administration expenses allocated	10,00,000	
Total Fixed Costs		48,61,000
Profit		55,34,000

Calculation of Contribution per Patient Day

Total Contribution = ₹1,03,95,000

Total Patient days = 8,000

Contribution per Patient Day = ₹1,03,95,000 / 8,000 = ₹1,299.375

Break even Point = Fixed Cost / Contribution per Patient Day

= ₹48, 61,000 / ₹1,299.375

= 3,741 patient days

Illustration 53

There are two warehouses for storing finished goods produced in a factory. Warehouse 'A' is at a distance of 10 kms and Warehouse 'B' is at a distance of 15 kms from the factory. A fleet, of 5 tonne lorries is engaged in transporting the finished goods from the factory. The records show that the lorries average speed is 30 kms per hour when running and regularly takes 40 minutes to load at the factory. At warehouse 'A' unloading takes 30 minutes per load while at warehouse 'B' it takes 20 minutes per load.

Drivers' wages, depreciation, insurance and taxes amount to ₹18 per hour operated. Fuel oil, tyres, repairs and maintenance cost is ₹2.40 per kilometer. You are required to draw up a statement showing the cost per tonne kilometer of carrying the finished goods to the two warehouses.

Solution:

Statement showing computation of total cost and cost per tonne kilometer of carrying finished goods to warehouses:

Particulars	Warehouse A		Warehouse B	
Time for travelling	$\frac{10\times2}{30}\times 60$	40 Min	$\frac{15\times2}{30}\times 60$	60 Min
Time for loading		40 Min		40 Min
Time for unloading		30 Min		30 Min
Total Time involved		110 Min		130 Min
Drivers' wages, depreciation, insurance and taxes	$\frac{110}{60}\times 18$	₹ 33	$\frac{120}{60}\times 18$	₹ 36
Fuel & Oil etc	10 × 2 × 2.40	₹ 48	15 × 2 × 2.4	₹ 72
Total Cost		₹ 81		₹ 108
Tonne Kilometers	5 tonne × 10 km	50	5 tonne × 15 km	75
Cost per tonne-kilometer	$\frac{₹\ 81}{50\ \text{tonne - km}}$	₹ 1.62	$\frac{₹\ 108}{75\ \text{tonne - km}}$	₹ 1.44

Illustration 54

A transport service company is running 4 buses between two towns which are 50 miles apart. Seating capacity of each bus is 40 passengers. The following particulars were obtained from their books for April, 2022.

	Amount (₹)
Wages of Drivers, Conductors and Cleaners	2,400
Salaries of Office and Supervisory Staff	1,000
Diesel and oil and other oil	4,000
Repairs and Maintenance	800
Taxation, Insurance, etc.	1,600
Depreciation	2,600
Interest and Other Chargers	2,000
Total	**14,100**

Actual passengers carried were 75% of the seating capacity. All the four buses ran on all days of the month. Each bus made one round trip per day. Find out the cost per passenger mile.

Solution:

Computation of Cost per Passenger Mile

= Number of buses × Distance Covered per day × Number of days operating in a month × Number of passenger × Occupancy × No. of trips

$= 4 \times (50 \times 2) \times 30 \times 40 \times 75\%$

$= 3,60,000$ passenger-mile

$$\text{Cost per Passenger-Mile} = \frac{\text{Total Cost}}{\text{Total Passenger - Mile}} = \frac{₹\ 14,100}{3,60,000 \text{ Passenger - Mile}} = ₹\ 0.04$$

Illustration 55

Mr. Sohan Singh has started transport business with a fleet of 10 taxies. The various expenses incurred by him are given below:

(i) Cost of each taxi ₹ 75,000.

(ii) Salary of Office Staff ₹ 1,500 p.m.

(iii) Salary of Garage's Supervisor ₹ 2,000 p.m.

(iv) Rent of Garage ₹ 1,000 p.m.

(v) Drivers Salary (per taxi) ₹ 400 p.m.

(vi) Road Tax and Repairs per taxi ₹ 2,160 p.a.

(vii)Insurance Premium @ 4% of Cost p.a.

The life of a taxi is 3,00,000 km and at the end of which it is estimated to be sold at ₹ 15,000. A taxi runs on an average 4,000 km per month of which 20% it runs empty, petrol consumption 9 km per litre of petrol costing ₹ 6.30 per litre. Oil and other sundry expenses amount to ₹ 10 per 100 km.

Calculate the effective cost of running a taxi per kilometre. If the hire charge is ₹ 1.80 per kilometre, find out the profit that Mr. Sohan may expect to make in the first year of operation.

Solution:

Total Distance travelled by 10 taxi per month = 4,000km/month × 10 Taxies = 40,000 km

Passenger - km = Total Distance × Occupancy = 40,000 × 80% = 32,000 passenger-km

Statement Showing Total Cost incurred per month for 10 taxies

Particulars	Workings	Cost per month (₹)	Cost per month (₹)
Fixed Expenses			
Salary of Staff		1,500	
Salary of Garage Supervisor		2,000	
Rent of Garage		1,000	
Drivers Salary	400 x 10	4,000	
Road Tax and Repairs	$\frac{2,160}{12} \times 10$	1,800	
Insurance Premium	$\frac{75,000 \times 10 \times 4\%}{12}$	2,500	
∴ **Total Fixed Expenses per month**			12,800
Running Expenses			

Particulars	Workings	Cost per month (₹)	Cost per month (₹)
Depreciation	$\frac{₹\ 75,000 - ₹\ 15,000}{3,00,000\ km} \times 4,000\ km \times 10$	8,000	
Petrol	$\frac{₹\ 6.30}{9\ km} \times 4,000\ km \times 10$	28,000	
Oil and other sundries	$\frac{₹\ 10}{100\ km} \times 4,000\ km \times 10$	4,000	
∴ **Total Running Expenses per month**			40,000
∴ **Total Cost per month (A)**	12,800 + 40,000		52,800
Total Hire charges (B)	32,000 × 1.80		57,600
Profit per month (B- A)	57,600 – 52,800		4,800
∴ **Profit per year**	4,800 × 12 months		57,600

Illustration 56

Janata Transport Co. has been given a route 20 km long for running buses. The company has a fleet of 10 buses each costing ₹ 50,000 and having a life of 5 years without any scrap value.

From the following estimated expenditure and other details calculate the bus fare to be charged from each passenger.

i.	Insurance charges	3% p.a.
ii.	Annual tax for each bus	₹ 1,000
iii.	Total Garage charges	₹ 1,000 p.m
iv.	Drivers' salary for each bus	₹ 150 p.m.
v.	Conductor's Salary for each bus	₹ 100 p.m.
vi.	Annual repairs to each bus	₹ 1,000
vii.	Commission to be shared by the driver and conductor equally:	10% of the takings
viii.	Cost of stationery	₹ 500 p.m.
ix.	Manager's salary	₹ 2,000 p.m.
x.	Accountant's salary	₹ 1,500 p.m.
xi.	Petrol and oil	₹ 25 per 100 km

Each bus will make 3 round trips carrying on an average 40 passengers on each trip. The bus will run on an average for 25 days in a month. Assuming 15% profit on takings, calculate, the bus fare to be charged from each passenger.

Solution:

Total Distance travelled by 10 bus per month

= (Distance of route one way × 2) × Number of trips per day × Number of days operating in the month × Number of buses

= 20 × 2 × 3 × 25 × 10

= 30,000 km per month

Computation of Passenger-Km per month

= Total Distance Travelled by 10 bus per month × Number of passenger

= 30,000 × 40

= 12,00,000 passenger - km per month

Computation of Total Cost for 10 bus per month
(Excluding Commission of Driver and Conductor)

Particulars	Workings	₹ (Cost per month)
Fixed or Standing Charges		
Depreciation	$\frac{₹\ 50,000 \times 10}{5\ \text{years}} \times \frac{1}{12}$	8,333.33
Insurance	$\frac{₹\ 50,000 \times 10 \times 3\%}{12}$	1,250.00
Tax	$\frac{₹\ 1,000 \times 10}{12}$	833.33
Garage Charges		1,000.00
Salary of Drivers	₹ 150 × 10	1,500.00
Salary of Conductors	₹ 100 × 10	1,000.00
Cost of Stationery		500.00
Salary of Manager		2,000.00
Salary of Accountant		1,500.00
Maintenance Charges		
Repairs	$\frac{₹\ 1,000 \times 10}{12}$	833.34
Running Charges		
Petrol and Oil	$\frac{30,000\ \text{km}}{100\ \text{km}} \times ₹\ 25$	7,500
		26,250.00

Let the taking be ₹ X

Total Cost (Excluding Commission) + Commission + Profit = Takings

or, $26,250 + \frac{10}{100} X + \frac{15}{100} X = X$

or, $\frac{75}{100} X = 26,250$

or, X = 35,000

∴ Takings= ₹ 35,000

Profit = 15% × 35,000 = ₹ 5,250

Commission of Driver and Conductor = 10% × 35,000 = ₹ 3,500

$$\therefore \text{ Fare per passenger - km} = \frac{₹\ 35,000}{12,00,000 \text{ passenger - km}} = ₹\ 0.0292 \approx ₹\ 0.03$$

Illustration 57

Union Transport Company supplies the following details in respect of a truck of 5 tonne capacity.

Cost of Truck	₹ 90,000
Estimated life	10 years
Diesel, oil, grease	₹ 15 per trip each way
Repairs and maintenance	₹ 500 p.m.
Driver's wages	₹ 500 p.m.
Cleaner's wages	₹ 250 p.m.
Insurance	₹ 4,800 per year
Tax	₹ 2,400 per year
General supervision charges	₹ 4,800 per year

The truck carries goods to and from the city covering a distance of 50 kms each way. On outward trip freight is available to the extent of full capacity and on return, 20% of capacity. Assuming that the truck runs on an average 25 days a month, work out:

(a) Operating cost per tonne-km.

(b) Rate per tonne-km that the company should charge if a profit of 50% on freight is to be earned.

Solution:

Computation of Tonne-km

= (Distance to × Tonne × capacity +Distance from × capacity × occupancy) × No.of days operating per month

= (50km × 5 tonne × 100% + 50km × 5tonne × 20%) × 25days = 7,500

Computation of Total Cost of the truck per month

Particulars	Workings	₹ (Cost per month)
Fixed Charges		
Wages of Driver		500
Wages of Cleaner		250
Insurance	$\frac{₹\ 4,800}{12}$	400
Tax	$\frac{₹\ 2,400}{12}$	200
General Supervision Charges	$\frac{₹\ 4,800}{12}$	400

Particulars	Workings	₹ (Cost per month)
Maintenance Charges		
Repairs and Maintenance		500
Running Charges		
Depreciation	$\frac{₹90,000}{10 \text{ years}} \times \frac{1}{12}$	750
Diesel, oil and grease	₹15 × 2 trips × 25days	750
Total Cost		**3,750**

(a) Computation of Cost per tonne-km

$$\text{Operating Cost per tonne-km} = \frac{\text{Cost incurred per month}}{\text{Tonne - km per month}} = \frac{3,750}{7,500} = ₹\ 0.50$$

(b) Computation of Rate per tonne-km

Let the Rate per tonne-km be ₹ X

or, Cost + Profit = Rate

or, 0.50 + 50% X = X

or, $X = \frac{0.50}{50\%} = ₹\ 1$

∴ Rate per tonne-km = ₹ 1

Illustration 58

XYZ Ltd runs a holiday home. For this purpose, it has hired a building at a rent of ₹ 10,000 per month along with 5% of total taking. It has three types of suites for its customers, viz., single room, double rooms and triple rooms.

Following information is available:

Type of Suite	Number	Percentage of Occupancy
Single Room	100	100%
Double Rooms	50	80%
Triple Rooms	30	60%

The rent of double rooms suite is to be fixed at 2.5 times of the single room suite and that of triple rooms suite as twice of the double rooms suite.

Particulars	₹
Staff salaries	14,25,000
Room attendants' wages	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000

Provide profit @ 20% on total taking and assume 360 days in a year.

Calculate the rent to be charged for each type of suite.

Solution:

Total Equivalent Single Room Suites

Nature of Suite	Occupancy (Room-days)	Equivalent Single Room Suite (Room-days)
Single Room	36,000 (100 rooms × 360 days × 100%)	36,000 (36,000 × 1)
Double Rooms	14,400 (50 rooms × 360 days × 80%)	36,000 (14,400 × 2.5)
Triple Rooms	6,480 (30 rooms × 360 days × 60%)	32,400 (6,480 × 2.5 × 2)
Total		**1,04,400**

Computation of Total Cost

Particulars	₹
Salary of Staff	14,25,000
Wages of Room Attendants	4,50,000
Lighting, heating and power	2,15,000
Repairs and renovation	1,23,500
Laundry charges	80,500
Interior decoration	74,000
Sundries	1,53,000
Total Cost (Excluding Building Rent)	**25,21,000**
Building Rent (10,000 × 12 + 5% × Takings)	**1,20,000 + 5% takings**
Total Cost	**26,41,0000+5% × Takings**

Total Cost + Profit = Takings

or, (26,41,0000+5% × Takings)+20% × Takings = Takings

or, 75% Takings = 26,41,000

or, Takings = $\frac{26,41,000}{75\%}$ = ₹ 35,21,333

Let the Rent of Single Room Suite = R

or,Takings = 1,04,400 R

or, R = $\frac{₹\ 35,21,333}{1,04,400 \text{ Equivalent Single Room}}$ days = ₹ 33.73

∴ Rent to be charged for Single Room = ₹ 33.73

Rent to be charged for Double Rooms = ₹ 33.73 × 2.5 = ₹ 84.33

Rent to be charged for Triple Rooms = ₹ 33.73 × 2.5 × 2 = ₹ 168.65

Illustration 59

Angel Holiday Home runs in a small hill station with 100 single rooms. The home offers concessional rates during six off season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March, 2022 [Assume a month as 30 days].

(i) Occupancy during the season is 80% while in the off-season it is 40% only.

(ii) Total investment in the home is ₹200 lakhs of which 80% relate to buildings and balance for furniture and equipment.

(iii) Expenses:

Particulars	₹
Staff salary [Excluding room attendants]	5,50,000
Repairs to building	2,61,000
Laundry Charges	80,000
Interior	1,75,000
Miscellaneous expenses	1,90,800

(iv) Annual depreciation is to be provided for buildings @ 5% and on furniture and equipment @ 15% on straight line basis.

(v) Room attendants are paid ₹10 per room day on the basis of occupancy of the rooms in a month.

(vi) Monthly lighting charges are ₹120 per room, except in four months in winter when it is ₹ 30 per room and this cost is on the basis of full occupancy for a month.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Solution:

Computation of Total Room days and Equivalent Full Room Rent days

Season	Total Room days	Equivalent Full Room Rent days
Season – 80% Occupancy	100 rooms × 80% × 6 months × 30 days in a month = 14,400	14,400 × 100%=14,400
Off – Season – 40% Occupancy	100 rooms × 40% × 6 months × 30 days in a month = 7,200	7,200 × 50%=3,600
Total	**21,600**	**18,000**

Lighting charges

The lighting charges for 8 months is ₹ 120 per month and during winter season of 4 months it is ₹ 30 per month. Further it is also given that peak season is 6 months and off season is 6 months.

Being hill station, winter season is to be considered as off-season. Hence, the non-winter season of 8 months include: peak season of 6 months and off-season of 2 months.

Computation of Lighting charges

Season	Workings	(₹)
Season & Non winter – 80% Occupancy (6 months)	100 rooms × 80% × 6 months × ₹ 120 per month	57,600
Off Season & Non winter – 40% Occupancy (2 months)	100 rooms × 40% × 2 months × ₹ 120 per month	9,600
Off Season & Winter – 40% Occupancy (4 months)	100 rooms × 40% × 4 months × ₹ 30 per month	4,800
Total Lighting charges		**72,000**

Computation of Total Cost

Particulars	(₹)
Salary of Staff	5,50,000
Repairs of Building	2,61,000
Laundry charges	80,000
Interior	1,75,000
Miscellaneous expenses	1,90,800
Depreciation – Building (₹ 200 lakhs × 80% × 5%)	8,00,000
Depreciation – Furniture & Equipment (₹ 200 lakhs × 20% × 15%)	6,00,000
Wages of Room Attendants (₹ 10 × 21,600 room days)	2,16,000
Lighting Charges	72,000
Total Cost	29,44,800

Total Cost + Profit = Takings

or, 29,44,800 + 20% Takings = Takings

or, Takings = $\frac{29,44,800}{80\%}$ = ₹ 36,81,000

Computation of Room Rent per day

$= \frac{\text{Takings}}{\text{Equivalent Full Room Rent days}} = ₹ \frac{36,81,000}{18,000} = ₹ 204.50$

∴ Room Rent during season = ₹ 204.50

and, Room Rent during Off-Season = ₹ 204.50 x 50% = ₹ 102.25

Illustration 60

Manar lodging home is being run in a small hill station with 50 single rooms. The home offers concessional rates during six-off season months in a year. During this period, half of the full room rent is charged. The management's profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March, 2022. [Assume a month to be of 30 days].

(i) Occupancy during the season is 80% while in the off season it is 40% only.

(ii) Expenses:

Staff salary [Excluding room attendants]	₹ 2,75,000
Repairs to building	₹ 1,30,500
Laundry and linen	₹ 40,000
Interior and tapestry	₹ 87,500
Sundry expenses	₹ 95,400

(iii) Annual depreciation is to be provided for buildings @ 5% and on furniture and equipments @ 15% on straight line basis.

(iv) Room attendants are paid ₹ 5 per room day on the basis of occupancy of the rooms in a month.

(v) Monthly lighting charges are ₹ 120 per room, except in four months in winter when it is ₹ 30 per room and this cost is on the basis of full occupancy for a month.

(vi) Total investment in the home is ₹ 100 lakhs of which ₹ 80 lakhs relate to buildings and balance for furniture and equipments.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information

Solution:

Computation of Total Room days and Equivalent Full Room Rent days

Season	Total Room days	Equivalent Full Room Rent days
Season – 80% Occupancy	50 rooms × 80% × 6 months × 30 days in a month = 7,200	7,200 × 100%=7,200
Off – Season – 40% Occupancy	50 rooms × 40% × 6 months × 30 days in a month = 3,600	3,600 × 50%=1,800
Total	**10,800**	**9,000**

Lighting charges

The lighting charges for 8 months is ₹ 120 per month and during winter season of 4 months it is ₹ 30 per month. Further it is also given that peak season is 6 months and off season is 6 months.

Being hill station, winter season is to be considered as off-season. Hence, the non-winter season of 8 months include: peak season of 6 months and off-season of 2 months.

Computation of Lighting charges

Season	Workings	₹
Season & Non winter – 80% Occupancy (6 months)	50 rooms × 80% × 6 months × ₹ 120 per month	28,800
Off Season & Non winter – 40% Occupancy (2 months)	50 rooms × 40% × 2 months × ₹ 120 per month	4,800
Off Season & Winter – 40% Occupancy (4 months)	50 rooms × 40% × 4 months × ₹ 30 per month	2,400
Total Lighting charges		**36,000**

Computation of Total Cost

Particulars	(₹)
Salary of Staff	2,75,000
Repairs of Building	1,30,500
Laundry charges	40,000
Interior	87,500
Miscellaneous expenses	95,400
Depreciation – Building (₹ 80 lakhs × 5%)	4,00,000
Depreciation – Furniture & Equipment (₹ 20 lakhs × 15%)	3,00,000
Wages of Room Attendants (₹ 5 × 10,800 room days)	54,000
Lighting Charges	36,000
Total Cost	**14,18,400**

Total Cost + Profit = Takings

or, 14,18,400 + 20% Takings = Takings

or, Takings $= \frac{14,18,400}{80\%} =$ ₹ 17,73,000

Computation of Room Rent per day

$$= \frac{\text{Takings}}{\text{Equivalent Full Room Rent days}} = \frac{17,73,000}{9,000} =$$ ₹ 197

∴ Room Rent during season = ₹ 197

and, Room Rent during Off-Season = ₹ 197 × 50% = ₹ 98.50

Exercise

A. Theoretical Questions

Multiple Choice Questions

1. Job Costing is used in:
   A. Furniture making
   B. Repair shops
   C. Printing press
   D. All of the above

2. In a job cost system, costs are accumulated _____.
   A. On a monthly basis
   B. By specific job
   C. By department or process
   D. By kind of material used

3. The most suitable cost system where the products differ in type of material and work performed is _____.
   A. Operating Costing
   B. Job Costing
   C. Process Costing
   D. All of these

4. Cost Price is not fixed in case of _____.
   A. Cost plus contracts
   B. Escalation clause
   C. De-escalation clause
   D. All of the above

5. Most of the expenses are direct in _____.
   A. Job Costing
   B. Batch Costing
   C. Contract Costing
   D. None of the above

6. Cost plus contract is usually entered into those cases where _____.
   A. Cost can be easily estimated
   B. Cost of certified and uncertified work
   C. Cost of certified work, cost of uncertified work and amount of profit transferred to Profit and Loss Account
   D. Determination of contract cost with reasonable accuracy is not possible

7. In order to determine cost of the products or services, different business firms follow:
   A. Different techniques of costing
   B. Uniform costing
   C. Different methods of costing
   D. None of the above

8. In case product produced or jobs undertaken are of diverse system, the system of costing to be used should be:
   A. Operating Costing
   B. Process Costing
   C. Job Costing
   D. None of the above

9. Job Costing is:
   A. Suitable where similar products are produced on mass scale
   B. Methods of costing used for non-standard and non-repetitive products
   C. Technique of costing
   D. Applicable to all industries regardless of the products or services provided

10. Batch costing is a type of:
   A. Direct Costing
   B. Process Costing
   C. Job Costing
   D. Differential Costing

11. Batch costing is similar to that under job costing except with the difference that:
   A. Process becomes a cost unit
   B. Job becomes a cost unit
   C. Batch become the cost unit instead of a job
   D. None of the above

12. Economic batch quantity is that size of the batch of production where:
   A. Carrying cost is minimum
   B. Set-up cost of machine is minimum
   C. Average cost is minimum
   D. Both A. and B.

14. Which of the following documents are used in job costing to record the issue of direct materials to a job:
    A. Purchase order
    B. Purchase requisition
    C. Goods received note
    D. Material requisition

15. Which of the following statements is true:
    A. Batch costing is a variant of jobs costing
    B. Job cost sheet may be used for estimating profit of jobs
    C. Job costing cannot be used in conjunction with marginal costing
    D. In cost plus contracts, the contractor runs a risk of incurring a loss

16. Which of the following statement is true:
    A. Job costing can be suitably used for concerns producing any specific product uniformly
    B. Job costing cannot be used in companies applying standard costing
    C. Job cost sheet may be prepared to facilitate routing and scheduling of the job
    D. Neither A. nor B. nor C.

17. The type of process loss that should not be allowed to affect the cost of good units is called:
    A. Standard Loss
    B. Normal Loss
    C. Abnormal Loss
    D. Seasonal Loss

18. Spoilage that occurs under inefficient operating conditions and is generally controllable is called _____.
    A. Normal defectives
    B. Abnormal spoilage
    C. Normal spoilage
    D. None of the above

19. In which of the following situations an abnormal gain in a process occurs:
    A. When normal loss is equal to actual loss
    B. When the actual output is greater than the planned output
    C. When actual loss is more than the expected
    D. When actual loss is less than the expected loss

20. The value of abnormal loss is equal to:

    A. Total cost of materials

    B. Total process cost less cost of scrap

    C. Total process cost less realisable value of normal loss less value of transferred out goods.

    D. Total process cost less realisable value of normal loss

21. A process account is debited by abnormal gain, the value is determined as:

    A. Equal to the value of good units less closing stock

    B. Equal to the value of normal loss

    C. Cost of good units less realisable value of normal loss

    D. Cost of good unit less realisable value of actual loss

22. In sugar manufacturing industry molasses is also produced along with sugar. Molasses may be of small value as compared with the value of sugar and is known as:

    A. Joint product

    B. Common product

    C. By-product

    D. None of them

23. Method of apportioning joint costs on the basis of output of each joint product at the point of split-offs is known as:

    A. Physical unit method

    B. Sales value method

    C. Average cost method

    D. Marginal cost and contribution method

24. The main purposes of accounting of joint products and by-products is to:

    A. Determine the replacement cost

    B. Determine the opportunity cost

    C. Determine profit or loss on each product line

    D. None of the above

25. Under net realisable value method of apportioning joint costs to joint products, the selling & distribution cost is:

    A. Ignored

    B. Deducted from sales value

    C. Deducted from further processing cost

    D. Added to joint cost

26. Which of the following is an example of by-product:

    A. Mustard seeds and mustard oil

    B. Diesel and Petrol in an oil refinery

    C. Edible oils and oil cakes

    D. Curd and butter in a diary

27. Which of following methods can be used when the joint products are of unequal quantity and used for captive consumption:

    A. Physical units method

    B. Net realisable value method

    C. Technical estimates, using market value of similar goods

    D. Market value at spit-off method

28. Cost of a particular service under operating costing is ascertained by preparing:

    A. Cost sheet

    B. Process account

    C. Job cost sheet

    D. Production account

29. Operating costing is applicable to:

    A. Hospitals

    B. Cinemas

    C. Transport undertaking

    D. All of the above

30. Composite cost unit for a hospital is:

    A. Per day

    B. Per bed

    C. Per patient day

    D. Per patient

31. Cost units used in power sector is called:

    A. Number of hours

    B. Number of electric points

    C. Kilowatt-hour (KWH)

    D. Kilo meter (K.M.)

32. Absolute Tonne-Km is an example of:

    A. Composite unit for bus operation

    B. Composite unit of transport sector

    C. Composite unit for oil and natural gas

    D. Composite unit in power sector

33. A company does job work for customers. Job 947 has direct materials costs of ₹ 125, direct labour costs of ₹80 and direct expenses of ₹ 25. Direct labour is paid ₹ 20 per hour. Production overheads are charged at the rate of ₹ 35 per hour and non-production overheads are charged as 60% of prime cost. What is the cost for Job 947?

    A. ₹ 493

    B. ₹ 508

    C. ₹ 514

    D. ₹ 592

34. A road haulage company transports goods. It operates two trucks. During a particular period, the two trucks travelled a total of 80,000 kilometers carrying goods. The average load was 3 tonnes per journey. In total they made 200 journeys. Total costs were ₹ 7,20,000. What is the average cost per tonne-kilometer transported?

    A. ₹ 3

    B. ₹ 4.50

    C. ₹ 6

    D. ₹ 12

35. A hotel has 80 standard twin-bedded rooms. The hotel is fully-occupied for each of the 350 days in each year that it is open. The total costs of running the hotel each year are ₹ 3,360,000. Calculate the cost per room/day

    A. ₹ 120

    B. ₹ 240

    C. ₹ 360

    D. None of the above

36. A company operates a job costing system. Job number 6789 will require ₹ 345 of direct materials and ₹ 210 of direct labour, which is paid ₹ 14 per hour. Production overheads are absorbed at the rate of ₹ 30 per direct labour hour and non-production overheads are absorbed at the rate of 40% of prime cost. Required What is the total expected cost of the job?

    A. ₹ 7,221

    B. ₹ 1,272

    C. ₹ 2,127

    D. ₹ 1,227

37. A road building company has the following data concerning one of its contracts.

Contract price ---- ₹11,200,000

Cost of work certified to date ---- ₹ 3,763,200

Estimated costs to completion ------ ₹ 2,956,800

No difficulties are foreseen on the contract.

The profit to be recognised on the contract to date is ₹ _____

A. ₹ 25,88,000

B. ₹ 25,80,800

C. ₹ 20,58,800

D. ₹ 25,08,800

38. ASA LLP operates a job costing system. The company's standard net profit margin is 20 per cent of sales value. The estimated costs for job B124 are as follows.

Direct materials 3 kg @ ₹ 5 per kg

Direct labour 4 hours @ ₹ 9 per hour

Production overheads are budgeted to be ₹ 2,40,000 for the period, to be recovered on the basis of a total of 30,000 labour hours.

Other overheads, related to selling, distribution and administration, are budgeted to be ₹ 1,50,000 for the period. They are to be recovered on the basis of the total budgeted production cost of ₹ 7,50,000 for the period.

The price to be quoted for job B124 is ₹ _____

A. ₹ 153.50

B. ₹ 124.50

C. ₹ 145.50

D. ₹ 142.50

39. A company calculates the prices of jobs by adding overheads to the prime cost and adding 30% to total costs as a profit margin. Job number Y256 was sold for ₹ 1,690 and incurred overheads of ₹ 694. What was the prime cost of the job?

A. ₹ 489

B. ₹ 606

C. ₹ 996

D. ₹ 1,300

40. Calculate the most appropriate unit cost for a distribution division of a multinational company using the following information.

    Miles travelled 636,500

    Tonnes carried 2,479

    Number of drivers 20

    Hours worked by drivers 35,520

    Tonne-miles carried 375,200

    Costs incurred ₹ 562,800

    A. ₹ 0.88

    B. ₹ 1.50

    C. ₹ 15.84

    D. ₹ 28,140

41. Process B had no opening inventory. 13,500 units of raw material were transferred in at ₹ 4.50 per unit. Additional material at ₹ 1.25 per unit was added in process. Labour and overheads were ₹ 6.25 per completed unit and ₹ 2.50 per unit incomplete.

    If 11,750 completed units were transferred out, what was the closing inventory in Process B?

    A. ₹ 6,562.50

    B. ₹ 12,250.00

    C. ₹ 14,437.50

    D. ₹ 25,375.00

42. A company makes a product, which passes through a single process.

    Details of the process for the last period are as follows.

    Materials 10,000 kg at 50 paisa per kg

    Labour ₹ 1,000

    Production overheads 200% of labour

    Normal losses are 10% of input in the process, and without further processing any losses can be sold as scrap for 20 paisa per kg.

    The output for the period was 8,400 kg from the process. There was no work in progress at the beginning or end of the period.

    The value of the abnormal loss for the period is _____

A. ₹ 200

B. ₹ 220

C. ₹ 80

D. None of the above

Answer:

1	**D**	**2**	**B**	**3**	**B**	**4**	**A**	**5**	**C**	**6**	**D**	**7**	**C**	**8**	**C**	**9**	**B**
10	**C**	**11**	**C**	**12**	**D**	**13**	**B**	**14**	**D**	**15**	**B**	**16**	**D**	**17**	**C**	**18**	**B**
19	**D**	**20**	**C**	**21**	**C**	**22**	**C**	**23**	**A**	**24**	**C**	**25**	**B**	**26**	**C**	**27**	**C**
28	**C**	**29**	**D**	**30**	**C**	**31**	**C**	**32**	**B**	**33**	**B**	**34**	**A**	**35**	**A**	**36**	**D**
37	**D**	**38**	**B**	**39**	**B**	**40**	**B**	**41**	**C**	**42**	**A**						

Hint

MCQ 37 - calculate percentage completion which will come as 56%.

Then,

Since the contract is 56% complete and no difficulties are foreseen, a profit can reasonably be taken.

Profit to be taken = 56% × final contract profit = 56% × ₹ (11200,000 – 6720,000) = ₹ 25,08,800

MCQ 38 - Production overheads absorption rate = ₹ 240,000/30,000 = ₹ 8 per labour hour

Other overheads absorption rate = (₹ 150,000/₹ 750,000) × 100% = 20% of total production cost

Then,

Do per unit cost sheet.

MCQ 39 - The most appropriate cost unit is the tonne-mile. Therefore, the cost per unit = 562800/35520= ₹1.50

MCQ 40 - Cost per unit in closing inventory = ₹ (4.50 + 1.25 + 2.50) = ₹ 8.25

Number of units in closing inventory = 13,500 – 11,750 = 1,750 units

∴ Value of closing inventory = 1,750 units × ₹ 8.25 = ₹ 14,437.50

MCQ 42

Normal loss = 10% × input = 10% × 10,000 kg = 1,000 kg

When scrap has a value, normal loss is valued at the value of the scrap i.e., 20 paisa per kg.

Normal loss = ₹ 0.20 × 1,000 kg = ₹ 200

State True or False

1. Operating costing is applied to ascertain the cost of products.
2. Cost of operating the service is ascertained by preparing job account.
3. The problem of equivalent production arises in case of operating costing.
4. FIFO methods are followed for evaluation of equivalent production when prices are fluctuating.
5. Work in progress is the inherent feature of processing industries.
6. Costs incurred prior to the split off point are known as "Joint Costs".
7. No distinction is made between Co products and Joint Products.
8. Contact costing is variant of job costing.
9. In contract costing, the unit of cost is a job.
10. Job costing is applied only in small concerns.

Answer:

1	F	**2**	F	**3**	F	**4**	F	**5**	T
6	T	**7**	F	**8**	F	**9**	F	**10**	F

Fill in the Blanks

1. Cost of _____ loss is not borne by good units.
2. If the actual loss in a process is less than the normal loss, the difference is known as _____.
3. _____ Costs are incurred after split off point.
4. The _____ product generally has a greater sale value than by product.
5. Statement of cost per unit of equivalent production shows the per unit cost_____.
6. Two principal methods of evaluation of equivalent production are _____ and _____.
7. In hospital the cost unit is _____.
8. In electricity companies, the cost unit is _____.
9. The method of costing used in undertaking like gas companies, cinema houses, hospitals etc is known as _____.
10. In motor transport costing two example of fixed cost are _____ and _____.

Answer:

1.	**Abnormal**	**2.**	**Abnormal Gain**	**3.**	**Subsequent**	**4.**	**Main**
5.	**Element wise,**	**6.**	**FIFO and Average Method**	**7.**	**per bed / per patient day**	**8.**	**kilowatt–hour**
9.	**Operating Costing**	**10.**	**Insurance abd Depreciation.**				

Short Essay Type Questions

1. Describe briefly, how joint costs up to the point of separation may be apportioned amongst the joint products
2. Write short notes on:
   (a) Escalation clause
   (b) Retention money
   (c) Equivalent units
   (d) Operating Costing
3. What is job costing?
4. Define batch costing.
5. What is contract costing?
6. Highlight a key difference between job costing and process costing.
7. How does batch size influence batch costing?
8. Explain very briefly EBQ.
9. Differentiate between contract costing and job costing.
10. How is loss treated in process costing?
11. Give an example of a service that would be suitable for service costing.
12. What is composite cost unit? Explain with example.

Essay Type Questions

1. Explain Job Costing and Batch Costing giving examples of Industries where they are used.
2. How is Economic Batch Quantity determined under Batch Costing System?
3. Distinguish between Joint products and By-products.
4. Discuss the advantages and disadvantages of using job costing in a manufacturing environment.
5. Explain the steps involved in the batch costing process, highlighting the key considerations for effective implementation.
6. Explore the challenges faced in contract costing and how these challenges can be addressed for accurate cost estimation.
7. Compare and contrast process costing with other costing methods, emphasizing its suitability for certain industries.

8. Analyze the unique challenges associated with service costing and propose strategies for overcoming these challenges.
9. Discuss situations where a company might use a combination of job costing, batch costing, and process costing in its operations.
10. How have technological advances influenced the accuracy and efficiency of costing methods in modern business environments?
11. Explore how environmental sustainability concerns can be integrated into costing practices, with a focus on batch and process costing.
12. Discuss ethical considerations related to costing methods, especially in cases where inaccurate costing information may have significant consequences.
13. Evaluate the applicability of traditional costing methods, such as job costing and process costing, in the service industry, and propose alternative approaches if necessary.

Hint

12. Ethical considerations play a crucial role in the realm of costing methods, particularly when inaccurate costing information can lead to significant consequences. Inaccurate costing can result in distorted financial reporting, misleading stakeholders, and potentially harming the organization's reputation. Several ethical considerations arise in such scenarios. some of the important ones are given below

    - Transparency and Accountability
    - Impact on Decision-Making
    - Legal Compliance
    - Employee Morale and Fairness
    - Long-Term Sustainability.

13. Traditional costing methods, including job costing and process costing, were originally developed for manufacturing industries, and their direct applicability to the service industry can be challenging due to the intangible and often customized nature of services.

    - Services are often intangible, making it difficult to define clear "jobs" or projects. Identifying direct costs for individual services may be ambiguous.
    - Services often lack standardized processes, making it difficult to identify homogeneous cost units.
    - Variation in service delivery may not align with the uniformity assumed in process costing.

    Alternative Approach:

    Activity-Based Costing (ABC): This method allocates costs based on the actual activities that drive costs. In the service industry, where activities may vary widely, ABC provides a more accurate reflection of resource consumption.

    While traditional costing methods may face challenges in the service industry, alternative approaches like ABC, offer more nuanced and adaptable ways to measure and manage costs effectively. The choice of approach should align with the specific characteristics and needs of the services provided by an organization, ensuring accurate cost measurement and informed decision-making in the dynamic service-oriented context.

B. Numerical Questions

⊙ Numerical Multiple Choice Questions

1. Equivalent production of 1,000 units, 60% complete in all respect, is:

   A. 1,000 units

   B. 1,600 units

   C. 600 units

   D. 1,060 units

   (1000 × 60%)

2. In a process 8,000 units are introduced during a period. 5% of input is normal loss. Closing work in progress 60% complete is 1,000 units. 6,600 completed units are transferred to next process. Equivalent production for the period is:

   A. 9,000 units

   B. 7,440 units

   C. 5,400 units

   D. 7,200 units

   (6,600 + 60% × 1,000)

3. 400 units were introduced in a process in which 40 units is the normal loss. If the actual output is 300 units, then there is:

   A. No abnormal gain

   B. Abnormal loss of 60 units

   C. No abnormal loss

   D. Abnormal gain of 60 units

   {(400 – 40) – 300}

Answer

1	**C**	**2**	**D**	**3**	**B**

SECTION-C

Cost Accounting Techniques

Cost Accounting Techniques 6

This Module Includes

6.1 Marginal Costing

6.2 Standard Costing and Variance Analysis

6.3 Budget and Budgetary Control

Cost Accounting Techniques

SLOB Mapped against the Module:

To attain adequate knowledge to apply costing techniques in decision management and appreciate control techniques for cost optimization. (CMLO 3c, 5b)

Module Learning Objectives:

After studying this module, the students will be able to –

- Understand the fundamentals of CVP analysis and its relation to decision making.
- Conceptualise the fundamental aspects of standard costing and analysis of variance in material cost and labour cost.
- Contextualise the importance of budgets and budgetary control.

Marginal Costing

6.1

CIMA Official Terminology[1] defines absorption costing or traditional costing as 'a costing system which assigns direct costs and all or part of overheads to cost units using one or more overheads absorption rates. It is also referred to as full costing although this is a misnomer if all costs are not attributed to cost units.'

Marginal Costing is not a method of costing like job, batch or contract costing. It is a technique of costing in which only variable manufacturing costs are considered while determining the cost of goods sold and also for valuation of inventories. This technique is based on the fundamental principle that the total costs can be divided into fixed and variable. While the total fixed costs remain constant at all levels of production, the variable costs go on changing with the production level.

Traditional costing or absorption costing is used exclusively for pricing and external reporting purpose. It is not to be used for the purpose of decision making.

Marginal costing alias variable costing, which is the subject of this study note, is used when short-term decisions on matters such as product/service profitability is under consideration, but if long-term decisions need to be made, long-run average costs are required which an absorption costing system provides.

Para 4.14 of CAS – 3 (Revised 2015) defines variable cost as the costs which tends to directly vary with the volume of activity.

Para 4.17 of CAS - 1 (Revised 2015) defines fixed costs as costs which do not vary with the change in the volume of activity. Fixed indirect costs are termed fixed overheads.

It is important to note that fixed cost remain fixed for a particular period and is thus referred as period cost and that also within the relevant range. Whereas, variable costs are treated as product costs as these costs are traceable to the product.

In this regard it is important to note that there are costs which cannot be classified as variable cost nor as fixed cost. These costs are referred as semi-variable costs.

Para 4.30 of CAS - 1 (Revised 2015) defines semi variable costs as the costs that contain both fixed and variable elements. They partly change with the change in the level of activity.

Semi-variable cost are to be segregated into fixed and variable elements specifically for the purpose of analysis under marginal costing system. The segregation of the semi-variable cost has been considered, in details, in Module 1 in this Study material.

1 CIMA Official Terminology, 2005 Edition, The Chartered Institute of Management Accountants. (https://www.e-bookdownload.net/search/cima-official-terminology

6.1.1 Concept of Marginal Cost and Marginal Costing

Definitions

Marginal cost

Fully absorbed product costs include fixed overheads, whereas the marginal cost of a product usually consists of variable costs only. It is defined as the change in aggregate costs due to change in the volume of production by one unit.

CIMA Official Terminology defines marginal cost as part of the cost of one unit of product or service that would be avoided if the unit were not produced, or that would increase if one extra unit were produced.

For example, if the total number of units produced are 800 and the total cost of production is ₹12,000, if one unit is additionally produced the total cost of production may become ₹12,010 and if the production quantity is decreased by one unit, the total cost may come down to ₹11,990. Thus the change in the total cost is by ₹10 and hence the marginal cost is ₹10. This change, particularly in the short run, is brought about by variable cost of production. The increase or decrease in the total cost is by the same amount because the variable cost always remains constant on per unit basis. The marginal production cost per unit of an item usually consists of the following:

- Direct materials
- Direct labour
- Variable production overheads

Marginal costing

Marginal costing is an alternative method of costing where, only variable costs are charged as a cost of sale and a contribution is calculated. Closing inventories of work in progress or finished goods are valued at marginal (variable) production cost. Fixed costs are treated as a period cost, and are charged in full against profit in the accounting period in which they are incurred. It is defined as ascertainment of cost and measuring the impact on profit of the change in the volume of output or type of output. This is subject to one assumption and that is the fixed cost will remain unchanged irrespective of the change. Thus marginal costing involves firstly the ascertainment of the marginal cost and measuring the impact on profit of alterations made in the production volume and type.

CIMA Official Terminology[2] defines marginal (or variable) costing as a technique which assigns only variable costs to cost units while fixed costs are written off as period costs.

The following example clarifies the issue of application of marginal costing:

Assume that company is manufacturing 45,000 units of product A, 50,000 units of product B and 30,000 units of product C in a particular year. If it decides to change the product mix and decides that the production of B is to be reduced by 5000 units and that of A should be increased by 5000 units, there will be impact on profits and it will be essential to measure the same before the final decision is taken. Marginal costing helps to prepare comparative statement and thus facilitates the decision-making. This decision is regarding the change in the volume of output. Now suppose if the company has to take a decision that product B should not be produced at all and the capacity, which will be available, should be utilized for A and B this will be change in the type of output and again the impact on profit will have to be measured. This can be done with the help of marginal costing by preparing comparative statement showing profits before the decision and after the decision. This is subject to one assumption and that is the fixed cost remains constant irrespective of the changes in the production. Thus, marginal costing is a very useful technique of costing for decision-making.

Contribution

Contribution is an important measure in marginal costing. It is calculated as the difference between sales value

2 Certificate Paper C1 (Study text: Fundamentals of Management Accounting) Published by BPP Learning Media Ltd [ISBN 9780 7517 8068 0]

and marginal or variable cost.

CIMA Official Terminology[1] defines contribution as 'sales value – variable cost of sales'.

The term 'contribution' is really short for 'contribution towards covering fixed overheads and making a profit'. The term is derived from the concept that the sales revenue generated through sales after covering up for variable cost of sales (without which the sales revenue cannot be generated) contributes towards fixed cost and after recouping the fixed cost the residue contributes towards profit.

Example 1

Let us assume that a fountain pen named Shikhar is sold by Lotus Ltd. for ₹14,500. The direct material cost (cost of blank, nib, clip and trims) per unit is ₹3,200, the direct labour cost per unit is ₹ 4100 and the variable production overheads cost per unit is ₹1,320. Fixed overheads per month are ₹1,00,000 and the budgeted production level is 100 units in a particular month.

The contribution is calculated as below:

Particulars	(₹)	(₹)
Sale Price (per unit)		14,500
Less: Variable cost of production		
Direct material	3,200	
Direct Labour	4,100	
Variable production overheads	2,320	9,620
Contribution per unit		4,880

In the above example there is a contribution of ₹4,880 for each unit of sale of Shikhar. This implies that sale of one unit of the fountain pen contributes ₹4,880 initially towards fixed overheads of ₹1,00,000 which is spent for the month and after such fixed overheads is recovered, towards profit. In the given situation the budgeted production level is 100 units in a particular month. Thus, ₹4,88,000 is the total contribution for the month which contributes towards the recovery of fixed cost for the month (₹1,00,000). Thus, profit (contribution – fixed cost) is ₹3,88,000.

Features of Marginal costing

Marginal costing, also known as variable costing, is a costing technique where only variable costs are considered in product costing. Below mentioned are the key features of marginal costing:

- Simple Costing Method: Marginal costing is relatively simple compared to absorption costing because it does not involve allocating fixed overheads costs to products. This simplicity makes it easier to understand and apply in decision-making
- Avoidance of Arbitrary Cost Allocation: Unlike absorption costing, marginal costing avoids the arbitrary allocation of fixed overheads costs to products, which can distort product costs and profitability analysis, especially in situations of fluctuating production levels.
- Variable Costs Only: Marginal costing includes only variable manufacturing costs (i.e., costs that vary with the level of production), such as direct materials, direct labour, and variable overheads. Fixed manufacturing costs are treated as period costs and are not allocated to products.
- Contribution Margin: Marginal costing focuses on the concept of contribution margin, which is the difference between total sales revenue and total variable costs. It helps in assessing the profitability of individual products and making decisions about product mix and pricing.

- Decision-Making Tool: Marginal costing is widely used as a tool for short-term decision making, such as pricing decisions, product mix decisions, and whether to accept or reject special orders. By focusing on variable costs and contribution margin, it provides insights into the incremental profitability of different alternatives.
- Reporting Format: The format of the marginal costing income statement typically separates costs into fixed and variable categories. This format helps management understand the behavior of costs and their impact on profitability.
- Internal Reporting: Marginal costing is often used for internal reporting purposes, providing managers with information to evaluate the performance of segments or departments based on their contribution to covering fixed costs and generating profit.

6.1.2 Absorption Costing vs Marginal costing

From the above discussion it is clear that marginal costing is a technique of costing which advocates that only variable costs should be taken into consideration while working out the total cost of production and while valuing the inventory, only variable costs should be taken into the computation. Fixed costs should not be absorbed in the cost of production but should be charged to the Costing Profit and Loss Account. On the other hand, under absorption costing all indirect costs i.e. overheads are first apportioned and then absorbed in the production units. The difference between the absorption costing and marginal costing is discussed in the subsequent lines.

Aspect	Marginal Costing	Absorption Costing
Cost Classification	Only variable manufacturing costs are considered.	Both variable and fixed manufacturing costs are included.
Treatment of Fixed Costs	Fixed manufacturing costs are treated as period costs and are not allocated to products.	Fixed manufacturing costs are allocated to products as part of inventory valuation.
Income Statement	Separates costs into fixed and variable categories.	Absorbs all manufacturing costs into the cost of goods sold, including fixed overheads.
Reporting Format	Emphasizes contribution margin.	Includes full absorption of all production costs.
Decision Making	Useful for short-term decision making and analyzing contribution margin.	Provides a comprehensive view of product costs but may lead to suboptimal decisions in some cases.
Performance Evaluation	Focuses on contribution to covering fixed costs and generating profit.	May provide distorted performance measures due to allocation of fixed overheads costs.

The impact on the profit under the two cost accounting systems may be summarized below:

- **Scenario one** –No opening and closing stock

  In this situation, profit / loss under absorption and marginal costing will be equal.
- **Scenario two** – Value of opening stock is equal to value of closing stock

  In this situation, profit / loss under two approaches will be equal provided the fixed cost element in both the stocks is same amount.
- **Scenario three** – Value of closing stock is more than value of opening stock

When production during a period is more than sales, then profit as per absorption approach will be more than that by marginal approach. The reason behind this difference is that a part of fixed overheads included in closing stock value is carried forward to next accounting period.

- **Scenario four** – Value of opening stock is more than the value of closing stock

  When production is less than the sales, profit shown by marginal costing will be more than that shown by absorption costing. This is because, in absorption costing a part of fixed cost from the preceding period is added to the current year's cost of goods sold in the form of opening stock.

The income statements under the two systems are presented in the following lines:

Income Statement (Absorption Costing)

Particulars	(₹)	(₹)
Sales		-----
• Direct material consumed		
• Direct labour cost		-----
• Variable manufacturing overheads		-----
• Fixed manufacturing overheads		-----
Cost of production		-----
Add: Opening stock of finished goods (Value at cost of previous year's production)		-----
Less: Closing stock of finished goods (Value at production cost of current period)		-----
Cost of Goods Sold		-----
Add:(or less) Under (or Over) absorption of Fixed Manufacturing overheads		-----
Add: Administration costs	-----	
Add: Selling and distribution costs	-----	-----
Total Cost		-----
Profit (Sales–Total cost)		-----

Income statement (Marginal Costing)

Particulars	(₹)
Sales	-----
Variable manufacturing costs:	
• Direct material consumed	-----
• Direct labour	-----
• Variable manufacturing overheads	-----
Cost of Goods Produced	-----
Add: Opening stock of finished goods (value at cost of previous period)	-----

Less: Closing stock of finished goods (Value at current variable cost)	-----
Cost of Goods Sold	-----
Add: Variable administration, Selling and distribution overheads	-----
Total Variable Cost	-----
Contribution (Sale–Total variable costs)	-----
Less: Fixed costs (production, administration, selling and distribution)	-----
Net profit	-----

Fundamental principle of marginal costing

Since fixed costs are constant within the relevant range of volume sales, the following is the net impact of selling one extra unit:

1. Revenue will increase by the sales price of one unit.
2. Costs will only increase by the variable cost per unit.
3. The increase in profit will equal sales value less variable costs, i.e. the contribution

If the volume of sales falls by one unit, then profit will fall by the contribution of that unit. If the volume of sales increases by one unit, profit will increase by the contribution of that unit.

Fixed costs relate to time and is thus referred as the period cost, and do not change with increases or decreases in sales volume. It avoids the often arbitrary apportionment of fixed cost and highlights contribution, which is considered more appropriate for decision –making purposes.

Differential Cost Analysis

Differential costs are also known as incremental cost. This cost is the difference in total cost that will arise from the selection of one alternative to the other. In other words, it is an added cost of a change in the level of activity. This type of analysis is useful for taking various decisions like change in the level of activity, adding or dropping a product, change in product mix, make or buy decisions, accepting an export offer and so on. Thus, differential cost analysis is similar to marginal cost. In the following lines a conceptual understanding of the same is undertaken.

Differential cost represents the algebraic difference between the relevant costs for the alternatives being considered. Thus, when two levels of activities are being considered, the differential cost is obtained by subtracting the cost at one level from the cost of another level. The difference in total costs of two alternative courses of action will be the differential cost. The existing cost or original cost is compared with the prospective / expected or proposed cost. If the differential cost is negative (i.e. proposed cost less existing cost) then the proposal is acceptable else the proposal is rejected. Suppose, present cost is ₹ 1, 25,000 when the work is done by an existing machine and the estimated cost, when the work is done by new machine, is ₹ 1,05,000. There is a decrease in cost by ₹ 20,000 and the decision for replacement of machine should be implemented because there is an increase of profit by ₹ 25,000.

Essential features of differential costs are as follows:

1. Differential cost analysis is not made within the accounting records, rather it is made outside the accounting records. Differential costs may however, be incorporated in the flexible budget because the budget shows costs at various levels of activity.
2. The database which is considered for analysis of differential costs are total costs (both fixed and variable), total revenue and the investment factors which are relevant in the problem for which the analysis is undertaken.

3. Total differential costs are considered in differential cost analysis. Cost per unit is not taken into consideration.
4. Cost benefit analysis is done in evaluating alternate course of actions. Total differential revenues are compared with total differential costs before advocating an alternate course of action. A change in course of action is recommended only if incremental revenue exceeds incremental costs.
5. As the differences in the costs at two levels are considered, absolute costs at each level are not as relevant as the difference between the two. Thus, items of costs which do not change but are identical for the alternative under consideration, are ignored.
6. The changes in costs are measured from a common base point which may be present course of action or present level of production.
7. Differential costs analysis is related to the future course of action or future level of output, so it deals with future costs. Historical costs or standard cost may be used but they should be adjusted to future conditions.
8. For making a choice among the various alternatives, the alternative which gives the maximum difference between the incremental revenue and incremental cost is recommended to be adopted.

Differential Cost Analysis and Marginal Costing

Differential costs are often considered as marginal costs but that is really too simplistic and the two terms are used to mean different things. Differential costs are simply, as stated above, the difference of total cost between two alternative courses of action and are therefore calculated on the basis of absorption costing or total costing but in marginal costing technique, analysis are made on the basis of variable costs and the fixed costs are considered as period costs and thus are excluded for the purpose of analysis. If the alternate course of action does not involve any extra fixed cost then change in variable costs will be equal to the differential costs and there will be no difference between differential costs and marginal costs.

Limitations of Marginal Costing

Marginal costing technique is used for internal reporting purpose and for the purpose of decision making. For external reporting purpose, total costing or absorption costing is still the preferred method. The discussion made, in the above paragraphs, so far highlights only the positive aspects of marginal costing. In the following lines, some of the limitations of the technique are noted.

1. The breakeven analysis assumes that cost and revenue behaviour patterns are known and that the change in activity levels can be represented by a straight line.
2. It may not always be feasible to split costs precisely into variable and fixed categories. Costs often show mixed behaviour and then, simple techniques of segregation fail.
3. The breakeven analysis assumes that fixed costs remain constant over the relevant range under consideration. If that is not the case, then the graph of total costs will have a step in it where the fixed costs are expected to increase.
4. Breakeven analysis assumes input and output volumes are the same, so that there is no build-up of stocks and work-in-progress.
5. Breakeven charts and simple analysis can only deal with one product at a time.
6. The entire gamut of break-even analysis is based on the assumption that cost behaviour depends entirely on volume.

These limitations may be overcome by modifying the breakeven analysis. However, that would involve considerably more computation work and is beyond the scope of this study note.

6.1.3 Cost –Volume – Profit (CVP) Analysis

Managers are concerned about the impact of their decisions on profit. The decisions managers make basically about volume of sales, pricing of products, or incurring a cost. Therefore, managers require an understanding of the relations among revenues, costs, volume, and profit. The cost accounting department supplies the data and analysis, called Cost-Volume-Profit (CVP) analysis, which facilitates managers to take their decisions. The term CVP analysis is interchangeably used with the term marginal costing.

CIMA's Official Terminology defines Cost–Volume–Profit (CVP) analysis as 'the study of the effects on future profit of changes in fixed cost, variable cost, sales price, quantity and mix'.

The terms CVP analysis and the term breakeven analysis are used interchangeably. However, this is somewhat misleading, since the term break even analysis seems to imply that the focus of the analysis is the breakeven point – that is, the level of activity which produces neither profit nor loss.

Tools and techniques of CVP analysis

Contribution analysis

It has been already discussed that the fundamental aspect of CVP analysis alias marginal costing is that the excess of sales value and the variable cost of sales contributes to the fixed cost (period cost) and after recouping fixed cost the residue contributes towards profit. Thus, the issue of contribution is fundamental to CVP analysis.

- Contribution per unit = Sales per unit – Variable Cost per unit
- Total Contribution = per unit contribution × number of units sold
- Total Contribution – Fixed Cost = Profit

If more than one product is produced, contributions of all products are added and out of aggregate contribution fixed costs are deducted to arrive at profit. Contribution is helpful in determination of profitability of the products. When there are two or more products, the product having more contribution is more profitable.

For example, the following are the three products with selling price and cost details :

Particulars	A	B	C
Selling Price p.u. (₹)	100	150	200
Variable Cost p.u. (₹)	50	70	100
Contribution p.u. (₹)	50	80	100

In the above example, one can say that the Product C is more profitable because, it has higher contribution. This proposition of product having higher contribution is more profitable is valid, as long as, there are no limiting factor.

Breakeven point

Contribution is so called because it contributes initially towards fixed costs (which is for a particular period and remains fixed within a relevant range) and then towards profit. As sales revenues grow from zero, the contribution also grows until it just covers the fixed costs. This is the breakeven point where neither profits nor losses are made. Thus, it is obvious that to break even, the amount of contribution must be exactly equal to the fixed costs. Thus, once the contribution per unit is calculated[3], the number of units required to break even can be calculated as follows:

$$\text{Breakeven point in units} = \frac{\text{Fixed costs}}{\text{Contribution per unit}}$$

3 For the student, in solving a analytical question, the first step is to attempt to calculate the contribution per unit.

Example 2

Suppose that ASA Ltd. manufactures a particular fountain pen called ASA Durga, incurring variable costs of ₹30 per unit and fixed costs of ₹20,000 per month. If the product sells for ₹50 per unit, then the breakeven point can be calculated as follows:

$$\text{Breakeven point in units} = \frac{₹\ 20{,}000}{₹\ (50 - 30)} = 1000 \text{ units per month}$$

This implies that if ASA Ltd. manufactures 1000 units of the fountain pen called ASA Durga then the income statement of the manufacturer for the particular month would be as follows;

Particulars	(₹) (per unit)	(₹) (1000 units)
Sale Price per unit	50	
Variable cost per unit	30	
Contribution per unit		20
Total contribution (for 1000 units)		20,000
Fixed cost for the month		20,000
Profit		Nil

Thus ASA Ltd. breaks even (no profit/no loss) at 1000 units per month.

It is obvious that;

Break-even point (in Amount) = Break-even point (in units) × Selling price per unit

In the above example, the Break-even point (in Amount) of ASA Ltd. is

= Break-even point (in units) × Selling price per unit

= 1000 units × ₹ 50.00 = ₹ 50,000.00

Thus ASA Ltd. breaks even (no profit/no loss) when it's sales revenue per month is ` 50000.

6.1.4 Margin of Safety

The margin of safety is the difference between the expected level of sales and the breakeven point. It is a reflection of the cushion. The larger the margin of safety, the more likely a profit will be made, i.e. if sales start to fall there is more leeway before the organisation begins to incur losses.

In the above example if for a particular month ASA Ltd. forecasts sales to be 1,700 units, the margin of is calculated as:

Margin of safety = projected sales – breakeven point

Margin of safety= 1700 – 1000 =700 units or 41% of Sales $\left(\frac{700}{1{,}700} \times 100\right)$

The margin of safety should be expressed as a percentage of projected sales. To quote a margin of safety of 700 units without relating it to the projected sales figure provides a partial picture.

The margin of safety might also be expressed as a percentage of the breakeven value, that is, 70 per cent of the breakeven value in this case.

The margin of safety can also be used as a way of profit calculation. We have seen that the contribution goes towards fixed costs and profit. Once breakeven point is reached the fixed costs are covered. After the breakeven point, there are no more fixed costs to be covered and all of the contribution goes towards making profits.

In our example the monthly profit from sales of 1,700 units would be ₹14,000 (₹20 per unit contribution × Margin of safety = ₹20 × 700 units). This is so because the Fixed cost of ₹20,000 is covered by ASA Ltd. by selling 1000 units of the ASA Durga in the particular month).

4. Contribution to Sales ratio (C/S) or Profit Volume Ratio (P/V)

The Contribution to Sales ratio (C/S) also referred as the Profit Volume Ratio (P/V) expresses the relationship between contribution to sales.

P/V Ratio may be expressed as follows:

- P/V Ratio is 1⁄4 th of sales.
- Sales is 4 times that of contribution.
- P/V Ratio is 25%.
- P/V Ratio is 0.25 of sales.

$$\text{P/V Ratio (C/S ratio)}^4 = \frac{\text{contribution per unit}}{\text{sals}} \times 100$$

A higher contribution to sales ratio means that contribution grows quicker as sales levels increase. Once the breakeven point has been passed, profits will accumulate more quickly than for a product with a lower contribution to sales ratio. This ratio is based on the fundamental assumption that unit selling price and unit variable cost remain constant. When there is a change in selling price or variable cost of sales then the P/V ratio changes.

If it is assumed that a unit's variable cost and selling price remains constant, then the C/S ratio (P/V ratio) will also remain constant.

In the above example, the P/V ratio is calculated as follows:

$$\text{P/V Ratio (C/S ratio)} = \frac{\text{Contribution per unit}}{\text{Selling price per unit}} \times 100$$

$$= \frac{₹\ 20}{₹\ 50} \times 100 = 40\%$$

Or,

$$\text{P/V Ratio (C/S ratio)} = \frac{\text{Total Contribution}}{\text{Total Sales}} \times 100$$

$$= \frac{20,000}{50,000} \times 100 = 40\%$$

$$\therefore \text{The Breakeven point (₹)} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$$

4 This can also be calculated on per unit basis. This is also referred as the contribution margin.

In the above example,

$$= \frac{\text{Fixed cost}}{\text{P/V Ratio}} = \frac{20,000}{40\%} = ₹\ 50,000$$

Thus, ASA Ltd. breaks even (no profit/no loss) when it's sales revenue per month is ₹50,000

There are situations when data for two periods is given and the per unit sale price or per unit variable cost of sales is not given then a modified version of the ratio is used. In such case the ratio is given as:

$$\text{P/ V Ratio} = \frac{\text{change in contribution}}{\text{change in sales}} \times 100$$

$$\text{Or, P/ V Ratio}^{5} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$$

5. Variable Cost Ratio

The variable cost ratio is a cost accounting tool used to express a company's variable production costs as a percentage of its net sales. The primary motive of calculating the ratio is to consider costs that may be subject to variations with the changes in production levels and compare them to the amount of revenues generated by the sales of that particular cycle of production.

The formula for the calculation of the variable cost ratio is as follows:

$$\text{Variable Cost Ratio} = \frac{\text{Variable Cost}}{\text{Net Sales}}$$

An alternate formula is given below:

Variable Cost Ratio = 1 – Contribution Margin

Variable Cost Ratio[6] = 1 – P/V Ratio.

If P/V ratio is 40% (0.4). This implies that the Variable Cost ratio is 1 – 0.4 = 0.6 or 60%

6. Sales to earn target profit

Besides being able to determine the break-even point, CVP analysis determines the sales required to attain a particular income level or target profit. There are two ways in which target net income can be expressed:

1. As a specific rupee amount
2. As a percentage of sales

As a specific rupee amount – As a specific rupee amount, the cost-volume equation specifying target profit is given as,

Sales = VC + FC + target profit

If q = volume in units, the above relationship can be rewritten as,

pq = uq + FC + target profit

Where,

p = sale price per unit

5 It is assumed that fixed cost remains fixed over the two periods.

6 Expressed as a fraction.

q = quantity sold

u = Variable cost per unit

The above equation can be written as,

q(p – u) = FC + target profit

Here[7] (p – u) = contribution per unit

$$\Rightarrow q = \frac{FC + \text{target profit}}{(p - u)}$$

$$\Rightarrow \text{target profit sales volume} = \frac{FC + \text{target profit}}{\text{contribution per unit}}$$

Specifying target profit as a percentage of sales, the cost-volume equation is,

pq = uq + FC + % (pq)

$$\Rightarrow q = \frac{FC}{(p-u) - \%(p)}$$

$$\Rightarrow q = \frac{FC}{\text{per unit contribution} - \text{profit as a \% of unit sale price}}$$

Example 3

Suppose that ASA Ltd. manufactures a student level fountain pen and sales each fountain pen @ ₹25 per unit, the variable cost of sales of each fountain pen is ₹10 each and the fixed cost for a month is ₹15,000.

assume that ASA Ltd. wishes to attain:

Case 1. A target profit of ₹15,000 before tax

Case 2. A target income of 20% of sales

Now,

In Case 1, target profit sales volume (in units) required is,

$$q_{\text{target profit}} = \frac{\text{Fixed cost} + \text{Target profit}}{(p-u)} = \frac{15,000+15,000}{(25-10)} = 2,000 \text{ units}$$

Check,

at 2000 units the income statement is:

	(₹)
Sales @ ₹25 per unit	50,000
Less: Variable cost @ ₹10 per unit	20,000
Contribution	30,000
Less: Fixed Cost	15,000
Target profit	15,000

In Case 2, the target income volume required is,

$$\Rightarrow q = \frac{FC}{(p-u) - \%(p)}$$

7 Selling price per unit – variable cost per unit = contribution per unit. This is elaborately discussed a previous section.

$$\Rightarrow q = \frac{15000}{(25-10)-(20\% \times 25)}$$

$$q = \frac{15000}{(15-5)} = 1500 \text{ units}$$

Check,

at 1500 units, the income statement is:

	(₹)
Sales @ ₹25 per unit	37,500
Less: Variable cost @ ₹10 per unit	15,000
Contribution	22,500
Less: Fixed Cost	15,000
Target profit	7,500

Profit is targeted at 20% of sales = 20% of 37,500 = ₹7,500 (as calculated in the above income statement).

7. Break-even analysis

Break-even analysis, a branch of CVP analysis, determines the break-even sales, which is the level of sales at which total costs equal total revenue. It refers to the identifying of the point where the revenue of the company starts exceeding its total cost i.e., the point when the project or company under consideration will start generating the profits by the way of studying the relationship between the revenue of the company, its fixed cost, and the variable cost. The break-even point, the point of no profit and no loss, provides managers with insights into profit planning. It can be computed in three different ways:

(i) The equation approach

(ii) The contribution approach

(iii) The graphical approach

(i) The Equation Approach is based on the cost-volume equation, which shows the relationships among sales, variable and fixed costs, and profit:

S = VC + FC + Profit

Where,

S = Sales revenue

VC = total fixed cost

FC = total fixed cost

At the break-even sales volume,

S = VC + FC + 0 (by definition)

If q = volume in units, the above relationship can be rewritten as

pq = uq + FC

Where,

p = sale price per unit

q = quantity sold

u = Variable cost per unit

To find the break-even point in units, simply solve the equation for q.

Example 4

If it is assumed that ASA Ltd. manufactures a student level fountain pen and sales each fountain pen @ ₹25 per unit, the variable cost of sales of each fountain pen is ₹10 each and the fixed cost for a month is ₹15,000.

We know,

At the break-even sales volume,

S = VC + FC + 0.

And

If q = volume in units, the above relationship can be rewritten as,

pq = uq + FC

Where,

p = sale price per unit

q = quantity sold

u = Variable cost per unit

Therefore,

25 × q = 10 × q + 15000

or, 15 q = 15,000

or, q = 1000 units

Therefore, ASA Ltd. breaks even at a sales volume of 1,000 units.

(ii) The Contribution Margin Approach, another technique for computing the break-even point, is based on solving the cost-volume equation stated earlier.

Solving the equation, pq = uq + FC for q yields:

$$q_{BE} = \frac{FC}{(p-u)} = \frac{FC}{\text{Contribution per unit}}$$

Here q_{BE} = break-even unit sales volume

If the break-even point is desired in terms of Rupees, then

Break – even point in Rupees = Break-even point in units × Unit sales price

$$\text{Break – even point in Rupees} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$$

8. Angle of Incidence

The angle formed at the break-even point by the intersection of the sales line and the total cost line is known as the angle of incidence. It should be the aim of the management to have a wider angle. The size of the angle indicates the rate of profit earned after break-even point. A wider angle means a high rate of profit accruing after the fixed costs are absorbed. On the contrary, a narrow angle means a relatively low rate of profit indicating that variable costs constitute a large part of cost of sales.

(iii) The Graphical Approach is based on the so-called break-even chart as shown in Fig. 6.1. Sales revenue, variable costs, and fixed costs are plotted on the vertical axis, while volume, x, is plotted on the horizontal axis. The break-even point is the point where the total sales revenue line intersects the total cost line. The chart can also effectively report profit potentials over a wide range of activity. The profit-volume (P--V) chart, as shown in Fig. 6.2, focuses more directly on how profits vary with changes in volume. Profits are plotted on the vertical axis, while units of output are shown on the horizontal axis. Note that the slope of the chart is the unit contribution margin. The main advantage of the profit–volume chart is that it is capable of depicting clearly the effect on profit and breakeven point of any changes in the variables.

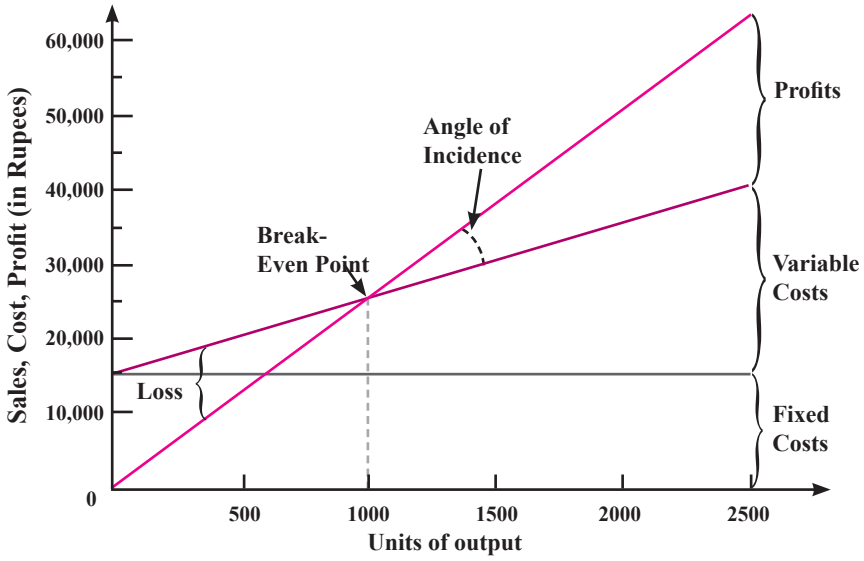


Figure 6.1: Break Even Chart

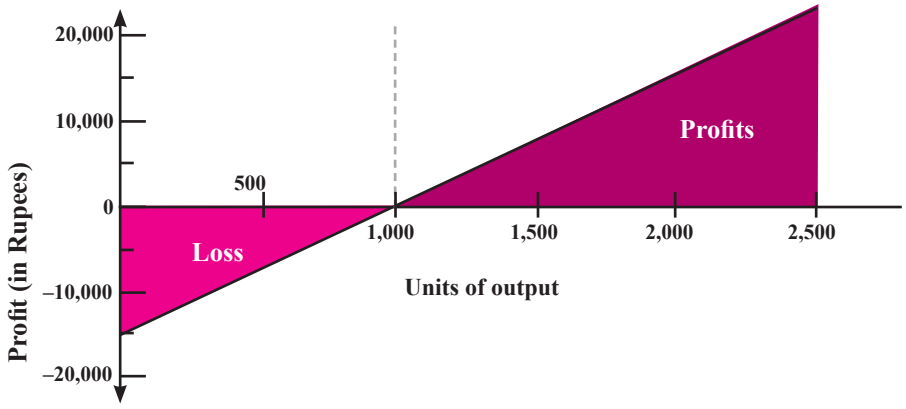


Figure 6.2 Profit-Volume Chart

The change in profit can be studied through Break even charts in different situations as mentioned below:

1. Increase in No. of Units

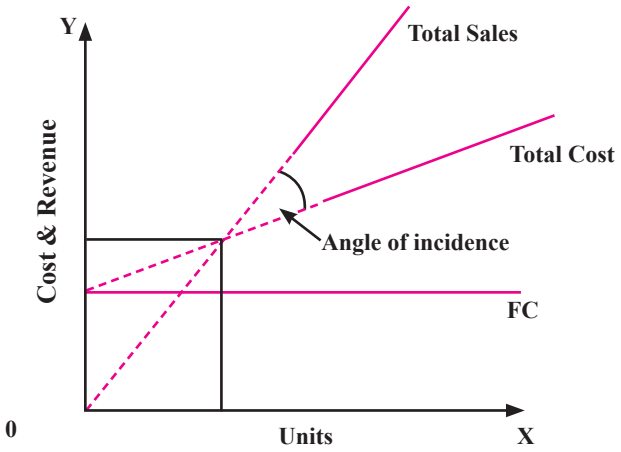


Figure 6.3: Change in BEP due to increase in No. of Units

In the above chart, if we clearly observe we find that there is no change in BEP even if there is increase or decrease in number of units.

2. Increase in Sales due to increase in selling price

NTS = New Total Sales line

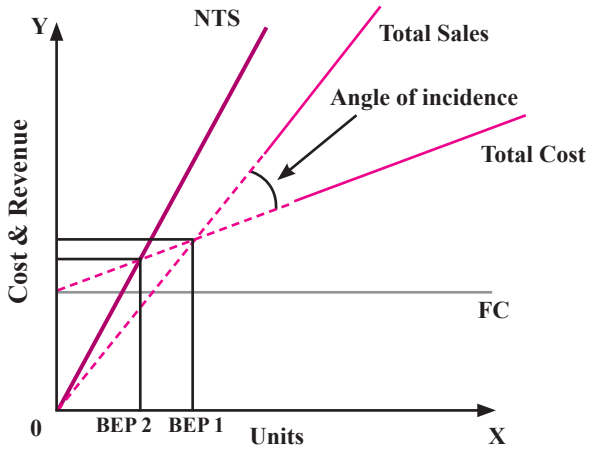


Figure 6.4: Change in BEP due to increase in Selling Price

From the above chart, we observe that profit is increased by increasing the selling price and also, if there is change in selling price, BEP also changes. If selling price is increased, then BEP decreases. If selling price is decreased, then BEP increases. Thus, we say that there is an inverse relationship between selling price and BEP.

3. Decrease in variable cost

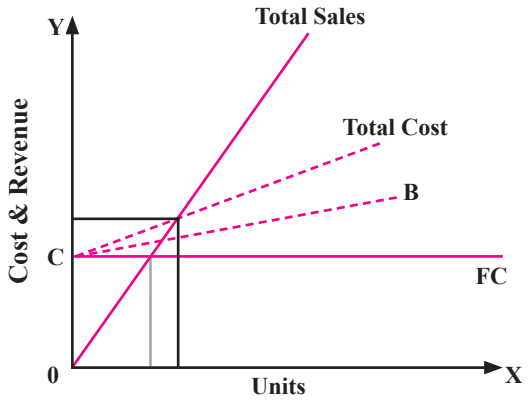


Figure 6.5: Change in BEP due to decrease in Variable cost

The CB line indicates decreased total cost line which also implies a decrease in BEP

From the above chart, it is observed that when variable costs are decreased profit increases. If there is change in variable cost, then BEP also changes. If variable cost decreases, then BEP also decreases. If variable cost is increases, then BEP also increases. Thus, there is direct relationship between variable cost and BEP.

4. Change in fixed cost

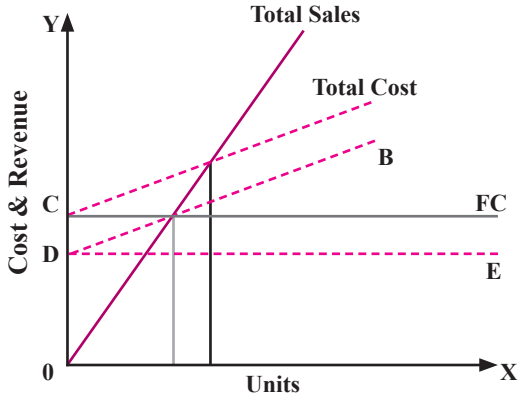


Figure 6.6: Change in BEP due to change in Fixed Cost

The DE and DB line indicate decrease in fixed cost and total cost respectively.

From the above chart, it may be observed that there is increase in profit due to decrease in fixed cost. If fixed cost increases then BEP also increases. If fixed cost decreases, then BEP also decreases.

Thus, there is a direct relationship between fixed cost and BEP.

Non-linear break-even analysis

In break-even analysis discussed above, linear (straight line) relationships are assumed. Sale price per unit and variable cost per unit are assumed to remain constant but in all practical scenario it is reasonable to think that increased sales can be obtained only if sales prices are reduced. Variable cost per unit also does not remain constant, given price rises and other external as well as internal factors. Empirical studies suggest that the average variable cost per unit falls over some range of output and then begins to rise. Thus, non-linear relationships between cost

curves and sale price may have to introduced though it complicates matters. In such case there would be two or more break even points. In such a case the optimum profit is earned where the difference between the sales and the total costs is the largest. It is obvious that the business should produce only upto this level. This is being illustrated in the below mentioned chart.

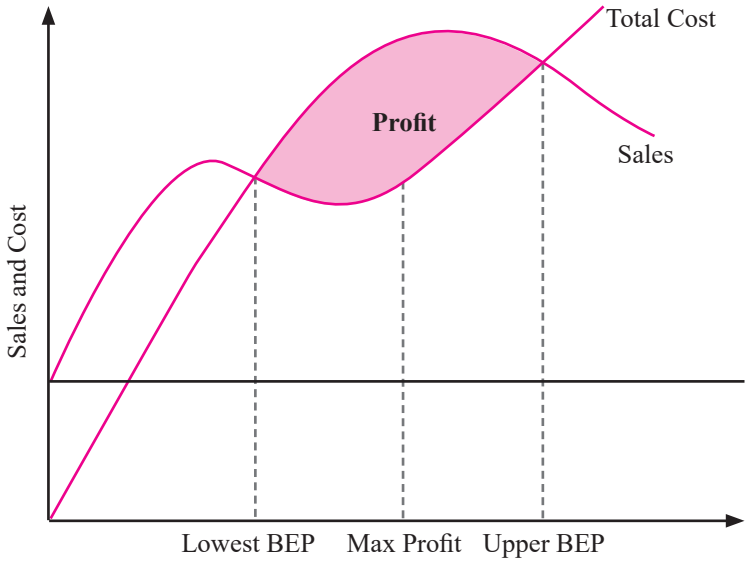


Figure 6.7: Non-Linear Break-Even Chart

Cash Break-Even Point

When break-even point is calculated only with those fixed costs which are payable in cash, such a break-even point is known as cash break-even point. This means that depreciation and other non-cash fixed costs are excluded from the fixed costs in computing cash break-even point. It is stated as:

$$\text{Cash break-even point} = \frac{\text{Cash Fixed Cost}}{\text{Contribution per unit}}$$

Applications of Marginal Costing

Marginal costing is a very useful technique of costing and is extensively used in various managerial tasks and the decision- making process. The applications of marginal costing are discussed in the following lines:

1. **Cost Control:** One of the important challenges in front of the management is the control of cost. In the modern competitive environment, increase in the selling price for improving the profit margin can be dangerous as it may lead to loss of market share. The other way to improve the profit is cost reduction and cost control. Cost control aims at not allowing the cost to rise beyond the present level. Marginal costing technique helps in this task by segregating the costs between variable and fixed. While fixed costs remain unchanged irrespective of the production volume, variable costs vary according to the production volume. Certain items of fixed costs are not controllable at the middle management or lower management level. In such situation it will be more advisable to focus on the variable costs for cost control purpose. Since the segregation of costs between fixed and variable is done in the marginal costing, concentration can be made on variable costs rather than fixed cost and in this way unnecessary efforts to control fixed costs can be avoided.

2. **Profit Planning:** Another important application of marginal costing is the arena of profit planning. Profit planning is be defined as the planning of future operations to attain a pre-determined profit goal. The marginal costing technique helps to generate data required for profit planning and decision-making. For example, computation of profit if there is a change in the product mix, impact on profit if there is a change in the selling price, change in profit if one of the product is discontinued or if there is a introduction of new product, decision regarding the change in the sales mix are some of the areas of profit planning in which necessary information can be generated by marginal costing for decision making. The segregation of costs between fixed and variable is thus extremely useful in profit planning.

3. **Key Factor Analysis:** The management has to prepare a plan after taking into consideration the constraints, if any, on the various resources. These constraints are also known as limiting factors or principal budget factors as discussed in the topic of 'Budgets and Budgetary Control'. These key factors may be availability of raw material, availability of skilled labour, machine hours availability, or the market demand of the product. Marginal costing helps the management to decide the best production plan by using the scarce resources in the most beneficial manner and thus optimize the profits. For example, if raw material is the key factor and its availability is limited to a particular quantity and the company is manufacturing three products, A, B and C. In such cases marginal costing technique helps to prepare a statement, which shows the amount of contribution per kg of material. The product, which yields highest contribution per kg of raw material, is given the priority and produced to the maximum possible extent. Then the other products are taken up in the order of priority. Thus, the resultant product mix will yield highest amount of profit in the given situation.

4. **Decision Making:** Managerial decision-making is a very crucial function in any organization. Decision – making should be on the basis of the relevant information. Through the marginal costing technique, information about the cost behaviour is made available in the form of fixed and variable costs. The segregation of costs between fixed and variable helps the management in predicting the cost behaviour in various alternatives. Thus, it becomes easy to take decisions. Some of the decisions are to be taken on the basis of comparative cost analysis while in some decisions the resulting income is the deciding factor. Marginal costing helps in generating both the types of information and thus the decision making becomes rational and based on facts rather than based on intuition. Some of the crucial areas of decision-making are mentioned below:
   - Pricing decisions in special circumstances:
     - Pricing in periods of recession
     - Use of differential selling prices
   - Acceptance of offer and submission of tenders.
   - Make or buy decisions.
   - Shutdown or continue decisions or alternative use of production facilities.
   - Retain or replace a machine.
   - Decisions as to whether to sell in the export market or in the home market.
   - Whether to expand or contract.
   - Product mix decisions like for example:
     - Selection of optimal product mix
     - Product substitution
     - Discontinuance of a product.

Some of the more important applications for the purpose of decision making are elaborated below:

6.1.5 Application of Marginal Costing for Decision Making

It is reiterated that breakeven analysis is a particular example of the more general technique of cost– volume–profit (CVP) analysis. Marginal costing is a term loosely used to mean entire gamut of CVP analysis. This analysis emphasises the relationship between sales revenue, costs and profit in the short term. It is important to note that the short term is a period of time over which some costs are fixed, whatever the level of output within a range[8] limited by the existing capacity of the business.

In the long term, all costs become variable because the capacity of a business can be altered by acquiring new premises, hiring more employees or investing in more equipment.

CVP analysis is used by the management accountant for the purpose of decision making. In the short term, decisions have to be made within the constraints of the capacity of the business and the aim of that decision making will be to maximise short-term profit. Typical decision-making situations based on CVP analysis mentioned above can be basically categorised as:

- accepting a special order to use up spare capacity
- abandoning a line of business
- the existence of a limiting factor
- carrying out an activity in – house rather than buying in a service under contract.

In the following lines each of them are discussed in brief:

Special order to use up spare capacity

In the short term, a business must ensure that the revenue from each item of activity at least covers variable costs and makes a contribution to fixed costs. Once the fixed costs are covered by contribution, the greater is the sales, greater is the profits (contribution results in profit when the organisation is working in margin of safety). When the business reaches full capacity there will be a new element of fixed cost to consider should the business decide to increase its capacity. If there is no increase in capacity, then the business should concentrate on those activities producing the highest contribution per unit or per item, but supposing the business is not operating at full capacity. Should it lower its sales price in an attempt to increase the volume of activity? The question may arise in the form of a request from a customer for a special price for a particular order. Should the business accept the special order?

CVP analysis gives the Solution: that the special order is acceptable provided the sales price per item covers the variable costs per item and provided there is no alternative use for the spare capacity which could result in a higher contribution per item.

Abandonment of a line of business

The management of a business may be concerned because one line of business appears not to be covering all its costs. This situation may arise particularly where costs are being used for score-keeping purposes and all fixed costs have been allocated to products. The allocation of fixed costs to products is a process which is somewhat arbitrary in nature, and is not relevant to decision making because the fixed costs are incurred irrespective of whether any business activity takes place.

When a line of business comes under scrutiny as to its profitability, CVP analysis shows that in the short term it is worth continuing with the line if it makes a contribution to fixed costs. If the line of business is abandoned and nothing better takes its place, then that contribution is lost but the fixed costs run on regardless.

8 Referred as relevant range

Existence of a limiting factor

In the short term, it may be that one of the inputs to a business activity is restricted in its availability. There may be a shortage of raw materials or a limited supply of skilled labour. There may be a delivery delay on machinery or a planning restriction which prevents the extension of a building on the business premises. There may then be a need to choose from a range of possible activities so as to maximise short-term profit. The item which is restricted in availability is called the limiting factor.

CVP analysis shows that maximisation of profit will occur if the activity is chosen which gives the highest contribution per unit of limiting factor.

In-house activity versus bought-in contract[9]

For a manufacturing business, there may be a decision between making a component in-house as compared with buying the item ready-made. For a service business there may be a decision between employing staff in-house and using the services of an agency which supplies staff as and when required.

CVP analysis shows that the decision should be based on comparison of variable costs per unit. If there is a difference between the fixed cost of the two options, then the comparison of the variable costs should be related this difference in fixed costs between the options.

Illustration 1

MAXWEL Ltd. produces a single product 'Boost'. The following figures relate to Boost for the period: 2021 - 2022.

Activity Level	50%	100%
Sales and production (units)	400	800
	(₹)	(₹)
Sales	8,00,000	16,00,000
Production costs:		
- Variable	3,20,000	6,40,000
- Fixed	1,60,000	1,60,000
Selling and distribution costs:		
- Variable	1,60,000	3,20,000
- Fixed	2,40,000	2,40,000

The normal level of activity for the year is 800 units. Fixed costs are incurred evenly throughout the year, and actual fixed costs are the same as budgeted. There were no stocks of Boost at the beginning of the year.

In the first quarter, 220 units were produced and 160 units were sold.

Required:

(a) What would be the fixed production costs absorbed by Boost if absorption costing is followed?

(b) What would be the under/over-recovery of overheads during the period?

(c) What would be the profit as per absorption costing?

(d) What would be the profit as per marginal costing?

9 This is simply referred as the 'Make or Buy' decision.

Solution:

Fixed production costs absorbed

Particlars	(₹)
Budgeted fixed production costs	1,60,000
Budgeted output (normal level of activity 800 units) Therefore, the absorption rate: 1,60,000/800 = ₹ 200 per unit	
During the first quarter, the fixed production cost absorbed by Boost would be (220 units × ₹ 200)	44,000

Under / over recovery of overheads during the period

Particulars	(₹)
Actual fixed production overheads (1/4 quarters of ₹ 1,60,000)	40,000
Absorbed fixed production overheads	44,000
Over-recovery of overheads	4,000

Profit for the Quarter (Absorption Costing)

	(₹)	(₹)
Sales revenue (160 units × ₹ 2,000): (A)		3,20,000
Less: Production costs:		
- Variable cost (220 units × ₹ 800)	1,76,000	
- Fixed overheads absorbed (220 units × ₹ 200)	44,000	2,20,000
Less: Opening Stock		-----
Add: Closing Stock (₹ 2,20,000/220 units × 60 units)		60,000
Cost of Goods sold		1,60,000
Less: Adjustment for over-recovery of fixed production overheads		4,000
Add: Selling & Distribution Overheads:		
-Variable (160 units × ₹ 400)	64,000	
- Fixed (1/4th of ₹ 2,40,000)	60,000	1,24,000
Cost of Sales (B)		2,80,000
Profit {(A) – (B)}		40,000

Profit for the Quarter (Marginal Costing)

Particulars	(₹)	(₹)
Sales revenue (160 units × ₹ 2,000): (A)		3,20,000
Less: Production costs: - Variable cost (220 units × ₹ 800)	1,76,000	
Add: Opening Stock Less: Closing Stock (₹ 1,76,000/220 units × 60 units)	48,000	-----
Variable cost of goods sold		1,28,000

Particulars	(₹)	(₹)
Add: Selling & Distribution Overheads: -Variable (160 units × ₹ 400)		64,000
Total Variable Cost (B)		1,92,000
Contribution {(C) = (A) – (B)}		1,28,000
Less: Fixed Costs: - Production cost - Selling & distribution cost	(40,000) (60,000)	(1,00,000)
Profit		28,000

Illustration 2

ABC Ltd. incurs fixed costs of ₹ 3,00,000 per annum. It is a single product company with annual sales budgeted to be 70,000 units at a sales price of ₹ 300 per unit. Variable costs are ₹ 285 per unit.

The company is deliberating upon an increase in the selling price of the product to ₹ 350 per unit. This shall be required in order to improve the quality of the product. It is anticipated that despite increase in the selling price the sales volume shall remain unaffected. However, the fixed costs shall increase to ₹ 4,50,000 per annum and the variable costs to ₹ 330 per unit.

You are required to draw a profit volume graph, and determine the breakeven point. Also draw on the same graph a second profit volume graph and give your comments.

Solution:

Particulars	Present Situation (₹)	Proposed Situation (₹)
Selling Price per unit	300	350
Less: Variable Cost per unit	285	330
Contribution Per unit	15	20
Budgeted Sales 70,000 units:		
Total Contribution	10,50,000	14,00,000
Less: Fixed Cost	3,00,000	4,50,000
Profit	7,50,000	9,50,000
Break Even Point (units) $= \frac{\text{Fixed costs}}{\text{Contribution per unit}}$	$\frac{3,00,000}{15} = 20,000$	$\frac{4,50,000}{20} = 22,500$
Indifference point of sales (i.e. sales unit when both situation have equal profits)	Let x be the units of sales where profit will remain same under both the situation. $15x - 3,00,000 = 20x - 4,50,000$ or, $x = \frac{1,50,000}{5} = 30,000$ units So, beyond 30,000 units of sales Proposed situation will have more profit and below 30,000 units of sales present situation will have more profit.	

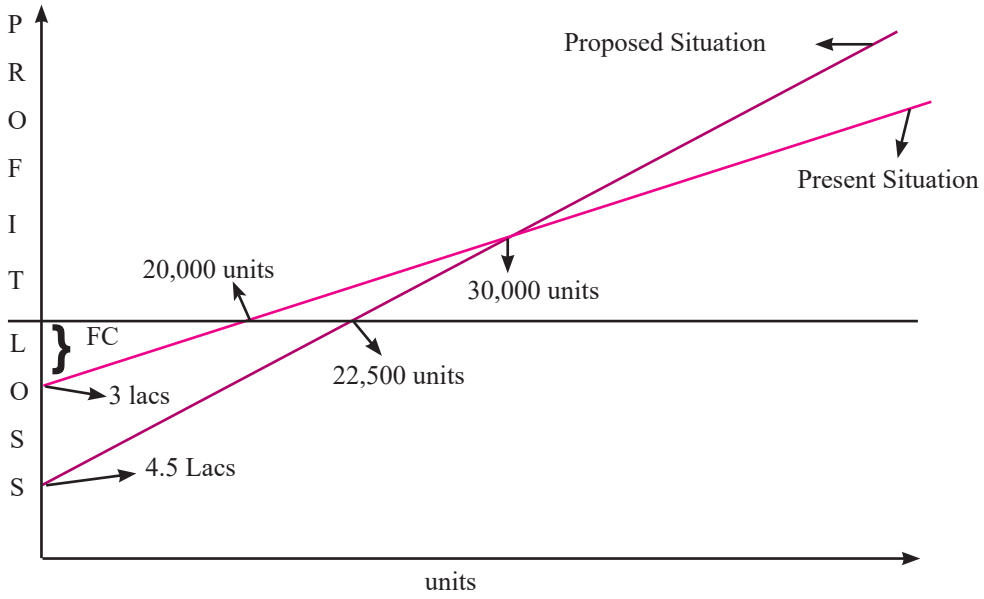


Figure 6.8: Profit Volume Graph

It is clear from the graph that break even point for present situation is 20,000 units and 22,500 units in proposed situation. Upto the sales of 30,000 units present situation will yield more profit and beyond 30,000 units of sales proposed situation will give more profits. This is because once the fixed cost in proposed situation is recovered the profitability rate is more because of higher contribution per unit in comparison to the present situation.

Illustration 3

The sports material manufacturing company budgeted the following data for the coming year:

	Amount (₹)
Sales (1,00,000 units)	1,00,000
Variable cost	40,000
Fixed cost	50,000

Find out

(a) P/V Ratio, BEP and Margin of Safety

(b) Evaluate the effect of

(i) 20% increase in physical sales volume

(ii) 20% decrease in physical sales volume

(iii) 5% increase in variable costs

(iv) 5% decrease in variable costs

(v) 10% increase in fixed costs

(vi) 10% decrease in selling price and 10% increase in sales volume

(viii) 10% increase in selling price and 10% decrease in sales volume

(ix) ₹ 5,000 variable cost decrease accompanied by ₹ 15,000 increase in fixed costs.

Solution:

(a)

Income Statement	(₹)
Sales (1,00,000 × ₹ 1 per unit)	1,00,000
Less: Variable Cost (1,00,000 × ₹ 0.40)	40,000
Contribution	60,000
Less: Fixed Cost	50,000
Profit	10,000

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{60,000}{1,00,000} \times 100 = 60\%$$

$$\text{BE Sales} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}} = \frac{₹\ 50,000}{60\%} = ₹\ 83,000$$

Margin of Safety = Sales – BEP Sales = ₹ 1,00,000 - ₹ 83,333 = ₹ 16,667

	Income Statement	P/V Ratio	BE Sales	MOS
(i) Increase in volume by 20%	₹ Sales (1,20,000 × 1) 1,20,000 Less: VC (1,20,000 × 0.4) 48,000 Contribution 72,000 FC 50,000	$= \frac{72,000}{1,20,000} \times 100$ = 60%	$= \frac{50,000}{60\%}$ = ₹ 83,333	= 1,20,000 – 83,333 = ₹ 36,667
(ii) Decrease in volume by 20%	₹ Sales (80,000 × 1) 80,000 Less: VC (80,000 × 0.4) 32,000 Contribution 48,000 FC 50,000	$= \frac{48,000}{80,000} \times 100$ = 60%	$= \frac{50,000}{60\%}$ = ₹ 83,333	= 80,000 – 83,333 = - ₹ 3,333
(iii) 5% Increase in Variable Cost	₹ Sales (1,00,000×1) 1,00,000 Less: VC (1,00,000 × 0.42) 42,000 Contribution 58,000 FC 50,000	$= \frac{58,000}{1,00,000} \times 100$ = 58%	$= \frac{50,000}{58\%}$ = ₹ 86,207	= 1,00,000 – 86,207 = ₹ 13,793
(iv) 5% Decrease in Variable Cost	₹ Sales (1,00,000×1) 1,00,000 Less: VC (1,00,000 × 0.38) 38,000 Contribution 62,000 FC 50,000	$= \frac{62,000}{1,00,000} \times 100$ = 62%	$= \frac{50,000}{62\%}$ = ₹ 80,645	= 1,00,000 – 80,645 = ₹ 19,355

	Income Statement	P/V Ratio	BE Sales	MOS
(v) 10% Increase in Fixed Cost	₹ Sales (1,00,000×1) 1,00,000 Less: VC (1,00,000 × 0.40) 40,000 Contribution 60,000 FC 55,000	$=\frac{60,000}{1,00,000}\times 100$ = 60%	$=\frac{55,000}{60\%}$ = ₹ 91,667	= 1,00,000 – 91,667 = ₹ 8,333
(vi) 10% Decrease in Fixed Cost	₹ Sales (1,00,000×1) 1,00,000 Less: VC (1,00,000 × 0.40) 40,000 Contribution 60,000 FC 45,000	$=\frac{60,000}{1,00,000}\times 100$ = 60%	$=\frac{45,000}{60\%}$ = ₹ 75,000	= 1,00,000 – 75,000 = ₹ 25,000
(vii) 10% Decrease in selling price and 10% increase in sales volume	₹ Sales (1,10,000 × 0.9) 99,000 Less: VC (1,10,000 × 0.40) 44,000 Contribution 55,000 FC 50,000	$=\frac{55,000}{99,000}\times 100$ 55.55%	$=\frac{50,000}{55.55\%}$ = ₹ 90,009	= 99,000 – 90,009 = ₹ 8,991
(viii) 10% Increase in selling price and 10% decrease in sales volume	₹ Sales (90,000 × 1.10) 99,000 Less: VC (90,000 × 0.40) 36,000 Contribution 63,000 FC 50,000	$=\frac{63,000}{99,000}\times 100$ = 63.63%	$=\frac{50,000}{63.63\%}$ = ₹ 78,579	= 99,000 – 78,597 = ₹ 20,421
(ix) ₹ 5,000 variable cost decrease accompanied by ₹15,000 increase in fixed cost	₹ Sales (1,00,000×1) 1,00,000 Less: VC (40,000 - 5,000) 35,000 Contribution 65,000 FC 65,000	$=\frac{65,000}{1,00,000}\times 100$ = 65%	$=\frac{65,000}{65\%}$ = ₹ 1,00,000	= 1,00,000 -1,00,000 = Nil

Illustration 4

Two businesses AB Ltd and CD Ltd sell the same type of product in the same market. Their budgeted profits and loss accounts for the year ending 30th June, 2021 are as follows: Amount (₹)

	AB Ltd		CD Ltd	
Sales		1,50,000		1,50,000
Less: Variable costs	1,20,000		1,00,000	
Fixed Cost	15,000	1,35,000	35,000	1,35,000
Profit		15,000		15,000

You are required to calculate the BEP of each business and state which business is likely to earn greater profits in the following conditions:

(a) Heavy demand for the product

(b) Low demand for the product

Solution:

Statement showing computation of P/V Ratio, BEP and determination of Profitability in different conditions:

Particulars	AB Ltd (₹)	CD Ltd (₹)
Sales	1,50,000	1,50,000
Less: Variable Cost	1,20,000	1,00,000
Contribution	30,000	50,000
Less: Fixed Cost	15,000	35,000
Profit	15,000	15,000
P/V Ratio = $\frac{\text{Contribution}}{\text{Sale}} \times 100$	$\frac{30,000}{1,50,000} \times 100 = 20\ \%$	$\frac{50,000}{1,50,000} \times 100 = 33\frac{1}{2}\%$
BE Sales = $\frac{\text{Fixed Cost}}{\text{P / V Ratio}}$	$= \frac{15,000}{20\%} = ₹\ 75,000$	$\frac{35,000}{33\frac{1}{2}\%} =$ **₹ 1,05,000**

(a) When there is heavy demand for the product – Product produced by CD Ltd is profitable because the P/V Ratio is higher than AB Ltd.

(b) When there is low demand for the product – Product produced by AB Ltd is profitable because fixed cost is less than CD Ltd. This is also revealed from the break even sales. The break even sales for AB Ltd is less than CD Ltd because the fixed cost of AB Ltd is less in comparison to CD Ltd.

Illustration 5

A factory is currently working to 40% capacity and produces 10,000 units. At 50% capacity the selling price falls by 3%. At 90% capacity the selling price falls by 5% accompanied by similar fall in prices of raw material. Estimate the profit of the company at 50% and 90% capacity production.

The cost at present per unit is:

Material ₹ 10

Labour ₹ 3

Overheads ₹ 5 (60% fixed)

The selling price per unit is ₹ 20 per unit.

Solution:

At 40% capacity, Production 10,000 units

Overheads per unit is ₹ 5 and 60% is fixed => Variable 40%

So, Variable cost per unit = 5 × 40% = ₹ 2

Fixed Cost = 5 × 60% × 10,000 = ₹ 30,000

Statement showing Computation of Profit at 50% and 90% Capacity as well as at Current Capacity

	Particulars	40%		50%		90%	
	Production	10,000 units		$= \frac{10,000}{40\%} \times 50\%$ = 12,500 units		$= \frac{10,000}{40\%} \times 90\%$ = 22,500 units	
		Per unit	Total	Per unit	Total	Per unit	Total
		(₹)	(₹)	(₹)	(₹)	(₹)	(₹)
i.	Selling Price	20.00	2,00,000	19.40	2,42,500	19	4,27,500
ii.	Variable Cost						
	Material	10.00	1,00,000	10.00	1,25,000	9.50	2,13,750
	Labour	3.00	30,000	3.00	37,500	3.00	67,500
	Variable Overheads	2.00	20,000	2.00	25,000	2.00	45,000
	Total Variable Cost	15.00	1,50,000	15.00	1,87,500	14.50	3,26,250
iii.	Contribution						
	= Sales – Variable Cost	5.00	50,000	4.40	55,000	4.50	1,01,250
iv.	Fixed Cost		30,000		30,000		30,000
v.	Profit		20,000		25,000		71,250
vi.	BE Sales $= \frac{\text{Fixed Cost}}{\text{Contribution p.u.}} \times \text{Selling price p.u.}$		1,20,000		1,32,272		1,26,667

Illustration 6

The sales turnover and profit during two periods were as follows:

Period	Sales (₹)	Profit (₹)
1	2,00,000	20,000
2	3,00,000	40,000

What would be probable trading results with sales of ₹ 1,80,000? What amount of sales will yield a profit of ₹ 50,000?

Solution:

$$\text{P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100 = \frac{40,000 - 20,000}{3,00,000 - 2,00,000} \times 100 = \frac{20,000}{1,00,000} \times 100 = 20\%$$

	Period 1 (₹)	Period 2 (₹)	Proposed sales (₹)
Contribution	2,00,000 × 20%	3,00,000 × 20%	1,80,000 × 20%
= Sales × P/V Ratio	= 40,000	= 60,000	= 36,000
Less: Fixed Cost (Bal. fig.)	20,000	20,000	20,000
Profit	20,000	40,000	16,000

$$\text{So, Desired Sales} = \frac{\text{Fixed Cost + Desired Profit}}{\text{P / V Ratio}} = \frac{20,000 + 50,000}{20\%} = \frac{70,000}{20} \times 100 = ₹\ 3,50,000$$

Illustration 7

The following results of a company for the last years are as follows:

Year	Sales (₹)	Profit (₹)
2020	1,50,000	20,000
2021	1,70,000	25,000

You are required to calculate:

(i) P/V Ratio

(ii) BEP

(iii) The sales required to earn a profit of ₹ 40,000

(iv) Profit when sales are ₹ 2,50,000

(v) Margin of safety at a profit of ₹ 50,000, and

(vi) Variable Costs of the two periods

Solution:

(i) $\text{P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$

$= \frac{25,000 - 20,000}{1,70,000 - 1,50,000} \times 100 = \frac{5,000}{20,000} \times 100 = 25\%$

(ii) $\text{BEP (i.e. Break Even Sales)} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}} = \frac{\text{Sales} \times \text{P / V Ration} - \text{Profit}}{\text{P / V Ratio}}$

$= \frac{1,50,000 \times 25\% - 20,000}{25\%} = \frac{17,500}{25\%} = ₹\ 70,000$

Alternatively, $= \frac{1,70,000 \times 25\% - 25,000}{25\%} = \frac{17,500}{25\%} = ₹\ 70,000$

(iii) $\text{Desired Sales} = \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{P / V Ratio}}$

$= \frac{17,500 + 40,000}{25\%} = \frac{57,500}{25\%} = ₹\ 2,30,000$

(iv) Profit = Sales × P/V Ratio – Fixed Cost = 2,50,000 × 25% – 17,500 = ₹ 45,000

(v) $\text{Margin of Safety} = \frac{\text{Profit}}{\text{P / V Ratio}} = \frac{50,000}{25\%} = ₹\ 2,00,000$

(vi) Variable Cost Ratio = 1 – P/V Ratio = 1 – 25% = 75%

Variable Cost = Sales × Variable Cost Ratio

Variable Cost for 2020 = 1,50,000 × 75% = ₹ 1,12,500

Variable Cost for 2021 = 1,70,000 × 75% = ₹ 1,27,500

Illustration 8

The following is the statement of a Radical Co. for the month of June

Particulars	Products		Total (₹)
	L (₹)	M (₹)	
Sales	60,000	60,000	1,20,000
Less: Variable Costs	42,000	30,000	72,000
Contribution	18,000	30,000	48,000
Less: Fixed Cost			36,000
Net Income			12,000

You are required to compute the P/V Ratio for each product and then compute the P/V Ratio, Break Even Point and Net Income for the following assumption:

(i) Sales revenue divided as 60% to Product L & 40% to Product M

(ii) Sales revenue divided as 40% to Product L & 60% to Product M

	Product L (₹)	Product M (₹)	Total (₹)
P/V Ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$	$= \frac{18,000}{60,000} \times 100 = 30\%$	$= \frac{30,000}{60,000} \times 100 = 50\%$	$= \frac{48,000}{1,20,000} \times 100 = 40\%$

Solution:

(i) Sales revenue divided 60% to Product L & 40% to Product M

Statement showing computation of P/V Ratio, Break Even Point and Net Income

	Product L (₹)	Product M (₹)	Total (₹)
Sales	1,20,000 × 60% =72,000	1,20,000 × 40% = 48,000	1,20,000
Less: Variable Cost (Sales × Variable Cost Ratio)	72,000 × 70% = 50,400	48,000 × 50% =24,000	74,400
Contribution (Sales × P/V Ratio)	72,000 × 30% = 21,600	48,000 × 50% =24,000	45,600
Less: Fixed Cost			36,000
Net Income			9,600
P/V Ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$	$\frac{21,600}{72,000} \times 100$ = 30%	$\frac{24,000}{48,000} \times 100$ = 50%	$\frac{45,600}{1,20,000} \times 100$ = 38%
Break Even Sales $= \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$			$= \frac{36,000}{38\%}$ = 94,737

(ii) Sales revenue divided 40% to Product L & 60% to Product M

Statement showing computation of P/V Ratio, Break Even Point and Net Income

	Product L (₹)		Product M (₹)		Total (₹)
Sales	1,20,000 × 40%	48,000	1,20,000 × 60%	72,000	1,20,000
Less: Variable Cost (Sales × Variable Cost Ratio)	48,000 × 70%	33,600	72,000 × 50%	36,000	69,600
Contribution (Sales × P/V Ratio)	48,000 × 30%	14,400	72,000 × 50%	36,000	50,400
Less: Fixed Cost					36,000
Net Income					14,400
P/V Ratio $= \frac{\text{Contribution}}{\text{Sales}} \times 100$	$\frac{14,400}{48,000} \times 100$ = 30%		$\frac{36,000}{72,000} \times 100$ = 50%		$\frac{50,400}{1,20,000} \times 100$ = 42%
Break Even Sales $= \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$					$= \frac{36,000}{42\%}$ = 85,714

Illustration 9

Accelerate Co. Ltd manufactures and sells four types of products under the brand name of A, B, C and D. The Sales Mix in value comprises 33⅓ %, 41⅔ %, 16⅔ % and 8⅓ %, of products A, B, C and D respectively. The total budgeted sales at 100% are ₹ 60,000 p.m. Operating Costs are:

Variable Costs:

Product A 60% of selling price

Product B 68% of selling price

Product C 80% of selling price

Product D 40% of selling price

Fixed Costs: ₹ 14,700 p.m.

(a) Calculate the break even point for the products on overall basis

(b) Also calculate break even point, if the sales mix is changed as follows the total sales per month remaining the same. Mix: A – 25%, B – 40%, C – 30%, D – 5%.

Solution:

Calculation of Contribution of the Products

Particulars	Product A (₹)	Product B (₹)	Product C (₹)	Product D (₹)	Total (₹)
Sales	60,000 × 33⅓ % = 20,000	60,000 × 41⅔ % = 25,000	60,000 × 16⅔ % = 10,000	60,000 × 8⅓ % = 5,000	60,000
Less: Variable Cost	60% × 20,000 = 12,000	68% × 25,000 = 17,000	80% × 10,000 = 8,000	40% × 5,000 = 2,000	39,000

Particulars	Product A (₹)	Product B (₹)	Product C (₹)	Product D (₹)	Total (₹)
Contribution	8,000	8,000	2,000	3,000	21,000
Less: Fixed Cost					14,700
Profit					6,300
P/V Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100$	$\frac{8,000}{20,000} \times 100$ = 40%	$\frac{8,000}{25,000} \times 100$ = 32%	$\frac{2,000}{10,000} \times 100$ = 20%	$\frac{3,000}{5,000} \times 100$ = 60%	$\frac{21,000}{60,000} \times 100$ = 35%

(a) Break Even Sales = $\frac{\text{Fixed Cost}}{\text{P / V Ratio}} = \frac{14,700}{35\%}$ = ₹ 42,000

Calculation of Contribution of the Products

Particulars	Product A (₹)	Product B (₹)	Product C (₹)	Product D (₹)	Total (₹)
Sales	60,000 × 25% = 15,000	60,000 × 40% = 24,000	60,000 × 30% = 18,000	60,000 × 5% = 3,000	60,000
Less: Variable Cost	60% × 15,000 = 9,000	68% × 24,000 = 16,320	80% × 18,000 = 14,400	40% × 3,000 = 1,200	40,920
Contribution	6,000	7,680	3,600	1,800	19,080
Less: Fixed Cost					14,700
Profit					4,380
P/V Ratio = $\frac{\text{Contribution}}{\text{Sales}} \times 100$	$\frac{6,000}{15,000} \times 100$ = 40%	$\frac{7,680}{24,000} \times 100$ = 32%	$\frac{2,600}{18,000} \times 100$ = 20%	$\frac{1,800}{3,000} \times 100$ = 60%	$\frac{19,080}{60,000} \times 100$ = 31.80%

(b) Break Even Sales = $\frac{\text{Fixed Cost}}{\text{P / V Ratio}} = \frac{14,700}{31.80\%}$ = ₹ 46,226

Illustration 10

Present the following information to show to management:

(i) The marginal product cost and the contribution per unit

(ii) The total contribution and profits resulting from each of the following sales mix results:

Particulars	Product	Per unit
Direct Materials	A	10
Direct Materials	B	9
Direct Wages	A	3
Direct Wages	B	2

Fixed Expenses - ₹ 800

Variable expenses are allotted to products at 100% of Direct Wages

Sales Price A ₹ 20

Sales Price B ₹ 15

Sales Mixtures: (a) 100 units of Product A and 200 units of Product B

(b) 150 units of Product A and 150 units of Product B

(c) 200 units of Product A and 100 units of Product B

Solution:

Statement showing Marginal Product Cost and Contribution per unit

Sl. No.	Particulars	Product A (₹)	Product B (₹)
i.	Selling Price per unit	20.00	15.00
ii.	Variable Cost		
	Direct Material cost per unit	10.00	9.00
	Direct Wages cost per unit	3.00	2.00
	Variable Expenses (100% of Direct Wages)	3.00	2.00
	Marginal Product Cost	16.00	13.00
iii.	Contribution per unit (i. – ii.)	4.00	2.00

Computation of Profit under Sales Mix (a)

Sl. No.	Particulars	Product A (₹)	Product B (₹)	Total (₹)
i.	No. of units	100	200	
ii.	Contribution per unit	4.00	2.00	
iii.	Total Contribution (i. × ii.)	400	400	800
iv.	Fixed Cost			800
v.	Profit (iii. – iv.)			Nil

Computation of Profit under Sales Mix (b)

Sl. No.	Particulars	Product A (₹)	Product B (₹)	Total (₹)
i.	No. of units	150	150	
ii.	Contribution per unit	4.00	2.00	
iii.	Total Contribution (i. × ii.)	600	300	900
iv.	Fixed Cost			800
v.	Profit (iii. – iv.)			100

Computation of Profit under Sales Mix (c)

Sl. No.	Particulars	Product A (₹)	Product B (₹)	Total (₹)
i.	No. of units	200	100	
ii.	Contribution per unit	4.00	2.00	
iii.	Total Contribution (i. × ii.)	800	200	1,000
iv.	Fixed Cost			800
v.	Profit (iii. – iv.)			200

Illustration 11

The following particulars are extracted from the records of a company:

		Per Unit	
		Product A	Product B
Sales	₹	100	120
Consumption of Material		2 kg	3 kg
Material cost	₹	10	15
Direct wages cost	₹	15	10
Direct expenses	₹	5	6
Machine hours used		3 hours	2 hours
Overheads expenses			
Fixed	₹	5	10
Variable	₹	15	20
Direct wages per hour is ₹ 5			

(a) Comment on profitability of each product (both use the same raw material) when:

1. Total sales potential in units is limited;
2. Total sales potential in value is limited;
3. Raw material is in short supply;
4. Production capacity (in terms of machine hours) is the limiting factor.

(b) Assuming raw material as the key factor, availability of which is 10,000 kgs and each product cannot be sold more than 3,500 units, find out the product mix which will yield the maximum profit.

Solution:

(a) Statement showing computation of contribution per unit of different factors of production and determination of profitability

Sl. No.	Particulars	Product A (₹)	Product B (₹)
i.	Selling price per unit	100	120
ii.	Variable Cost per unit		
	Material	10	15
	Labour	15	10
	Direct expenses	5	6
	Variable overheads	15	20
iii.	Total Variable Cost per unit	45	51
iv.	Contribution per unit (i. – iii.)	55	69
v.	$\text{P/V Ratio} = \frac{\text{Contribution per unit}}{\text{Selling Price per unit}}$	55%	57.50%
vi.	Contribution per kg of material	$\frac{₹\ 55}{2kg} = ₹\ 27.50$	$\frac{₹\ 69}{3kg} = ₹\ 23$

Sl. No.	Particulars	Product A (₹)	Product B (₹)
vii.	Contribution per machine hour	$\frac{₹\ 55}{3\ \text{hours}}$ = **₹ 18.33**	$\frac{₹\ 69}{2\ \text{hours}}$ = **₹ 34.50**

From the above computation, we may comment upon the profitability in the following manner:

1. If total sales potential in units is limited, Product B is more profitable, it has more contribution per unit.
2. If total sales potential in value is limited, Product B is more profitable, because it has higher P/V Ratio.
3. If the raw material is in short supply, Product A is more profitable, because it has more contribution per kg of material.
4. If the production capacity is limited, Product B is more profitable, because it has more contribution per machine hour.

(b) Statement showing optimum product mix – when raw material is a limiting factor

Sl. No.	Particulars	Product A	Product B	Total
i.	No. of units	3,500	1,000	
		(₹)	(₹)	(₹)
ii.	Contribution per unit	55	69	
iii.	Total contribution	1,92,500	69,000	2,61,500
iv.	Fixed cost	3,500 × 5 = 17,500	#3,500 × 10 = 35,000	52,500
v.	Profit (iii. – iv.)			2,09,000

Fixed cost is taken at maximum capacity

Working Notes

Available Material		10,000 kgs
Less: Utilized for Product A	3,500 units × 2 kg/unit	7,000 kgs
Balance quantity available for Production of Product B		3,000 kgs

$$\text{Number of units of Production of Product B} = \frac{3000\ \text{kg}}{3\ \text{kg per unit}} = 1{,}000\ \text{units}$$

Illustration 12

A company has a capacity of producing 1 lakh units of a certain product in a month. The sales department reports that the following schedule of sales price is possible:

Volume of Production	Selling Price per unit
%	(₹)
60	0.90
70	0.80
80	0.75
90	0.67
100	0.61

The variable cost of manufacture between these levels is 15 paise per unit and fixed cost ₹ 40,000. Prepare a statement showing incremental revenue and differential cost at each stage. At which volume of production will the profit be maximum?

Solution:

Statement showing computation of differential cost, incremental revenue and determination of capacity at which profit is maximum:

Capacity %	Units	Sales (₹)	Variable Cost @ ₹ 0.15 per unit (₹)	Fixed cost (₹)	Total Cost (₹)	Profit (₹)	Differential Cost (₹)*	Incremental Revenue (₹)#
i.	ii.	iii.	iv.	v.	vi. = iv. + v.	vii. = iii. – vi.	viii.	ix.
60	60,000	54,000	9,000	40,000	49,000	5,000	-	-
70	70,000	56,000	10,500	40,000	50,500	5,500	1,500	2,000
80	80,000	60,000	12,000	40,000	52,000	8,000	1,500	4,000
90	90,000	60,300	13,500	40,000	53,500	6,800	1,500	300
100	1,00,000	61,000	15,000	40,000	55,000	6,000	1,500	700

*Differential Cost is the change in total cost with respect to previous year.

#Incremental Revenue is the change in the value of sales over previous year.

The incremental revenue is more than incremental cost up to 80% capacity, the profit is maximum at that capacity.

Illustration 13

A company is at present working at 90% of its capacity and producing 13,500 units per annum. It operates a flexible budgetary control system. The following figures are obtained from its budget:

	90% Amount (₹)	100% Amount (₹)
Sales	15,00,000	16,00,000
Fixed expenses	3,00,500	3,00,600
Semi-fixed expenses	97,500	1,00,500
Variable expenses	1,45,000	1,49,500
Units made	13,500	15,000

Labour and material costs per unit are constant under present conditions. Profit margin is 10%.

(a) You are required to determine the differential cost of producing 1,500 units by increasing capacity to 100%.

(b) What would you recommend for an export price for these 1,500 units taking into account that overseas prices are much lower than indigenous prices?

Solution:

Computation of Material and Labour cost

Particulars	Amount (₹)	Amount (₹)
Sales at present		15,00,000
Less: Profit @ 10%		1,50,000
Total Cost		13,50,000
Less: All costs other than material and labour		
Fixed expenses	3,00,500	
Semi fixed expenses	97,500	
Variable expenses	1,45,000	5,43,000
Material and Labour Cost		8,07,000

(a) Statement showing differential cost of producing 1,500 units

Particulars	Amount (₹)
Material and Labour Cost = $\left(₹\ 8,07,000 \times \frac{1,500\ \text{units}}{13,500\ \text{units}}\right)$	89,667
Fixed expenses (3,00,600 – 3,00,500)	100
Semi-fixed expenses (1,00,500 – 97,500)	3,000
Variable expenses (1,49,500 – 1,45,000)	4,500
Differential cost	97,267

(b) Differential cost per unit = $\frac{₹\ 97,267}{1,500\ \text{units}}$ = ₹ 64.84

The minimum price for these 1,500 units should not be less than ₹ 64.84 for export.

Illustration 14

A company manufactures scooters and sells it at ₹ 3,000 each. An increase of 17% in cost of materials and of 20% of labour cost is anticipated. The increased cost in relation to the present sales price would cause at 25% decrease in the amount of the present gross profit per unit.

At present, material cost is 50%, wages 20% and overheads is 30% of cost of sales.

You are required to:

(a) Prepare a statement of profit and loss per unit at present

(b) Compute the new selling price to produce the same percentage of profit to cost of sales as before.

Solution:

Let the total cost per unit at present be ₹ X and Profit per unit be ₹ Y

Particulars	Present Cost Structure (₹)	Percentage increase/decrease	Anticipated Cost Structure (₹)
Material	0.50X	17% increase = 0.50X × 117%	0.585X
Labour	0.20X	20% increase = 0.20X × 120%	0.24X
Overheads	0.30X		0.30X
Total (Cost of Sales)	X		1.125X
Profit	Y	25% decrease = Y × 75%	0.75Y
Sales	3,000		3,000

So, two equations are $X + Y = 3,000$ ..... (i)

and $1.125X + 0.75Y = 3,000$ ..... (ii)

Multiplying equation (i) by 1.125 and subtracting equation (ii) from (i)

$$\begin{array}{rrcr} & 1.125X + 1.125Y & = & 3,375 \\ (-) & 1.125X + 0.75Y & = & 3,000 \\ \hline & 0.375Y & = & 375 \end{array}$$

or, Y = 1,000 or, Profit = ₹ 1,000

by putting the value of Y = 1,000 in equation (i)

or, X + 1,000 = 3,000

or, X = 2,000

or Total Cost = ₹ 2,000

(a) Statement showing Profit or Loss per unit at present

Particulars	Workings	(₹)
Material	0.50 × 2,000	1,000
Labour	0.20 × 2,000	400
Overheads	0.30 × 2,000	600
Total Cost		2,000
Profit		1,000
Selling Price per unit		3,000

Percentage of Profit on Sales $= \frac{\text{Profit}}{\text{Sales}} \times 100 = \frac{1,000}{3,000} \times 100 = 33\frac{1}{3}\% = \frac{1}{3}$rd of Sales

(b) Computation of New Selling Price to get same percentage of profit on sales

Particulars	Workings	(₹)
Material	0.585 × 2,000	1,170
Labour	0.24 × 2,000	480
Overheads	0.30 × 2,000	600
Total Cost		2,250
Profit	**Bal. fig. on Sales** × $\frac{1}{3}$	1,125
Selling Price per unit	**(Working Note)**	3,375

Working Note

Cost + Profit = Sales

or, 2,250 + $\frac{1}{3}$ × Sales = Sales

or, $\frac{1}{3}$ × Sales = 2,250

or Sales = 3,375

Illustration 15

Mr. Young has ₹ 1,50,000 investment in a business. He wants a 15% profit on his money. From an analysis of recent cost figures, he finds that his variable cost of operating is 60% of sales; his fixed costs are ₹ 75,000 per year. Show supporting computations for each Solution:

(a) What sales volume must be obtained to break even?

(b) What sales volume must be obtained to his 15% return of investment?

(c) Mr. Young estimates that even if he closed the doors of his business, he would incur ₹25,000 expenses per year. At what sales would be better off by locking his sales up?

Solution:

Variable Cost Ratio = 60% (given)

P/V Ratio = 1 – Variable Cost Ratio = 1 – 60% = 40%

(a) Break Even Point (in ₹) $= \frac{\text{Fixed Cost}}{\text{P / V Ratio}} = \frac{75{,}000}{40\%} =$ ₹ 1,87,500

(b) Desired Profit = 1,50,000 × 15% = ₹ 22,500

$$\text{Expected Sales} = \frac{\text{Fixed Cost + Desired Profit}}{\text{P / V Ratio}} = \frac{75{,}000 + 22{,}500}{40\%} = ₹\ 2{,}43{,}750$$

(c) $$\text{Shut Down Sales} = \frac{\text{Fixed Cost – Shut Down Cost}}{\text{P / V Ratio}} = \frac{75{,}000 – 25{,}000}{40\%} = ₹\ 1{,}25{,}000$$

Standard Costing and Variance Analysis

6.2

Efficient management of an organisation pivots on the two fundamental issues; planning and controlling. Planning is the fundamental management function, which involves deciding beforehand what is to be done, when is it to be done, how it is to be done and who is going to do it. Planning chalks out exactly, how to attain a specific goal. Controlling, on the other, enables the management to review the actual performance and locate the difference between the planned performance and actual performance. For evaluating performance, it is necessary to compare the actual performance with pre-determined targets. One of the important parameters of performance is the cost of production. It is of importance that the costs are monitored closely and there is a constant comparison of the actual costs with pre-determined targets.

It is important to note that costs may be classified either as historical cost or predetermined cost. Historical costs are 'incurred' costs and represent the cost of actual operational performance. However, for decision making purpose these costs are considered as irrelevant and pre-determined costs are considered as important. Pre-determined cost are also referred as future cost and are computed prior to actual production, on the basis of a specification of all the factors affecting cost. Pre-determined costs are estimated or standard costs.

6.2.1 Concept of Standard Cost and Standard Costing

Definitions

Standard cost

Para 4.32 of CAS 1 (Classification of Cost) defines standard cost as a predetermined cost of a product or service based on technical specifications and efficient operating conditions.

The same definition is reiterated in para 4.11 of CAS 6 (Material Cost) and para 4.15 of CAS 7 (Employee cost). However, the explanations provided by CAS, are different and elucidates two significant aspects of the notion of standard cost. In CAS 1 the following explanation to the definition is provided:

Standard costs are used as scale of reference to compare the actual cost with the standard cost with a view to determine the variances, if any, and analyse the causes of variances and take proper measure to control them.

While in CAS 6, the following explanation to the definition is provided:

The standard cost serves as a basis of cost control and as a measure of productive efficiency when ultimately posed with an actual cost. It provides management with a medium by which the effectiveness of current results is measured and responsibility for deviation is placed. Standard costs are used to compare the actual costs with the standard cost with a view to determine the variances, if any, and analyze the causes of variances and take proper measure to control them.

From the above it is obvious that standard costs are predetermined costs used for estimation and the following three points regarding standard cost emerge.

1. It is used as a scale of reference
2. It is used as a basis of cost control
3. It naturally fit in an integrated system of responsibility accounting.

CIMA Official Terminology[1] defines standard cost as planned unit cost of a product, component or service.

Standard Costing

Standard costing is a management accounting technique that is used to determine the expected costs of producing goods or services. It involves setting predetermined costs for various elements of production, such as materials, labour, and overheads, based on historical data, industry benchmarks, or engineering estimates. These predetermined costs, known as standard costs, serve as benchmarks against which actual costs are compared, allowing managers to identify variances and take corrective actions to control costs and improve efficiency.

CIMA Official Terminology[1] standard costing is a control technique that reports variances by comparing actual costs to pre-set standards so facilitating action through management by exception.

Thus we can state that Standard costing involves the following steps:

1. The establishment of predetermined estimates of the costs of products or services
2. The collection of actual costs
3. The comparison of the actual costs with the predetermined estimates.

The predetermined costs are known as standard costs and the difference between standard and actual cost is known as a variance. The process by which the total difference between standard and actual results is analyzed is known as variance analysis.

Two primary uses of standard costing are:

1. To value inventories and cost production for cost accounting purposes. It is an alternative method of valuation to methods like FIFO and LIFO.
2. To act as a control device by establishing standards (planned costs), highlighting (via variance analysis which we will cover in the next chapter) activities that are not conforming to plan and thus alerting management to areas which may be out of control and in need of corrective action.

Standard costing and Management by Exception (MBE)

Standard costs are average expected unit costs, because they are only averages and not a rigid specification actual results will vary to some extent. Standard costs can therefore be viewed as benchmarks for comparison purposes. Variances (the differences between standard costs and actual costs) should only be reported and investigated if there is a significant difference between actual and standard. The problem is in deciding whether a variation from standard should be considered significant and worthy of investigation. Tolerance limits can be set and only variances that exceed such limits would require investigation. Standard costing therefore enables the principle of management by exception.
CIMA Official Terminology[1] defines management by exception as 'the practice of concentrating on activities that require attention and ignoring those which appear to be conforming to expectations. Typically, standard cost variances or variances from budget are used to identify those activities that require attention.'

Standard Costs and Estimated Costs

Before proceeding with the intricacies it is important to distinguish between standard Costs and estimated costs.

1 Certificate Paper C1 Fundamentals of Management Accounting, Chartered Institute of Management Accounting (CIMA)

Though both are predetermined costs, there are various differences, some of which are taken up for discussion, point wise:

1. Estimated Costs are intended to determine what the costs 'will' be. Standard Costs aim at what costs 'should' be.
2. Estimated cost is used in budgetary control system and historical costing system. Standard cost is ascertained and applied is standard costing system.
3. Estimated cost is used in decision making and selection of alternative with maximum profitability. It is also used in price fixation. Standard cost is used for analysis of variances and cost control purposes.
4. Estimated costs are based on average of past actual figures adjusted for anticipated changes in future. Anticipated wastes, spoilage and inefficiencies, all of which tend to increase costs are included in estimated costs. Standard costs are planned costs determined on a scientific basis and they are based upon certain assumed conditions of efficiency and other factors.
5. In estimated costing systems, stress is not so much on cost control, but costs are used for other purposes such as fixation of prices to be quoted in advance. Standard costs serve as effective tools for cost control.

Setting of Standard Costs

Setting of standard cost is an elaborate process which is sensitive as well. Exclusive operational knowledge is essential for setting standard costs. While setting production costs standards, the following preliminaries should be considered:

1. Study of the technical and operational aspects of the concern, such as methods of manufacture and the processes involved, management of organisation and line of assignment of responsibilities, division of the organisation into cost centres, units of measurement of input and output, anticipation of wastes, rejections and losses, expected efficiency, and capacity likely to be utilized.
2. Review of the existing costing system and the cost records and forms in use.
3. The type of standard to be used, i.e, whether current, basic, or normal standard costs are to be set. The choice of a particular type of standard will depend upon two factors, viz. which type would be most effective for cost control in the organisation, and whether the standards will be merged in the accounting system or kept outside the accounts as statistical data.
4. Proper classification of the accounts so that variances may be determined in the manner desired.
5. Fixation of responsibility for setting standards. As definite responsibility for variances from standards is ultimately to be laid on individuals or departments, it is but natural that all those individuals or departments should be associated with the setting of standards.
6. Further, two specific aspects need to be noted,
    a. It is important to note that standards for each cost element are made up of a monetary component and a resources requirement component.
    b. Though standard costs may be used in both absorption costing and in marginal costing systems it is generally designated to marginal costing systems.

Monetary Parts of Standards

Standard direct material prices - Direct material prices will be estimated by the purchasing department from their knowledge of the following:

a. Purchase contracts already agreed
b. Pricing discussions with regular suppliers

c. The forecast movement of prices in the market

d. The availability of bulk purchase discounts

Price inflation can cause difficulties in setting realistic standard prices. Suppose that a material costs ₹ 10 per kilogram at the moment and during the course of the next twelve months it is expected to go up in price by 20% to ₹ 12 per kilogram. What standard price should be selected?

- If the current price of ₹ 10 per kilogram were used in the standard, the reported price variance will become adverse as soon as prices go up, which might be very early in the year. If prices go up gradually rather than in one big jump, it would be difficult to select an appropriate time for revising the standard.
- If an estimated mid-year price (The average expected price for the year, say ₹ 11 per kilogram) were used, price variances should be favourable in the first half of the year and adverse in the second half of the year, again assuming that prices go up gradually throughout the year.

Standard direct labour rates - Direct labour rates per hour will be set by discussion with the personnel department and by reference to the payroll and to any agreements on pay rises with trade union representatives of the employees.

a. A separate hourly rate or weekly wage will be set for each different labour grade/type of employee.

b. An average hourly rate will be applied for each grade (even though individual rates of pay may vary according to age and experience).

Similar problems when dealing with inflation to those described for material prices can be met when setting labour standards.

Standard Resource Requirements

There are three aspects of standard resource requirement which are as follows:

a. To estimate the materials required for making each product (material usage) and also the labour hours required (labour efficiency), technical specifications must be prepared for each product by production experts (either in the production department or the work study department).

b. The 'standard product specification' for materials must list the quantities required per unit of each material in the product. These standard input quantities must be made known to the operators in the production department so that control action by management to deal with excess material wastage will be understood by them.

c. The 'standard operation sheet' for labour will specify the expected hours required by each grade of labour in each department to make one unit of product. These standard times must be carefully set (for example by work study) and must be understood by the labour force. Where necessary, standard procedures or operating methods should be stated.

Taking account of wastage and losses

If, during processing, the quantity of material input to the process is likely to reduce (due to wastage, evaporation and so on), the quantity input must be greater than the quantity in the finished product and a material standard must take account of this.

Suppose that the fresh Lichi juice content of a litre of Purple Pop is 100ml and that there is a 10% loss of Lichi juice during process due to evaporation. The standard material usage of Lichi juice per litre of Purple Pop will be:

$$100 \text{ ml} \times \frac{100\%}{(100-10)\%} = 100 \text{ ml} \times \frac{100\%}{90\%} = 111.11 \text{ ml}$$

Problems in setting standards

The standard setting process is encountered with some difficulties in the stage of implementation. The below mentioned are some of the problems in the standard setting process:

1. Inflation needs to be incorporated into planned unit costs. The standard setting process must ensure the inclusion of methods to mitigate the issue inflation and rising prices into the planned costs.
2. It is an important issue that a performance standard is agreed upon by all who are instrumental in working with the performance standard which should be attainable and not too idealistic.
3. The quality of materials to be used is to be decided upon before a set of standard costs is agreed upon as a better quality of material will cost more, but perhaps reduce material wastage.
4. Estimating materials prices where seasonal price variations or bulk purchase discounts may be significant.
5. Finding sufficient time to construct accurate standards as standard setting can be a time-consuming process.
6. Incurring the cost of setting up and maintaining a system for establishing standards.
7. Dealing with possible behavioural problems, managers responsible for the achievement of standards possibly resisting the use of a standard costing control system for fear of being blamed for any adverse variances.

6.2.2 Advantages and Limitations

The advantages of standard costing

Though there are several advantages of standard costing, the following are more important:

1. Carefully planned standards aids the budgeting process.
2. Standard costs provide a yardstick against which actual costs can be measured.
3. The setting of standards involves determining the best materials and methods which may lead to cost economies.
4. A target of efficiency is set for employees to reach and cost consciousness is stimulated.
5. Variances can be calculated which enable the principle of 'management by exception' to be operated.
6. Only the variances which exceed acceptable tolerance limits need to be investigated by management with a view to control action.
7. Standard costs simplify the process of bookkeeping in cost accounting, because they are easier to use than LIFO, FIFO and weighted average costs.
8. Standard times simplify the process of production scheduling.
9. Standard performance levels might provide an incentive for individuals to achieve targets for themselves at work.

Types of Standard

A standard is a norm against which the actual performance can be measured. The objective of setting standards is to measure efficiency and to monitor costs by assigning responsibility for deviations from the standards. Also, a standard can motivate employees by providing a goal for achievement, but the moot question that often arises is, "What is the proper standard to use?" A company can estimate materials, labour, and factory overheads usage and

costs, but what about the unforeseen costs, such as spoilage, lost time, and equipment breakdowns? Should these items be considered in determining the standard cost to manufacture a product? This issue is attempted to be solved if the types of standards are discussed. As such two specific type of standard may be set which depends on the top management. The two basic type of standards are:

- Ideal standard
- Attainable standard

Ideal standard

Some companies set their standards at the maximum degree of efficiency. Using such an ideal standard, they determine costs by considering estimated materials, labour, and overheads costs; the condition of the factory and machinery; and time for rest periods, holidays, and vacations—but make no allowances for inefficient conditions such as lost time, waste, or spoilage. This ideal standard can be achieved only under the most efficient operating conditions; therefore, it is practically unattainable, generally giving rise to unfavourable variances. Companies using this type of standard feel that it provides a maximum objective for which to strive in the attempt to improve efficiency. There is, however, a psychological disadvantage —factory personnel may become discouraged and lose their incentive to meet standards that are usually impossible to attain except under perfect operating conditions.

Attainable standards

From the potential problems of the ideal standard as discussed in the previous paragraph most companies set attainable standards that include such factors as lost time and normal waste and spoilage. These companies realize that some inefficiencies cannot be completely eliminated, so they design standards that can be met or even bettered in efficient production situations. The primary concern of the manufacturer should be to set standards that are high enough to provide motivation and promote efficiency, yet not so high that they are unattainable and, thus, bad for worker morale.

Some authors prefer the following categorization:

Ideal standards are based on the most favourable operating conditions, with no wastage, no inefficiencies, no idle time and no breakdowns. These standards are likely to have an unfavourable motivational impact, because employees will often feel that the goals are unattainable and not work so hard.

Attainable standards are based on efficient (but not perfect) operating conditions. Some allowance is made for wastage, inefficiencies, machine breakdowns and fatigue. If well-set they provide a useful psychological incentive, and for this reason they should be introduced whenever possible. The consent and co-operation of employees involved in improving the standard are required.

Current standards are standards based on current working conditions (current wastage, current inefficiencies). The disadvantage of current standards is that they do not attempt to improve on current levels of efficiency, which may be poor and capable of significant improvement.

Basic standards are standards which are kept unaltered over a long period of time, and may be out-of-date. They are used to show changes in efficiency or performance over an extended time period. Basic standards are perhaps the least useful and least common type of standard in use.

Criticisms of standard costing

Critics of standard costing have argued that standard costing is not appropriate in the modern business environment[2].

2 https://www.ukessays.com/essays/accounting/is-standard-costing-relevant-in-a-modern-business-environment.php#:~:text=Even%20though%20accountants%20believed%20that%20standard%20costing%20is,modern%20businesses%20%28Fleischman%20and%20Tyson%202008%2C%20pp.%20342%29.

They have put forward various reasons in favour their argument, some of those are listed in the next few lines:

a. The use of standard costing relies on the existence of repetitive operations and relatively homogeneous output. Nowadays many organisations are forced continually to respond to customers' changing requirements, with the result that output and operations are not so repetitive.

b. Standard costing systems were developed when the business environment was more stable and less prone to change. The current business environment is more dynamic and it is not possible to assume stable conditions.

c. Standard costing systems assume that performance to standard is acceptable. Today's business environment is more focused on continuous improvement.

d. Standard costing was developed in an environment of predominantly mass production and repetitive assembly work. It is not particularly useful in today's growing service sector of the economy.

Use of Standard Costing

Standard costing is a cost accounting method widely used in various industries, including the Indian industry, for several practical purposes. It is employed to project the profit level of the business at any production level, aid in effective management functions such as planning and cost control, analyze the impact of cost changes on sales volume, measure production efficiency, evaluate segment performance, identify and measure variances between standards and actuals, and design performance measurement systems to encourage employee participation. For example, in the automobile industry, standard costing is used to determine the cost of production of a car by assigning overheads costs to the products. Similarly, in the pharmaceutical industry, it is used to determine the cost of production of a drug by assigning overheads costs to the products.

Standard Costing and budgetary control

Budgetary control and standard costing have the common objective of cost control by establishing pre-determined targets. These two techniques are similar in certain respects but differ in respect of other points. Budgetary control is a system of planning and controlling costs. It involves the establishment of budgets, measurement of actual performance, comparison of actual performance with budgeted performance to develop the deviations and the analysis of the causes of variations for taking appropriate remedial steps.

A contrast between standard costing and budgetary control is presented below:

Aspect	Standard Costing	Budgetary Control
Definition	Standard costing is a technique used to set predetermined costs for various elements of production, such as materials, labour, and overheads, to establish benchmarks for comparison with actual costs.	Budgetary control involves the establishment of budgets (financial plans) for various functions or activities within an organization and comparing actual performance against these budgets to monitor and control financial activities.
Focus	Focuses on setting predetermined costs for individual cost elements involved in the production process.	Focuses on setting financial targets for overall performance, including revenues, expenses, and profits, across different functions or departments within the organization.
Time Horizon	Typically short-term in nature, focusing on costs incurred during the production process.	Can be short-term or long-term, depending on the budget period set by the organization, but often covers a fiscal year.

Purpose	Primarily aimed at cost control and performance evaluation by comparing actual costs with standard costs to identify variances and take corrective actions.	Aimed at planning, coordinating, and controlling overall financial activities by setting targets, allocating resources, and evaluating performance against budgeted figures.
Scope	Primarily used in manufacturing industries where production costs are a significant component of overall expenses.	Applicable to various types of organizations across different sectors, including manufacturing, service, and non-profit organizations.
Flexibility	Less flexible compared to budgetary control as it focuses on predetermined costs based on historical data or industry standards.	More flexible as it allows for adjustments to budgets based on changing circumstances, such as economic conditions or business priorities.
Control Mechanism	Focuses on controlling costs through variance analysis and corrective actions to ensure that actual costs align with predetermined standards.	Focuses on controlling overall financial performance by monitoring actual performance against budgeted targets and taking corrective actions to address any deviations.
Performance Evaluation	Evaluates performance based on cost variances between actual and standard costs, focusing on efficiency and cost-effectiveness in production.	Evaluates performance based on variances between actual and budgeted figures across different financial categories, providing insights into overall financial health and performance.

6.2.3 Computation and Analysis of Variances (Material and Labour Costs only)

Variance Analysis

Once the standards are set, the next step is to compare the set standard with the actual results of a reporting period (week, month, quarter, year). The actual results achieved by an organisation during a reporting period will, in all likelihood, be different from the expected results (costs and revenues).

The top management spends considerable time and trouble setting standards. If the actual results turn out to be different from the standards, the top management is interested to investigate into the variances between the actual and the standard for control purpose, but prior to any investigation of the variances or fixation of responsibility the wise manager will consider the differences that have occurred and use the results of these considerations to assist in attempts to attain the standards.

Variances measure the difference between actual results and expected results. The process by which the total difference between standard and actual results is analyzed is known as variance analysis. The first step after finding out the deviations is to calculate the deviations which are either variances in sales revenue or variances in costs.

CIMA Official Terminology[1] defines Variance as the difference between a planned, budgeted, or standard cost and the actual cost incurred. The same comparisons may be made for revenues.

CIMA Official Terminology[1] defines Variance analysis as the evaluation of performance by means of variances, whose timely reporting should maximize the opportunity for managerial action.

Explanation to the definition of standard cost in para 4.32 of CAS 1 (Classification of Cost) states that Standard costs are used as scale of reference to compare the actual cost with the standard cost with a view to determine the variances, if any, and analyse the causes of variances and take proper measure to control them.

Thus, the main purpose of standard costs is comparison with actual costs and their analysis of causes of variance.

This enable the management to take proper measure to control the variances.

It is obvious that variances must be measured before they are analysed and managed[3].

In the following chart a comprehensive classification of variances is considered.

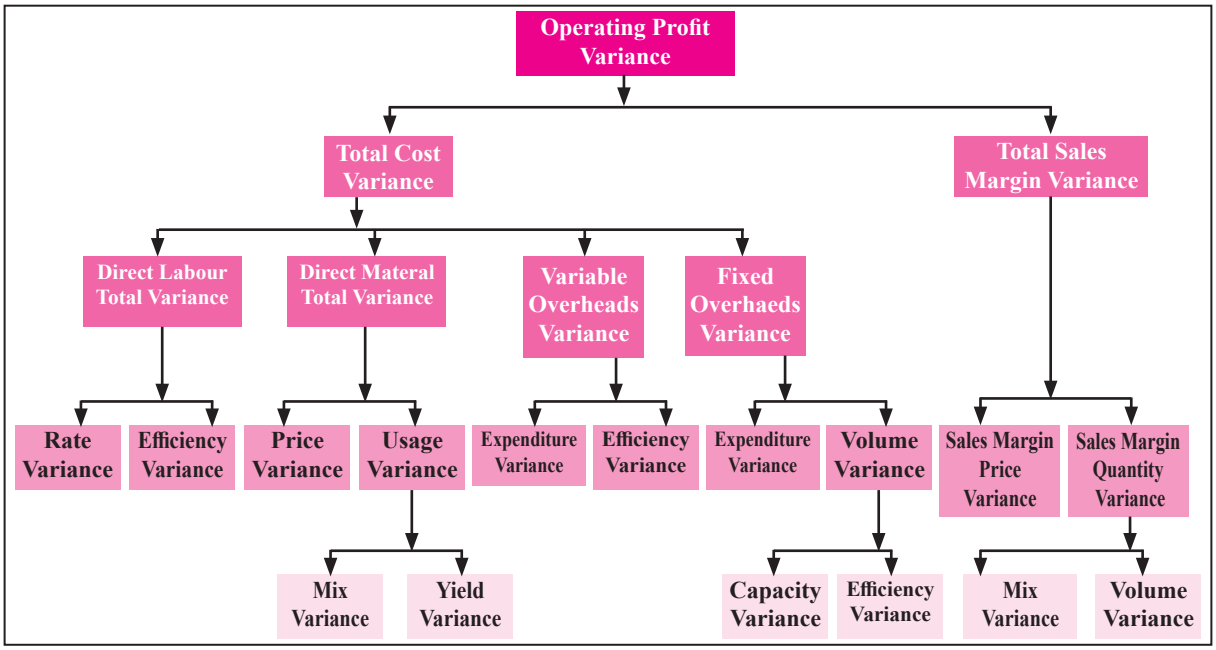


Figure 6.9: Chart of common variances [adapted from Lucey, T. (1996). Costing, 5th ed.]

Variances are, as such, are either:

- **Favourable** - A favourable variance is achieved when the actual performance is better than the expected results.
- **Adverse** - An adverse variance is achieved when the actual performance is worse than the expected results.

In terms of cost, when the actual cost is less than the standard cost it is advantagious to the management and is thus termed favourable variance. On the other, when actual cost is more that standard cost it is disadvantageous to the management and is referred as adverse variance.

Computation of Variances

After setting the standards and standard costs for various elements of cost, the next important step is to compute variances for each element of cost. Variance is the difference between the standard cost and the actual cost. In other words, it is the difference between what the cost should have been and what is the actual cost. These are either favourable or adverse. Element wise computation of variances[4] is taken up for discussion in the following lines:

3 A conceptual understanding of variance analysis is available at https://corporatefinanceinstitute.com/resources/knowledge/accounting/variance-analysis/

4 It is important to note that the variance analysis is being introduced in this module and as such only direct material cost variances and direct labour cost variances are covered up in this module. Variable overheads variances, fixed overheads variances, sales variances and other advanced topics in variance analysis would be covered up in Paper 12 and Paper 16.

Material Cost Variance

The main objective is to find out the difference between the standard cost of material used for actual production and actual cost of material used. Thus, the main variance in this category is the material cost variance, which is thereafter categorised into other variances.

CIMA Official Terminology[5] defines the direct material total variance as the measurement of the difference between the standard material cost of the output produced and the actual material cost incurred.

The formula for calculating material cost variance is given as under:

Material cost variance = (standard material cost of output produced – actual cost of material purchased)[6]

The direct material total variance (the difference between what the output actually cost and what it should have cost, in terms of material) can be divided into the following:

- **Direct Material Price Variance** - this variance arises due to changes in prices of direct materials and as such, due to the external factors and may be referred as uncontrollable variance.
- **Direct Material Usage Variance** – this variance arises due to internal factors of using materials more than what is stipulated for the purpose. This is, as such, a controllable variance. For investigating into the reason for such internal deviations of usage of direct material, this variance is subdivided into the following two:
  - **Mix variance** – this variance arises as the actual mix of materials used (given that two or more materials is used) is different from the standard mix of materials recommended.
  - **Yield variance** - in any manufacturing process, some unavoidable loss always takes place. The normal loss is always anticipated and taken into consideration while determining the standard quantity. Yield variance arises when the actual loss is more or less than the normal loss.

Following is a pictorial representation of direct material cost variance and its classifications:

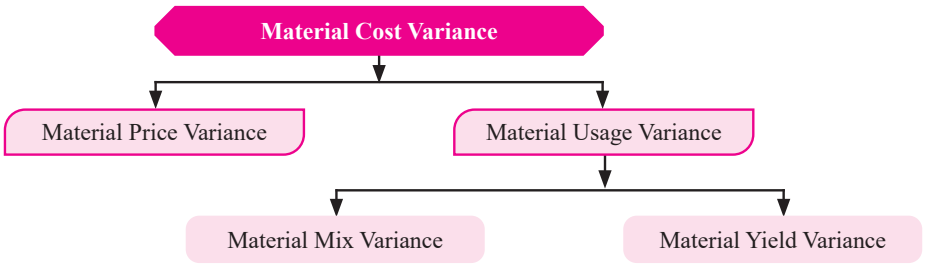


Figure 6.10: Classification of Material Cost Variance

Material Price Variance

One of the reasons for difference between the standard material cost and actual material cost is the difference between the standard price and actual price. Material price variance measures the difference between the standard price and actual price with reference to the actual quantity consumed.

CIMA Official Terminology[5] defines the direct material total variance as the measurement of the difference between the standard material cost of the output produced and the actual material cost incurred.

The formula for calculating the material price variance is given as under:

5 CIMA Official Terminology, 2005, The Chartered Institute of Management Accountants (CIMA Publishing, an imprint of Elsevier).

6 This may be derived into AQAP (actual quantity × actual price) – standard cost of actual yield.

Material price variance

= **{(actual quantity of material purchased × standard price) – actual cost of material purchased}**

= **Actual Quantity (Standard Price – Actual Price)**[7]

It is important to note that their might be a situation where the quantities of material purchased and used are different, then as per the guidelines of CIMA Official Terminology[1], the total variance should be calculated as the sum of the usage and price variances.

Material Usage Variance

This is the difference between the standard quantity of materials that should have been used for the number of units actually produced, and the actual quantity of materials used, valued at the standard cost per unit of material. In other words, it is the difference between how much material should have been used and how much material was used, valued at standard cost.

CIMA Official Terminology[1] defines the direct material total variance as the measurement of efficiency in the use of material, by comparing standard material usage for actual production with actual material used, the difference is valued at standard cost.

The formula for calculating material usage variance is given as under:

Material usage variance

= **((actual production × standard material per unit – actual material usage) × standard cost per kg, litre, other)**

= **Standard Price [Standard Quantity – Actual Quantity]**[8]

The direct material usage variance may be divided into mix and yield variances if several materials are mixed in standard proportions which are taken up for discussion in a later paragraph.

Solved Case 1

In a particular situation, ASA Ltd., furnishes the following information:

Standard quantity of materials for producing 1 unit of finished product 'P' is 5 kg. The standard price is ₹6 per kg. During a particular period, 500 units of 'P' were produced. Actual material consumed was 2700 kg at a cost of ₹16,200. The owner, Subbuji requests his son, Nikkhil, to calculate the direct material cost variances from the above data.

Solution:

Nikhil, Subbuji's son, who is a Cost Accountant uses the usual formulae for calculating the direct material cost variances as follows:

Material cost variance = (standard material cost of output produced – actual cost of material purchased)

= (500 units × 5 kg × ₹6) – 16200

= 15000 – 16200

= 1200 (A)[9]

7 This may be derived into AQAP (actual quantity × actual price) – AQSP (actual quantity × standard price)

8 This may be derived into AQAP (actual quantity × actual price) – standard cost of actual yield.

9 It is an adverse variance as the actual cost (₹16,200) is more than the standard cost (₹15,000), the cost that was stipulated for the production of 500 units.

Material price variance

= Actual Quantity (Standard Price – Actual Price[10]) = 2700 × (6 – 6) = nil

Material usage variance

= Standard Price [Standard Quantity – Actual Quantity] = 6 (2500 – 2700) = 1200 (A)

The results put forward by Nikkhil, perplexed Subbuji who requested his son to present a layman's understanding on the variances calculated and presented. As a response, Nikkhil presented the following to his father:

The direct material total variance

This is the difference between what 500 units should have cost and what they did cost.

	(₹)
500 units should have cost (500 units × 5kg × ₹6 per kg)	15,000
But did cost (actual cost of actual yield)	16,200
Difference (Variance)	1,200

The variance is adverse because the yield costs more than what they should have cost.

The direct material total variance into its two constituent parts:

- The direct material price variance (since prices may have gone up or down)
- The direct material usage variance (internal issues of using more/less than what is stipulated).

The direct material price variance

This is the difference between what 2700 kgs should have cost and what 2700 kgs did cost.

	(₹)
2700 kg should have cost @ ₹ 6 per kg	16,200
But did cost (actual cost of material used)	16,200
Difference (Variance)	nil

The direct material usage variance

This is the difference between how many kilograms of material should have been used to produce 500 units of P and how many kilograms were used, valued at the standard cost per kilogram.

	(₹)
500 units should have used (500 units × 5kg)	2,500 kgs
But actual usage is	2,700 kgs
Excess usage	200 kgs
Excess usage valued at standard cost of ₹ 6 per kg (200 × 6)	1200 (A)

10 The actual price per kg is ₹ 6 (2700 kg of material is purchased at ₹16,200).

Excess usage valued at standard price results in disadvantageous and is adverse[11].

Summary,

Direct material cost variance = 1200 (A)

This comprise of

- Direct material price variance = nil
- Direct material usage variance = 1200 (A)

Further classification of direct material usage variance

It is noted in an earlier line that the direct material usage variance may be divided into:

- Direct material mix variance
- Direct material yield variance.

Direct material mix variance

The direct material mix variance may arise when two or more types of raw materials are mixed to produce the final product. In such cases, standard proportion of mixture is pre-determined. For example, in manufacturing one unit of product 'Q', material X and Y may have to be mixed in a standard proportion of 3:2. This is called as the standard mix.

However, when the actual production ensues, it is found that the actual mix may have to be changed due to several reasons like non-availability of a particular material etc. In such cases material mix variance arises.

CIMA Official Terminology[1] notes that the direct material mix variance is a subdivision of the material usage variance. If different materials can be substituted, the mix variance measures the cost of any variation from the standard mix of material.

Direct material mix variance

= **{(quantity of material based on total material quantity split in standard proportions – actual quantity of material) × standard cost per kg,litre,other)},**

This may be simplified and represented as

= **Standard Cost of Standard Mix – Standard Cost of Actual Mix**[12]

Material Yield Variance

In any manufacturing process, some unavoidable loss always takes place. Thus, if the input is 100, output may be 96, four units is the normal loss which is unavoidable in nature. The normal loss is always anticipated and taken into consideration while determining the standard quantity. Yield variance arises when the actual loss is more or less than the normal loss.

CIMA Official Terminology[1] makes the following observation:

Direct material yield variance is subdivision of the material usage variance. It measures the effect on cost of any difference between the actual usage of material and that justified by the output produced. It is recommended that the variance be calculated in total and not for individual material inputs.

11 Under the given circumstances, the total direct material cost variance is due to the excess usage and is attributable to the direct material usage variance as the direct material price variance is nil.

12 This is also written as [AQSP (actual quantity × standard price) – RSQSP (revised standard quantity × standard price)]

Material yield variance

= {(standard material quantity required for actual output – actual material quantities used in standard proportions) × standard cost per kg, litre, other)}

It is also written as,

Material Yield Variance = SYR [Actual Yield – Standard Yield][13]

SYR = Standard Yield Rate, i.e. standard cost per unit of standard output.

It follows that:

Direct material usage variance

= direct material mix variance + direct material yield Variance

Solved Case 2

Suppose that the Mr Arun Singji, the owner of Lotus Ltd. is worried about the variances in the direct material cost in his fountain pen manufacturing unit, Lotus Ltd. In the manufacturing unit he has adopted standard costing system and for a particular month he extracts following information:

Standard:	Material for 70 kg finished products	100 kg.
	Price of material	₹ 1 per kg
Actual:	Output	2,10,000 kg.
	Material used	2,80,000 kg.
	Cost of Materials	₹ 2,52,000

Mr Arun asks his Cost Accountant to calculate the direct material variances and reports the same to him.

Solution:[14]

A. Actual Quantity [AQ] × Actual Price [AP] or AQAP = ₹2,52,000 (given)

B. Actual Quantity [AQ] × Standard Price [SP] or AQSP = 2,80,000 Kgs (material used) × ₹1 = ₹ 2,80,000

C. NIL (as only one material is used in production)

D. Standard Material Cost for Actual yield[15] = [(100 kgs × ₹1) ÷ 70 kgs] × 210000 kgs = ₹ 3,00,000

Material Cost Variance = D – A = ₹48,000 (Favourable[16])

Material Price Variance = B – A = ₹28,000 (Favourable[17])

Material Usage Variance = D – B = ₹20,000 (Favourable[17])

Note:

Students need to be careful in calculating D i.e., Standard Material Cost for Actual Yield.

For every 100 kgs of input only 70 kgs is the output or actual yield.

13 This is also written as [RSQSP (revised standard quantity × standard price) – standard material cost of actual yeild]

14 It is very important to note that the formulae for calculation has been recommended by CIMA official terminology (mentioned in note 6). The format for working is the author's way of representation and is for illustrative purpose only. Students are advised to refer to the working note format for understanding purpose only.

15 This is also referred as Standard Cost of Standard Material (SQSP).

16 Actual Material Cost is lower than what has been stipulated (Standard) for the actual production. Thus, favourable variance, implying efficiency regarding Material Cost.

Thus, standard cost for one kg of actual yield = $\frac{(100\text{kg} \times ₹\ 1)}{70\text{kg}} = ₹1.42857$

for total actual yield (210000 kgs) standard cost of actual yield = 2,10,000 kgs × ₹1.42857 = ₹3,00,000

Alternatively, students may use traditional formulae to calculate the variances. This is given as under:

Material Usage Variance = (SQ – AQ) × SP

Material Price Variance = (SP – AP) × AQ

Material Cost Variance = (SQ × SP) – (AQ × AP)

Before proceeding the following working is required.

Standard Quantity of input for actual output (SQ) = 2,10,000 kg × $\frac{100\text{ kg}}{70\text{ kg}}$ = 3,00,000 kg.

Actual Price (AP) = $\frac{₹\ 2,52,000}{2,80,000\text{ kg}}$ = ₹0.9 per kg

And the calculations would be

Material Cost Variance = (300000 × ₹1) – (280000 × ₹0.90) = 48000 (F)

Material Price Variance = (₹1 – ₹0.90) × 280000 = 28000 (F)

Material Usage Variance = (300000 – 280000) × ₹1 = 20000 (F)

Reconciliation

Material Cost Variance = Material Price Variance + Material Usage Variance

48000 (F) = 28000 (F) + 20000 (F)

Solved Case 3

Suppose that in a particular production process two material, material A and material B, are used to produce a chemical mixture called 'P'.

The standard cost of the chemical mixture 'P' is as follows:

40% material A at ₹20 per kg.

60% material B at ₹30 per kg.

A standard loss of 10% of input is expected in production.

The cost records for a period showed the following usage:

90 kg material A at a cost of ₹18 per kg.

110 kg material B at a cost of ₹34 per kg.

In a particular month the quantity produced of product 'P' was 182 kg.

The owner asks the cost accountant of the company to calculate the material variances.

Solution:

Working

A. **AQAP** {Actual Quantity [AQ]× Actual Price [AP]}

(Material A: [90 × ₹ 18] = 1620 + Material B: [110 ×34] = 3740) = 5360

B. **AQSP** {Actual Quantity [AQ]× Standard Price [SP]}

(Material A: [90 × 20]= 1800 + Material B: [110 ×30]= 3300)= 5100

C. **RSQSP** {Actual Quantity in Standard Mix × Standard Price [SP]}

(Material A: [200 kg × 40% × 20] = 1600 + Material B [200 kg × 60% × 30 = 3,600]) = 5,200

D. Standard material cost for actual yield

$$= \frac{₹\ 200\ kg \times 40\% \times 20 + 200\ kg \times 60\% \times 30}{180\ kg} \times 182\ kg = \frac{5200}{180} \times 182 = \mathbf{5257.78}$$

Material cost variance	= AQAP – standard material cost for actual yield	= (A – D)	= 102.22	(A)
Material price variance	= AQAP – AQSP	= (A – B)	= 260	(A)
Material usage variance	= AQSP - standard material cost for actual yield	= (B – D)	= 157.78	(F)
Material mix variance	= AQSP – RSQSP	= (B – C)	= 100	(F)
Material yield variance	= RSQSP – standard material cost for actual yield	= (C – D)	= 57.78	(F)

Reconciliation

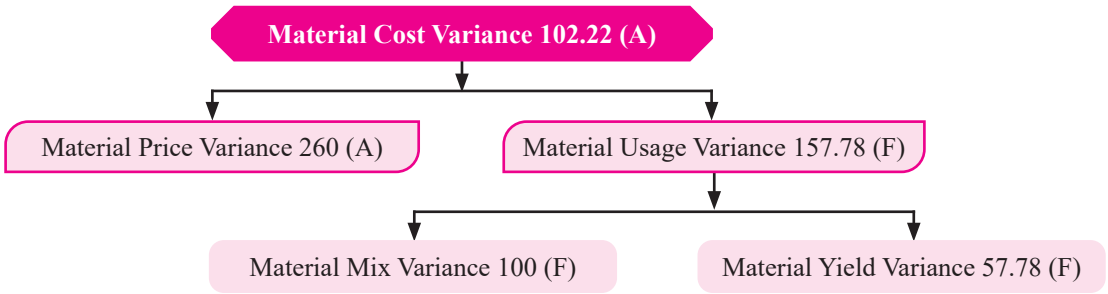


Figure 6.11: Reconciliation of Material Cost Variance

Solved Case 4

Suppose that in a factory, Chemical A, B and C are mixed to manufacture Chemical D. After elaborate discussion with various stakeholders the following standards for material cost was designed.

The standard material cost for 100 kg of output, Chemical D, is made up of:

Chemical A 30 kg. @ ₹4 per kg

Chemical B 40 kg. @ ₹5 per kg

Chemical C 80 kg. @ ₹6 per kg

For a particular period 500 kg. of Chemical D was produced from a mix of:

Chemical A 140 kg. @ ₹588

Chemical B 220 kg. @ ₹1,056

Chemical C 440 kg. @ ₹2,860

How do yield mix and price of factors contribute to the variance in the actual cost per 100 kg. of chemical D over the standard cost?

Solution:

Working note 1

It is given in the problem that 500 kg. of chemical D were produced from a mix of:

Chemical A 140 kg. @ ₹588

Chemical B 220 kg. @ ₹1,056

Chemical C 440 kg. @ ₹2,860

Thus, for 100 kg (as required in the problem)

$$\text{Chemical A} = \frac{140}{500} \times 100 = 28 \text{ kg}$$

$$\text{Chemical B} = \frac{220}{500} \times 100 = 44 \text{ kg}$$

$$\text{Chemical C} = \frac{440}{500} \times 100 = 88 \text{ kg}$$

160 kg

and

Actual price of Chemical A = 4.2 (588 ÷ 140),

Actual price of Chemical B = 4.8 (1056 ÷ 220) and

Actual price of Chemical C= 6.5 (2860 ÷ 440).

Working note 2

$$\text{Total actual Qty (input)} = \frac{800 \text{ kg } (140 + 220 + 440)}{5} = 160 \text{ kg (for 100 kg of Chemical D, output)}$$

Revised Actual Qty (in Standard Mix)

$$\text{Chemical A} = 160 \times \frac{30}{150} = 32 \text{ kg}$$

$$\text{Chemical B} = 160 \times \frac{40}{150} = 42.67 \text{ kg}$$

$$\text{Chemical C} = 160 \times \frac{80}{150} = 85.33 \text{ kg}$$

A. Actual Quantity [AQ] × Actual Price [AP] or **AQAP**

(Material A: [28 × 4.2] = 117.6 + Material B: [44 ×4.8] = 211.2+ Material C: [88 ×6.5] = 572) = 900.80

B. Actual Quantity [AQ] × Standard Price [SP] or **AQSP**

(Material A: [28 × 4] = 112 + Material B: [44 ×5] = 220 + Material C: [88 ×6] = 528) = 860

C. Actual Quantity in Standard Mix × Standard Price [SP] or **RSQSP**

(Material A: [32 × 4] = 128 + Material B: [42.67 ×5] = 213.33 + Material C: [85.33 ×6] = 512) = 853.33

D. Standard material cost for actual yield

$$\frac{(30 \times 4 + 40 \times 5 + 80 \times 6)}{100 \text{ kg}} \times 100 \text{ kg} = (120 + 200 + 480) = 800$$

Material Cost Variance = D – A = ₹ 100.80 (A)

Material Price Variance = B – A = ₹ 40.80 (A)

Material Mix Variance = C – B = ₹ 6.67 (A)

Material Usage Variance = D – B = ₹ 60 (A)

Material Yield Variance = D – C = ₹ 53.33 (A)

Materials variances and opening / closing inventory

Suppose that a company uses raw material P in production, and that this raw material has a standard price of ₹3 per metre. During one month 6,000 metres are bought for ₹18,600, and 5,000 metres are used in production. At the end of the month, inventory will have been increased by 1000 metres. In other words, there would be a closing inventory of 1000 meters.

In variance analysis, the problem is to decide on the calculation of the material price variance. Should it be calculated on the basis of materials purchased (6,000 metres) or on the basis of materials used (5,000 metres)?

The Solution to this problem depends on how closing inventories of the raw materials will be valued, as follows:

a. If closing inventories of raw materials are valued at standard cost, (1,000 units at ₹3 per unit) the price variance is calculated on material purchases in the period.

b. If closing inventories of raw materials are valued at actual cost (FIFO) (1,000 units at ₹3.10 per unit) the price variance is calculated on materials used in production in the period.

Since material inventories are usually valued at standard cost in a standard costing system, direct material price variances are usually calculated at the time of receipt of the materials, rather than at the time of usage.

A full standard costing system is usually in operation and therefore the price variance is usually calculated on purchases in the period. The variance on the full 6,000 metres will be written off to the costing profit and loss account, even though only 5,000 metres are included in the cost of production.

There are two main advantages in extracting the material price variance at the time of receipt, as follows:

a. If variances are extracted at the time of receipt they will be brought to the attention of managers earlier than if they are extracted as the material is used. If it is necessary to correct any variances, then management action can be more timely.

b. Since variances are extracted at the time of receipt, all inventories will be valued at standard price. This is administratively easier and it means that all issues from inventories can be made at standard price. If inventories are held at actual cost it is necessary to calculate a separate price variance on each batch as it is issued.

The price variance would be calculated (at the point of purchase) as follows:

	(₹)
6,000 metres of material P purchased should cost (×₹3)	18,000
but did cost	18,600
Price variance	600(A)

Solved Case 5

The following data is extracted from the cost records of FOSFER LLP which maintains a standard costing system. From the data given below, the Cost Accountant of the company is requested to calculate Material Price Variances for the two materials X and Y assuming that price variances are calculated at the time of purchase. Also calculate material usage variances the two material X and Y.

Particulars	Material X		Material Y	
	Qty (Kg)	Value (₹)	Qty (Kg)	Value (₹)
Raw material purchased	2000	4000	5000	6250
Issues to Works	2150	-	3950	-
Works stocks of Material				
Opening	300	-	1000	-
Closing	200	-	1250	-

The standard price of material and the standard usage are given as below:

Standard Price: Material X: ₹1.9 per Kg
Material Y: ₹1.30 per Kg

Standard usage:	Material X	Material Y
Product A	1 Kg	1 Kg
Product B	0.5 Kg	1 Kg

Actual Yield

Product A : 1130 units
Product B : 2550 units

Solution:

Material Price Variance is to be calculated at the point of purchase[17]

A. Actual Quantity (purchase) × Actual Price

X: 2000 × 2 = 4000
Y: 5000 × 1.25 = 6250 | 10250

B (i). Actual Quantity (purchase) × Standard Price

X: 2000 × 1.9 = 3800
Y: 5000 × 1.30 = 6500 | 10300.00

Material Price Variance = 10300 – 10250 = **50 (F)**

17 Material Price variance is calculated at the point of purchase as it is specifically required. The material price variance can also be calculated on the basis of material used. If the organisation follows a standard costing system, the closing inventory is also to be calculated on the basis of standard cost and therefore it is recommended that the material price variance is calculated at the point of purchase. (this is discussed in detail in discussion leading to the Solved Case 5)

Material Usage Variance

(ii). Actual Quantity (Material Consumed w/n1) × Standard Price

X: 2250 × 1.90 = 4275.00
Y: 3700 × 1.30 = 4810.00 | 9085.00

C. (There is no need to calculate C as Mix variance is not required to be calculated)

D. Standard Material Cost for actual yield w/n 2

Product A: 1130 units × 3.20 = 3616.00
Product B: 2550 units × 2.25 = 5737.50 | 9353.50

Material Usage Variance = 9353.50 – 9085 = **268.5 (F)**

[D can also be calculated in terms of Material used in which case, D would be:
Material X = [1130 × 1 kg + 2550 × 0.5 kg] × 1.9 = 4569.5
Material Y = [1130 × 1 kg + 2550 × 1 kg] × 1.30 = 4784 .0 | 9353.50

Working Notes:

w/n 1: Material Consumed = Material issued + opening stock – closing stock

Material X = 2150 + 300 – 200 = 2250

Material Y = 3950 + 1000 – 1250 = 3700

w/n 2: Standard material cost for 1 unit of Product A and Product B

	Material X		Material Y		Total
	Usage	Rate	Usage	Rate	
Product A	1kg	1.90	1 kg	1. 30	3.20 = (1.90 + 1.30)
Product B	0.50 kg	1.90	1 kg	1.30	2.25 = (0.95 + 1.30)

Direct Labour Variances

The calculation of direct labour variances are similar to the calculation of materials variances as discussed in the previous paragraphs, except the terms hours and rate are used in place of the terms quantity and price. The production department is responsible for both the prices paid for labour services and the quantity of labour services used. Therefore, the production department must explain why any labour variances occur.

Total direct labour cost variance

It is the difference between the standard cost of labour allowed (as per standard laid down) for the actual output achieved and the actual cost of labour employed. In other words, it indicates the difference between the standard direct labour cost of the output which has been produced and the actual direct labour cost incurred.

standard direct labour cost of the output which has been produced and the actual direct labour cost incurred.

CIMA Official Terminology[1] gives the formula for calculating the variance as:

Total direct labour cost variance

= (standard hours produced × standard direct labour rate per hour) – (actual hours paid × actual direct labour rate per hour)

If standard hours produced = SH for actual yield,

standard direct labour rate per hour = SR

actual hours paid = AH and

actual direct labour rate per hour = AR

then the above formula reduces to

= (SH for actual yield × SR) – (AH × AR)

The direct labour total variance, discussed above, is divided into the direct labour rate variance and the direct labour efficiency variance.

Labour Rate Variance

It is that portion of the labour cost variance which arises due to the difference between the standard rate specified and the actual rate paid. This is more or less a variance arising out of external reason of labour charges which might is induced by external (to the management) factors. This is similar to the direct material price variance. It is the difference between the standard cost and the actual cost for the actual number of hours paid for. In other words, it is the difference between what the labour did cost and what it should have cost.

CIMA Official Terminology[1] states that labour rate variance indicates the actual cost of any change from the standard labour rate of remuneration. It gives the formula for calculating the variance as:

(actual hours paid × standard direct labour rate per hour) – (actual hours paid × actual direct labour rate per hour)

It follows that:

Direct labour rate variance = (AH × SR) – (AH × AR) the connotation of AH, SR and AR is as discussed above.

Labour Efficiency Variance

It is of paramount importance that efficiency of labour is measured. For doing this, the actual time taken by the workers should be compared with the standard time allowed for the job. The standard time allowed for a particular job is decided with the help of time and motion study. This is similar to the direct material usage variance. It is the difference between the hours that should have been worked for the number of units actually produced, and the actual number of hours worked, valued at the standard rate per hour. In other words, it is the difference between how many hours should have been worked and how many hours were worked, valued at the standard rate per hour.

CIMA Official Terminology[1] states that the direct labour efficiency variance is the 'standard labour cost of any change from the standard level of labour efficiency' and gives the formula of labour efficiency variance as:

(actual production in standard hours – actual hours worked[18]) × standard direct labour rate per hour

Solved Case 6

Mr Lakhsman Rao, the owner of Guider Ltd. provides the following information regarding the production process of a particular fountain pen called the Zimbo.

The standard direct labour cost of Zimbo is as follows:

18 This is same as standard hours for actual production as stated in the formula for total labour cost variance.

2 hours of grade Z labour at ₹ 5 per hour = ₹ 10 per unit of Zimbo.

During the month of January 2022, 1,000 units of Zimbo were made, and the direct labour cost of grade Z labour was ₹ 8,900 for 2,300 hours of work.

Mr Lakhsman Rao asks his friend Mr Shiva who is a Cost Accountant to calculate for him the Labour Variances if any and also state to him whether they favourably or adversely impacts his cost structure.

Solution:

Mr Shiva calculates the following and presents them to Mr Lakhsman Rao:

A. Actual hours worked × Actual rate = $2{,}300 \times \frac{8{,}900}{2{,}300}$ = **8,900**

B. Actual hours worked × Standard rate = (2300 × ₹ 5 per hour) = **11,500**

C. Not applicable (as there is no idle time in the case)

D. Not applicable (as there is single type of worker)

E. Standard labour cost for actual yield = (1000 units × ₹ 10 per unit) = **10,000**

Labour cost variance = (Actual hours worked × Actual rate) – Standard labour cost for actual yield
= A – E
= **1100 (F)**

Labour rate variance = (Actual hours worked × Actual rate) – (Actual hours worked × Standard rate)
= A –B
= **2600 (F)**

Labour efficiency variance = (Actual hours worked × Standard rate) – Standard labour cost for actual yield
= B – E
= **1500 (A)**

Reconciliation

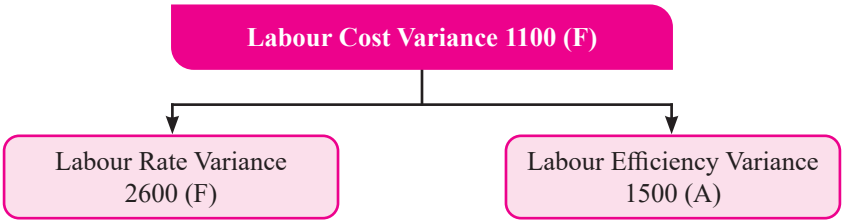


Figure 6.12: Reconciliation of Labour Cost Variance

Mr Lakhsman Rao, the owner of Guider Ltd. is not happy with the presentation of Mr Shiva since the calculations involve various technical terms and asks him to explain the matter in layman's terms. Mr Shiva as a response submits the following:

Direct labour total variance

This is the difference between what 1,000 units should have cost and what they did cost.

	(₹)
1,000 units should have cost (× ₹10)	10,000
But did cost	8,900
Direct labour total variance	**1,100 (F)**

The variance is favourable because the units cost less than they should have done. This variance is analysed two constituent parts: (a) Labour rate variance and (b) Labour efficiency variance.

Direct labour rate variance

This is the difference between what 2,300 hours should have cost and what 2,300 hours did cost.

	(₹)
2300 hours of work units should have cost (× ₹ 5 per hour)	11,500
But did cost	8,900
Direct labour rate variance	**2,600 (F)**

The variance is favourable because the labour cost less than it should have cost.

Direct labour efficiency variance

1000 units of Zimbo should have (× 2 hours)	2000	hours
But actually took	2300	hours
Excess hours taken	300	hours
The Excess hours valued at standard rate per hours (@ ₹ 5)	**₹ 1,500**	**(A)**

The variance is adverse because more hours were worked than should have been worked.

Reconciliation

Direct labour total variance [(1100(F)]
= Direct labour rate variance [(2600 (F)]
+ Direct labour efficiency variance [(1500 (A)]

Idle time variance

This variance indicates the loss caused due to abnormal idle time. While fixing the standard time, normal idle time is taken into consideration. However, if the actual idle time is more than the standard/normal idle time, it is called as abnormal idle time. This variance always badly affects the efficiency of the worker and is thus always an adverse variance. As such it is a part of the efficiency variance but is shown separately. CIMA study text[1] points that if idle time arises, it is usual to calculate a separate idle time variance, and to base the calculation of the efficiency variance on active hours (when labour actually worked) only. It is always an adverse variance.

A company may operate a costing system in which any idle time is recorded. Idle time may be caused by machine breakdowns or insufficient flow of work to employees (because of bottlenecks in production or a shortage of orders from customers). When idle time occurs, the labour force is still paid wages for time at work, but no actual work is done. Time paid for without any work being done is unproductive and therefore inefficient. In variance analysis,

idle time is always an adverse efficiency variance. When idle time is recorded separately, it is helpful to provide information, for the purpose of control, which identifies the cost of idle time separately. Thus, in labour variance analysis, it is judicious to show an idle time variance as a separate part of the total labour efficiency variance. The remaining efficiency variance will then relate only to the productivity of the labour force during the hours spent actively working, and in such case, calculation of the efficiency variance would be based active hours (when labour actually worked) only.

From the above discussion an analysis of labour variances in the nature shown in the following chart is better suited[19]:

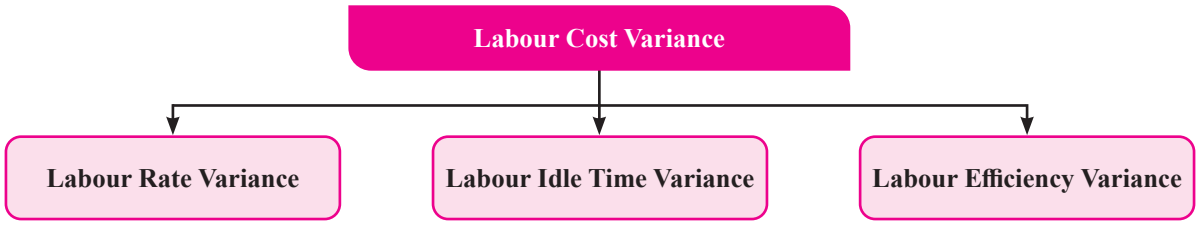


Figure 6.13: Classification of Labour Cost Variance

CIMA office terminology[1] gives the following explanation regarding labour idle time variance as 'occurs when the hours paid exceed the hours worked and there is an extra cost caused by this idle time. Its computation increases the accuracy of the labour efficiency variance'.

The document gives the following formula for its computation:

Labour idle time variance = [(hours paid – hours worked) × standard direct labour rate per hour]

Solved Case 7

Mr Lakhsman Rao, the owner of Guider Ltd. provides the following information regarding the production process of a particular fountain pen called the Zimbo.

The standard direct labour cost of Zimbo is as follows:

2 hours of grade Z labour at ₹ 5 per hour = ₹ 10 per unit of Zimbo.

During the month of February 2022, 1,500 units of Zimbo were made, and the direct labour cost of grade Z labour was ₹ 17,500 for 3080 hours of work. It is also noted that during the period, however, there was a shortage of customer orders and 100 hours were recorded as idle time.

Mr Lakhsman Rao asks his friend Mr Shiva who is a Cost Accountant to calculate for him the Labour Variances if any and also state to him whether they favourably or adversely impacts his cost structure.

Solution:[15]

Mr Shiva calculates the following and presents them to Mr Lakhsman Rao:

A. Actual hours worked × Actual rate = $3{,}080 \times \frac{17{,}500}{3{,}080}$ = **17,500**

B. Actual hours worked × Standard rate = (3080 × ₹ 5 per hour) = **15,400**

19 In some books, idle time variance is shown as a part of labour efficiency variance. This will not reflect the true efficiency (productivity) variance of the labour force as idle time may be caused by forces beyond the control of the labour like machine break down

C. Not applicable (as there is single type of worker)

D. Actual hours paid ×Standard rate = (2980 × ₹ 5 per hour) = **14,900**

E. Standard labour cost for actual yield = (1500 units × ₹ 10 per unit) = **15,000**

and

Labour cost variance = (Actual hours worked × Actual rate) – Standard labour cost for actual yield
= A – E
= **2500 (A)**

Labour rate variance = (Actual hours worked × Actual rate) – Actual hours worked × Standard rate
= A – B
= **2100 (A)**

Labour idle time variance = (Hours paid – Hours worked) × Standard direct labour rate per hour
= D – B
= **500 (A)**

Labour efficiency variance = (Actual hours worked × Standard rate) – Standard labour cost for actual yield
= D – E
= **100 (F)**

Reconciliaton

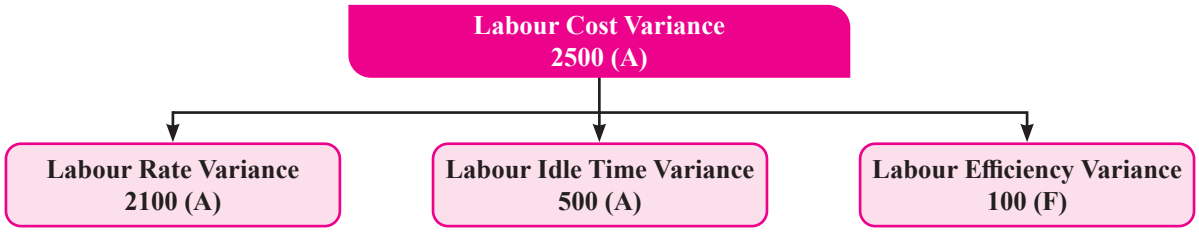


Figure 6.14: Reconciliation of Labour Cost Variance

Mr Lakhsman Rao, the owner of Guider Ltd. is not happy with the presentation of Mr Shiva since the calculations involve various technical terms and asks him to explain the matter in layman's terms. Mr Shiva as a response submits the following:

The direct labour total variance

	(₹)
1,500 units should have cost (× ₹10)	15,000
But did cost	17,500
Direct labour total variance	**2,500 (A)**

The variance is adverse because the actual labour cost is more than what it should have cost.

This variance is analysed three constituent parts: (a) Labour rate variance and (b) Labour idle time variance and (c) Labour efficiency variance

The direct labour rate variance

The rate variance is a comparison of what the hours paid should have cost and what it actually cost.

	(₹)	
3080 hours of grade Z labour should have cost (× ₹ 5)	15,400	
But did cost	17,500	
Direct labour total variance	**2,100**	**(A)**

This is adverse variance as the actual cost is more than the standard labour cost.

The idle time variance

The idle time variance is the idle time hours, valued at the standard rate per hour.

Idle time variance = 100 hours × ₹ 5 = **₹ 500 (A)**

Idle time is always an adverse variance.

The direct labour efficiency variance

The efficiency variance considers the hours actively worked (the difference between hours paid for and idle time hours).

In the given case, 2,980 (3,080 – 100) hours is the actively worked hours. The variance is calculated by taking the amount of output produced (1,500 units of product Zimbo) and comparing the time it should have taken to make them. The variance in hours is valued at the standard rate per labour hour.

1500 units of Zimbo should take (×2 hrs)	3000 hrs
But did take (3080 – 100)[20]	2980 hrs
Direct labour efficiency variance in hrs	20 hrs (F)
× Standard rate per hour	× ₹ 5 per hour
Direct Labour efficiency variance	**₹ 100 (F)**

Reconciliation

Direct labour rate variance 2,100 (A)

+ Idle time variance 500 (A)

+ Direct labour efficiency variance 100 (F)

= Direct labour total variance 2,500 (A)

It is noted in an earlier line that labour efficiency variance comprises of (a) labour mix variance and (b) labour yield variance.

Labour Mix Variance

Labour mix variance is the part of labour efficiency variance and its computation is similar to that of material mix variance. In a factory or an any workplace, there are various grades of worker. Workers may be skilled, semi-skilled and unskilled and thus they are paid differently. For any particular purpose, the actual composition of various

20 It is important to note that if idle time is recorded and the variance is calculated separately (not as a part of the efficiency variance) the actual hours used in the efficiency variance calculation are the active hours worked and not the hours paid for.

grades of labour would be different from what is supposed to be (as mentioned in the standard). For example, the standard hours of skilled workers may be stipulated as 40 hrs, but during a month the there is a shortfall in supply of actual labour of skilled labourers and only 30 hrs can be employed. This is met by employing semi-skilled workers. Thus, the actual composition varies from the standard composition and thus labour mix variance arises.

CIMA official terminology[1] classifies labour mix variance as a subdivision of the direct labour efficiency variance. And notes that if grades of labour can be substituted the mix variance measures the cost of any variation from the standard mix of grade. The formula for labour mix variance is given as:

Labour mix variance = (actual hours for grade – hours for grade based on total labour hours split in standard proportions) × (weighted average cost per hour – standard cost per hour)

This may be simply stated as

= Standard Cost of Standard Mix of Labourers – Standard Cost of Actual Mix of Labourer

Labour yield variance[21]

Labour yield variance is defined as the portion of direct labour efficiency variance that is attributable to the difference between the standard yield specified and the actual yield obtained.

CIMA official terminology[1] classifies labour yield variance as a subdivision of the direct labour efficiency variance. And notes that labour yield variance measures the effect on cost of any difference between the actual usage of labour and that justified by the output produced. The formula for labour yield variance is given as:

Labour yield variance = (standard labour hours allowed for actual output – actual labour hours input) × standard weighted average cost per direct labour hour

This may be simply stated as,

Labour yield variance = (Actual yield or output – Standard yield or output for actual input) × Standard cost per unit

Solved Case 8

Mr Lakhsman Rao, the owner of Guider Ltd. provides the following information regarding the production process of a particular fountain pen called the Zimbo. After careful consideration he has noted that a group of workers usually consists of 10 skilled, 5 semi-skilled and 5 unskilled workers, paid at standard hourly rates of ₹ 5,00, ₹ 3.20 and ₹ 2.80 respectively. In a normal working week of 40 hours, the group is expected to produce 1,000 units of Zimbo.

During March 2022, adjustments were to be made to the actual composition of the group, due to non-availability of labour and actually consisted of 13 skilled, 4 semi-skilled and 3 unskilled employees; actual wages paid were ₹ 4.80, ₹ 3.40 and ₹ 2.60 respectively.

Two hours were lost due to abnormal idle time and 960 units of Zimbo were produced.

Mr Lakhsman Rao is worried about the variances in labour cost and asks his friend Mr Shiva, who is a Cost Accountant to submit the analysis of the labour cost variances.

Solution

Mr Shiva makes the following calculation and presents to Mr Lakhsman Rao which covers the analysis of the variances calculated.

21 This is also referred as labour sub-efficiency variance.

Working note[15]

A. Actual hours worked (in actual mix) × Actual rate

Skilled – 13 workers × 40 hrs × ₹ 4.80 per hour	=	2496
Semi-skilled - 4 workers × 40 hrs × 3.40 per hour	=	544
Unskilled – 3 workers × 40 hrs × 2.60 per hour	=	312
		3352

B. Actual hours worked (in actual mix) × Standard rate

Skilled – 13 workers × 40 hrs × ₹ 5.00 per hour	=	2600
Semi-skilled - 4 workers × 40 hrs × 3.20 per hour	=	512
Unskilled – 3 workers × 40 hrs × 2.80 per hour	=	336
		3448

C. Actual hours worked (in standard mix) × Standard rate

Skilled – 10 workers × 40 hrs × ₹ 5.00 per hour	=	2000
Semi-skilled - 5 workers × 40 hrs × 3.20 per hour	=	640
Unskilled – 5 workers × 40 hrs × 2.80 per hour	=	560
		3200

D. Actual hours paid (in actual mix) × Standard rate

Skilled – 10 workers × 38 hrs × ₹ 5.00 per hour	=	1900
Semi-skilled – 5 workers × 38 hrs × 3.20 per hour	=	608
Unskilled – 5 workers × 38 hrs × 2.80 per hour	=	532
		3040

E. Standard labour cost for actual yield

$$= \frac{40 \text{ hrs} \times (10 \times 5.00 \text{ per hr} + 5 \times 3.20 \text{ per hr} + 5 \times 2.80 \text{ per hr})}{1{,}000 \text{ units}} \times 960 \text{ units} = \mathbf{3{,}072}$$

and

Labour cost variance = (Actual hours worked × Actual rate) – Standard labour cost for actual yield

= A – E

= **280 (A)**

Labour rate variance = (Actual hours worked × Actual rate) – Actual hours worked × Standard rate

= A – B

= **96 (F)**

Labour idle time variance = (Hours paid – Hours worked) × Standard direct labour rate per hour

= C – D

= **160 (A)**

Labour efficiency variance = (Actual hours worked × Standard rate) – Standard labour cost for actual yield

= B – E

= **376 (A)**

but idle time variance is to be calculated separately which is recommended.

Thus, labour efficiency variance adjusted for idle time variance = 376(A) – 160 (A) = **216 (A)**[22]

Labour mix variance = (actual hours for grade – hours for grade based on total labour hours split in standard proportions) × (weighted average cost per hour – standard cost per hour) = Standard Cost of Standard Mix of Labourers - Standard Cost of Actual Mix of Labourer

= B – C = **248 (A)**

Labour yield variance = (Actual yield or output – Standard yield or output for actual input)× Standard cost per unit

= D – E = **32 (F)**

Reconciliation

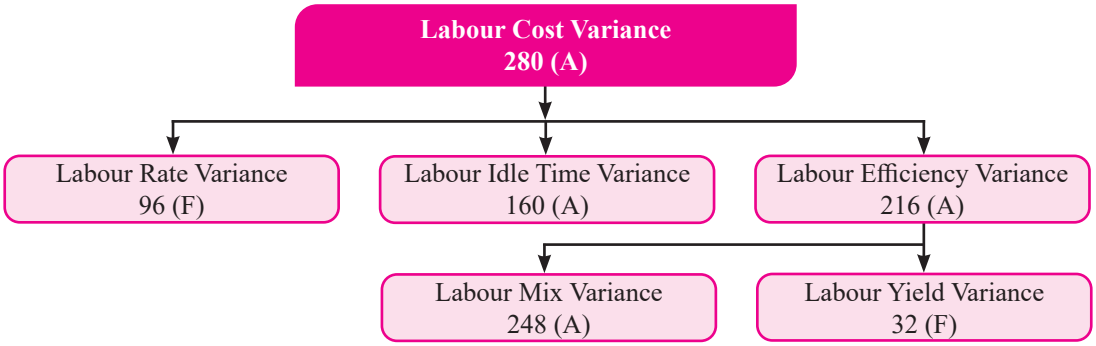


Figure 6.15: Reconciliation of Labour Cost Variance

Illustration 16

The standard cost of a certain chemical mixture is as under:

40% of Material A at ₹ 20 per kg. 60% of Material B at ₹ 30 per kg. A standard loss of 10% is expected in production. The following actual cost data is given for the period:

180 kg material A at a cost of ₹ 18 per kg

220 kg material B at a cost of ₹ 34 per kg

The weight produced is 360 kg.

22 Labour idle time variance is shown separately from efficiency variance as discussed in previous section.

Calculate and present:

i. Material Cost Variance
ii. Material Price Variance
iii. Material Usage Variance
iv. Material Mix Variance
v. Material Yield Variance

Solution:

Assume 100 kg of Standard Input is used in the ratio of 40% and 60% for Material A and Material B respectively. So, the information can be presented as follows:

	Standard		Actual	
	Quantity	Rate	**Quantity**	**Rate**
	Kg	(₹)	**Kg**	(₹)
Material A	40	20	180	18
Material B	60	30	220	34
Total	100		400	
Less: Loss	10		40 (Bal. fig.)	
Output	90		360	

When there are more than one input then five parameters are to be calculated as follows:

1. SQ – Standard Quantity for Actual Output

   Material A = $\frac{40}{90} \times 360 = 160$ kg

   Material B = $\frac{60}{90} \times 360 = 240$ kg

2. SP – Standard Price per unit

   Material A = ₹ 20, Material B = ₹ 30

3. AQ – Actual Quantity

   Material A = 180 kg, Material B = 220 kg

4. AP – Actual Price per unit

   Material A = ₹ 18, Material B = ₹ 34

5. RSQ – Revised Standard Quantity for Actual Input

   Material A = $\frac{40}{100} \times 400 = 160$ kg

   Material B = $\frac{60}{100} \times 400 = 240$ kg

6. Material Cost Variance = SQ × SP – AQ × AP

Material A = 160 × 20 – 180 × 18 = 3,200 – 3,240	= ₹ 40 (A)
Material B = 240 × 30 – 220 × 34 = 7,200 – 7,480	= ₹ 280 (A)
	= **₹ 320 (A)**

7. Material Price Variance = (SP – AP) × AQ

Material A = (20 – 18) × 180	= ₹ 360 (F)
Material B = (30 – 34) × 220	= ₹ 880 (A)
	= **₹ 520 (A)**

8. Material Usage Variance = (SQ – AQ) × SP

Material A = (160 – 180) × 20	= ₹ 400 (A)
Material B = (240 – 220) × 30	= ₹ 600 (F)
	= **₹ 200 (F)**

9. Material Mix Variance = (RSQ – AQ) × SP

Material A = (160 – 180) × 20	= ₹ 400 (A)
Material B = (240 – 220) × 30	= ₹ 600 (F)
	= **₹ 200 (F)**

10. Material Yield Variance = (SQ – RSQ) × SP

Material A = (160 – 160) × 20	= Nil
Material B = (240 – 240) × 30	= Nil

Illustration 17

From the following you are required to calculate:

(a) Material Cost Variance

(b) Material Price Variance

(c) Material Usage Variance

Quantity of material purchased	3,000 units
Value of material purchased	₹ 9,000
Standard quantity of material required:	
for one tonne of finished product	25 units
Standard rate of material	₹ 2 per unit
Opening stock of material	NIL
Closing stock of material	500 units
Finished production during the period	80 tonnes

Solution:

SQ = Standard Quantity for Actual Output = 80 × 25 = 2,000 units

SP = Standard Price = ₹ 2 per unit

AQ = Actual Quantity Used for Production = 3,000 – 500 = 2,500 units

AP = Actual Price per unit = $\frac{₹\ 9,000}{3,000\ \text{units}}$ = ₹ 3 per unit

(a) Material Cost Variance = SQ × SP – AQ × AP

= (2,000 × 2) – (2,500 × 3)

= 4,000 – 7,500 = ₹ 3,500 (A)

(b) Material Price Variance = (SP – AP) × AQ

= (2 – 3) × 2,500 = ₹ 2,500 (A)

(c) Material Usage Variance = (SQ – AQ) × SP

= (2,000 – 2,500) × 2 = ₹ 1,000 (A)

Illustration 18

The standard cost of one of the products of the company shows the following standards:

Materials	Quantity (kg)	Price (₹)
A	40	76
B	10	50
C	50	20

The standard input mix is 100 kg and the standard output of the finished product is 90 kg

The actual results for the period are:

Materials	Quantity (kg)	Price (₹)
A	1,95,000	80
B	42,500	52
C	2,25,000	21

Actual output of the finished product is 4,18,500 kg

You are required to calculate the material variances.

Solution:

SQ = Standard Quantity for Actual Output

Material A = $\frac{40}{90}$ × 4,18,500 = 1,86,000 kg

Material B = $\frac{10}{90}$ × 4,18,500 = 46,500 kg

Material C = $\frac{50}{90}$ × 4,18,500 = 2,32,500 kg

SP = Standard Price per unit

Material A = ₹ 76 Material B = ₹ 50 Material C = ₹ 20

AQ = Actual Quantity used

Material A = 1,95,000 kg Material B = 42,500 kg Material C = 2,25,000 kg

AP = Actual Price per unit

Material A = ₹ 80 Material B = ₹ 52 Material C = ₹ 21

RSQ = Revised Standard Quantity for Actual Input

Material A = $\frac{40}{100}$ × (1,95,000 + 42,500 + 2,25,000) = $\frac{40}{100}$ × 4,62,500 = 1,85,000 kg

Material B = $\frac{10}{100}$ × 4,62,500 = 46,250 kg

Material C = $\frac{50}{100}$ × 4,62,500 = 2,31,250 kg

i. Material Cost Variance = SQ × SP – AQ × AP

Material A = (1,86,000 × 76) – (1,95,000 × 80)	= ₹	14,64,000 (A)
Material B = (46,500 × 50) – (42,500 × 52)	= ₹	1,15,000 (F)
Material C = (2,32,500 × 20) – (2,25,000 × 21)	= ₹	75,000 (A)
	= ₹	**14,24,000 (A)**

ii. Material Price Variance = (SP – AP) × AQ

Material A = (76 – 80) × 1,95,000	= ₹	7,80,000 (A)
Material B = (50 – 52) × 42,500	= ₹	85,000 (A)
Material C = (20 – 21) × 2,25,000	= ₹	2,25,000 (A)
	= ₹	**10,90,000 (A)**

iii. Material Usage Variance = (SQ – AQ) × SP

Material A = (1,86,000 – 1,95,000) × 76	= ₹	6,84,000 (A)
Material B = (46,500 – 42,500) × 50	= ₹	2,00,000 (F)
Material C = (2,32,500 – 2,25,000) × 20	= ₹	1,50,000 (F)
	= ₹	**3,34,000 (A)**

iv. Material Mix Variance = (RSQ – AQ) × SP

Material A = (1,85,000 – 1,95,000) × 76	= ₹	7,60,000 (A)
Material B = (46,250 – 42,500) × 50	= ₹	1,87,500 (F)
Material C = (2,31,250 – 2,25,000) × 20	= ₹	1,25,000 (F)
	= ₹	**4,47,500 (A)**

v. Material Yield Variance = (SQ – RSQ) × SP

Material A = (1,86,000 – 1,85,000) × 76	= ₹	76,000 (F)
Material B = (46,500 – 46,250) × 50	= ₹	12,500 (F)
Material C = (2,32,500 – 2,31,250) × 20	= ₹	25,000 (F)
	= ₹	**1,13,500 (F)**

Illustration 19

Material	Standard Quantity (kg)	Price (₹)	Total (₹)
A	500	6.00	3,000
B	400	3.75	1,500
C	300	3.00	900
	1,200		5,400
Less : 10% Normal loss	120		
	1,080		5,400

Material	Actual Quantity (kg)	Price (₹)	Total (₹)
A	400	6.00	2,400
B	500	3.60	1,800
C	400	2.80	1,120
	1,300		5,320
Less : Actual loss	120		
	1,180		5,320

Calculate:

a. Material Cost Variance

b. Material Price Variance

c. Material Usage Variance

d. Material Mix Variance

e. Material Yield Variance

Solution:

SQ – Standard Quantity for Actual Output

$$\text{Material A} = \frac{500}{1,080} \times 1,180 = 546.29 \text{ kg}$$

$$\text{Material B} = \frac{400}{1,080} \times 1,180 = 437 \text{ kg}$$

$$\text{Material C} = \frac{300}{1,080} \times 1,180 = 327.78 \text{ kg}$$

SP – Standard Price per unit

Material A = ₹ 6 per kg Material B = ₹ 3.75 per kg Material C = ₹ 3 per kg

AQ – Actual Quantity

Material A = 400 kg Material B = 500 kg Material C = 400 kg

AP = Actual Price per unit

Material A = ₹ 6 per kg Material B = ₹ 3.60 per kg Material C = ₹ 2.80 per kg

RSQ – Revised Standard Quantity for Actual Input

$$\text{Material A} = \frac{500}{1{,}200} \times 1{,}300 = 541.67 \text{ kg}$$

$$\text{Material B} = \frac{400}{1{,}200} \times 1{,}300 = 433.33 \text{ kg}$$

$$\text{Material C} = \frac{300}{1{,}200} \times 1{,}300 = 325 \text{ kg}$$

i. Material Cost Variance = SQ × SP – AQ × AP

Material A = (546.29 × 6) – (400 × 6)	= ₹ 877.74 (F)
Material B = (437 × 3.75) – (500 × 3.60)	= ₹ 161.25 (A)
Material C = (327.78 × 3) – (400 × 2.80)	= ₹ 136.66 (A)
	= ₹ 579.83 (F)

ii. Material Price Variance = (SP – AP) × AQ

Material A = (6 – 6) × 400	= Nil
Material B = (3.75 – 3.60) × 500	= ₹ 75 (F)
Material C = (3 – 2.80) × 400	= ₹ 80 (F)
	= ₹ 155 (F)

iii. Material Usage Variance = (SQ – AQ) × SP

Material A = (546.29 – 400) × 6	= ₹ 877.74 (F)
Material B = (437 – 500) × 3.75	= ₹ 236.25 (A)
Material C = (327.78 – 400) × 3	= ₹ 216.66 (A)
	= ₹ 424.83 (F)

iv. Material Mix Variance = (RSQ – AQ) × SP

Material A = (541.67 – 400) × 6	= ₹ 850.02 (F)
Material B = (433.33 – 500) × 3.75	= ₹ 250.01 (A)
Material C = (325 – 400) × 3	= ₹ 225 (A)
	= ₹ 375.01 (F)

v. Material Yield Variance = (SQ – RSQ) × SP

Material A = (546.29 – 541.67) × 6	= ₹ 27.72 (F)
Material B = (437 – 433.33) × 3.75	= ₹ 13.76 (F)
Material C = (327.78 – 325) × 3	= ₹ 8.34 (F)
	= ₹ 49.82 (F)

Illustration 20

The standard set for material consumption was 100 kg. @ ₹ 2.25 per kg.

In a cost period:

Opening stock was 100 kg. @ ₹2.25 per kg.

Purchases made 500 kg. @ ₹ 2.15 per kg. Consumption 110 kg.

Calculate: (a) Usage (b) Price variance

(1) When variance is calculated at point of purchase

(2) When variance is calculated at point of issue on FIFO basis

(3) When variance is calculated at point of issue on LIFO basis

Solution:

SQ – Standard Quantity for Actual Output = 100 kg

SP – Standard Price per unit = ₹ 2.25 per kg

AQ – Actual Quantity used = 110 kg

(a) Material Usage Variance = (SQ – AQ) × SP

= (100 – 110) × 2.25 = ₹ 22.50 (A)

(b) Computation of Price Variance = (SP – AP) × AQ = SP × AQ – AP × AQ

1. **When variance is calculated at point of purchase:**

   AP – Actual Price at the point of purchase is ₹ 2.15

   Price Variance = (2.25 × 110) – (2.15 × 110) = ₹ 11(F)

2. **When variance is calculated at point of issue on FIFO basis:**

   Price Variance = (2.25 × 110) – [2.25 × 100 + 2.15 × 10] = ₹ 1 (F)

3. **When variance is calculated at point of issue on LIFO basis:**

   Price Variance = (2.25 × 110) – (2.15 × 110) = ₹ 11 (F)

Illustration 21

Using the following information calculate each of three labour variance for each department:

	Department X	Department Y
Gross wages direct	₹ 28,080	₹ 19,370
Standard hours produced	8,640	6,015
Standard rate per hour	₹ 3	₹ 3.40
Actual hours worked	8,200	6,395

Solution:

Department X

SH – Standard Hours for Actual Output = 8,640 hours

SR – Standard Rate per hour = ₹ 3 per hour

AH – Actual Hours Paid for = 8,200

AR – Actual Rate per hour = $\frac{₹\ 28,080}{8,200 \text{ hours}}$

i. Labour Cost Variance $= SH \times SR - AH \times AR$

$= ₹8,640 \times 3 - 8,200 \times \frac{28,080}{8,200}$

$= ₹25,920 - 28,080 = ₹\ 2,160\ (A)$

ii. Labour Rate Variance $= (SR - AR) \times AH = SR \times AH - AR \times AH$

$= (3 \times 8,200) - (\frac{28,080}{8,200} \times 8,200)$

$= ₹24,600 - ₹28,080 = ₹\ 3,480\ (A)$

iii. Labour Efficiency Variance $= (SH - AH) \times SR$

$= (8,640 - 8,200) \times 3$

$= ₹\ 1,320\ (F)$

Department Y

SH = 6,015 hours

SR = ₹ 3.40 per hour

AH = 6,395 hours

AR = $\frac{₹\ 19,370}{6,395 \text{ hours}}$

i. Labour Cost Variance $= SH \times SR - AH \times AR$

$= (6,015 \times ₹3.40) - (6,395 \times \frac{19,370}{6,395}) = ₹\ 1,081\ (F)$

ii. Labour Rate Variance $= (SR - AR) \times AH = SR \times AH - AR \times AH$

$= (₹3.40 \times 6,395) - (\frac{19,370}{6,395} \times 6,395) = ₹\ 2,373\ (F)$

iii. Labour Efficiency Variance $= (SH - AH) \times SR$

$= (6,015 - 6,395) \times ₹3.40 = ₹\ 1,292\ (A)$

Illustration 22

Calculate variances from the following:

Standard				Actual			
Input (kg)	Material	₹ / kg	Total ₹	₹ Input (kg)	Material	₹ / kg	Total ₹
400	A	@ 50	20,000	420	A	@ 45	18,900
200	B	@ 20	4,000	240	B	@ 25	6,000
100	C	@ 15	1,500	90	C	@ 15	1,350
700			25,500	750			26,250
Labour hours				**Labour hours**			
		₹ / hour	Total			₹ / hour	Total
	Men 100 hours	@ 2	200		Men 120 hours	@ 2.50	300
	Women 200 hours	@ 1.50	300		Women 240 hours	@ 1.60	684
25	Normal Loss		500	75	Actual Loss		
675			26,000	675			26,934

Solution

Material Variances

SQ – Standard Quantity for Actual Output

Material A = $\frac{400}{675 \text{ (Standard Output)}} \times 675$ (Actual Output) = 400 *kg*

Material B = $\frac{200}{675} \times 675 = 200$ *kg*

Material C = $\frac{100}{675} \times 675 = 100$ *kg*

SP – Standard price per unit

Material A = ₹ 50 per kg Material B = ₹ 20 per kg Material C = ₹ 15 per kg

AQ – Actual Quantity used

Material A = 420 kg Material B = 240 kg Material C = 90 kg

AP – Actual Price per unit

Material A = ₹ 45 per kg Material B = ₹ 25 per kg Material C = ₹ 15 per kg

RSQ – Revised Standard Quantity for Actual Input

Material A = $\frac{400}{700} \times 750 = 428.57$ kg

Material B = $\frac{200}{700} \times 750 = 214.29$ kg

Material C = $\frac{100}{700}$ × 750 = 107.14 kg

i. Material Cost Variance = SQ × SP – AQ × AP

Material A = 400 × 50 – 420 × 45 = ₹ 1,100 (F)

Material B = 200 × 20 – 240 × 25 = ₹ 2,000 (A)

Material C = 100 × 15 – 90 × 15 = ₹ 150 (F)

= ₹ 750 (A)

ii. Material Price Variance = (SP – AP) × AQ

Material A = (50 – 45) × 420 = ₹ 2,100 (F)

Material B = (20 – 25) × 240 = ₹ 1,200 (A)

Material C = (15 – 15) × 90 = Nil

= ₹ 900 (F)

iii. Material Usage Variance = (SQ – AQ) × SP

Material A = (400 – 420) × 50 = ₹ 1,000 (A)

Material B = (200 – 240) × 20 = ₹ 800 (A)

Material C = (100 – 90) × 15 = ₹ 150 (F)

= ₹ 1,650 (A)

iv. Material Mix Variance = (RSQ – AQ) × SP

Material A = (428.57 – 420) × 50 = ₹ 428.50 (F)

Material B = (214.29 – 240) × 20 = ₹ 514.20 (A)

Material C = (107.14 – 90) × 15 = ₹ 257.10 (F)

= ₹ 171.40 (F)

v. Material Yield Variance = (SQ – RSQ) × SP

Material A = (400 – 428.57) × 50 = ₹ 1,428.50 (A)

Material B = (200 – 214.29) × 20 = ₹ 285.80 (A)

Material C = (100 – 107.14) × 15 = ₹ 107.10 (A)

= ₹ 1,821.40 (A)

Labour Variances

SH – Standard Hours for Actual Output

Men = $\frac{100}{675 \text{ (Standard Output)}}$ × 675 (Actual Output) = 100 hours

Women = $\frac{200}{675}$ × 675 = 200 hours

SR – Standard Rate per hour

Men = ₹ 2 per hour Women = ₹ 1.50 per hour

AH – Actual Hours Paid

Men = 120 hours Women = 240 hours

AR – Actual rate per hour

Men = ₹ 2.50 per hour Women = ₹ 1.60 per hour

RSH – Revised Standard Hours for actual input

Men = $\frac{100}{700}$ × 750 = 107.14 hours

Women = $\frac{200}{700}$ 200/700 × 750=214.28 hours

i. Labour Cost Variance = SH × SR – AH × AR

Men = 100 × 2 – 120 × 2.50 = ₹ 100 (A)

Women = 200 × 1.50 – 240 × 1.60 = ₹ 84 (A)

= ₹ 184 (A)

ii. Labour Rate Variance = (SR – AR) × AH

Men = (2 – 2.50) × 120 = ₹ 60(A)

Women = (1.50 – 1.60) × 240 = ₹ 24 (A)

= ₹ 84 (A)

iii. Labour Efficiency Variance = (SH – AH) × SR

Men = (100 – 120) × 2 = ₹ 40 (A)

Women = (200 – 240) × 1.50 = ₹ 60 (A)

= ₹ 100 (A)

iv. Labour Mix Variance = (RSH – AH) × SR

Men = (107.14 – 120) × 2 = ₹ 25.72 (A)

Women = (214.28 – 240) × 1.50 = ₹ 38.58 (A)

= ₹ 64.30 (A)

v. Labour Yield Variance = (SH – RSH) × SR

Men = (100 – 107.14) × 2 = ₹ 14.28 (A)

Women = (200 – 214.28) × 1.50 = ₹ 21.42 (A)

= ₹ 35.70 (A)

Illustration 23

The standard labour component and the actual labour component engaged in a week for a job are as under:

	Skilled workers	Semi-skilled workers	Unskilled workers
Standard no. of workers in the gang	32	12	6
Standard wage rate per hour (₹)	3	2	1

Actual no. of workers employed in the gang during the week	28	18	4
Actual wage rate per hour (₹)	4	3	2

During the 40 hour working week the gang produced 1,800 standard labour hours of work.

Calculate labour variances.

Solution:

Analysis of the Given data

Workers	Standard		Actuals	
Skilled	32 × 40 = 1,280 hours	@ ₹ 3 per hour	28 × 40 = 1,120 hours	@ ₹ 4 per hour
Semi-Skilled	12 × 40 = 480 hours	@ ₹ 2 per hour	18 × 40 = 720 hours	@ ₹ 3 per hour
Unskilled	6 × 40 = 240 hours	@ ₹ 1 per hour	4 × 40 = 160 hours	@ ₹ 2 per hour
Input	2,000 hours		2,000 hours	
Output	2,000 hours		1,800 hours	

SH – Standard Labour Hours for Actual output

$$\text{Skilled} = \frac{1,280}{2,000} \times 1,800 = 1,152 \text{ hours}$$

$$\text{Semi – Skilled} = \frac{480}{2,000} \times 1,800 = 432 \text{ hours}$$

$$\text{Unskilled} = \frac{240}{2,000} \times 1,800 = 216 \text{ hours}$$

SR – Standard Rate per hour

Skilled = ₹ 3 per hour Semi-Skilled = ₹ 2 per hour Unskilled = ₹ 1 per hour

AH – Actual Hours Paid

Skilled = 1,120 hours Semi-Skilled = ₹ 720 hours Unskilled = ₹ 160 hours

AR – Actual Rate

Skilled = ₹ 4 per hour Semi-Skilled = ₹ 3 per hour Unskilled = ₹ 2 per hour

RSH – Revised Standard Hours for Actual Input

$$\text{Skilled} = \frac{1,280}{2,000} \times 2,000 = 1,280 \text{ hours}$$

$$\text{Semi-Skilled} = \frac{480}{2,000} \times 2,000 = 480 \text{ hours}$$

$$\text{Unskilled} = \frac{240}{2,000} \times 2,000 = 240 \text{ hours}$$

i. Labour Cost Variance = SH × SR – AH × AR

Skilled = (1,152 × 3) – (1,120 × 4) = ₹ 1,024 (A)

Semi-Skilled = (432 × 2) – (720 × 3)	= ₹ 1,296	(A)
Unskilled = (216 × 1) – (160 × 2)	= ₹ 104	(A)
	= ₹ 2,424	**(A)**

ii. Labour Rate Variance = (SR – AR) × AH

Skilled = (3 – 4) × 1,120	= ₹ 1,120	(A)
Semi-Skilled = (2 – 3) × 720	= ₹ 720	(A)
Unskilled = (1 – 2) × 160	= ₹ 160	(A)
	= ₹ 2,000	**(A)**

iii. Labour Efficiency Variance = (SH – AH) × SR

Skilled = (1,152 – 1,120) × 3	= ₹ 96	(F)
Semi – Skilled = (432 – 720) × 2	= ₹ 576	(A)
Unskilled = (216 – 160) × 1	= ₹ 56	(F)
	= ₹ 424	**(A)**

iv. Labour Mix Variance = (RSH – AH) × SR

Skilled = (1,280 – 1,120) × 3	= ₹ 480	(F)
Semi-Skilled = (480 – 720) × 2	= ₹ 480	(A)
Unskilled = (240 – 160) × 1	= ₹ 80	(F)
	= ₹ 80	**(F)**

v. Labour Yield Variance = (SH – RSH) × SR

Skilled = (1,152 – 1,280) × 3	= ₹ 384	(A)
Semi-Skilled = (432 – 480) × 2	= ₹ 96	(A)
Unskilled = (216 – 240) × 1	= ₹ 24	(A)
	= ₹ 504	**(A)**

Illustration 24

A chemical company gives you the following standard and actual data of its Chemical No. 1456. You are required to calculate variances.

Standard Data		
450 kg	Material A @ ₹ 20 per kg	₹ 9,000
360 kg	Material B @ ₹10 per kg	₹ 3,600
810 kg		**₹ 12,600**
90 kg	Normal Loss	

720 kg		**₹ 18,600**
	2,400 Skilled hours @ ₹ 2 per hour	₹ 4,800
	1,200 Unskilled hours @ ₹ 1 per hour	₹ 1,200
		₹ 6,000

Actual Data		
450 kg	Material A @ ₹ 19 per kg	₹ 8,550
360 kg	Material B @ ₹11 per kg	₹ 3,960
810 kg		**₹ 12,510**
50 kg	Actual Loss	
760 kg		**₹ 19,410**
	2,400 Skilled hours @ ₹ 2.25 per hour	₹ 5,400
	1,200 Unskilled hours @ ₹ 1.25 per hour	₹ 1,500
		₹ 6,900

Solution:

Material Variances

SQ – Standard Quantity for Actual Output

$$\text{Material A} = \frac{450}{720} \times 760 = 475 \text{ kg}$$

$$\text{Material B} = \frac{360}{720} \times 760 = 380 \text{ kg}$$

SP – Standard Price per unit

Material A = ₹ 20 per kg Material B = ₹ 10 per kg

AQ – Actual Quantity used

Material A = 450 kg Material B = 360 kg

AP – Actual Price per unit

Material A = ₹ 19 per kg Material B = 11 per kg

RSQ – Revised Standard Quantity for Actual Input

$$\text{Material A} = \frac{450}{810} \times 810 = 450 \text{ kg}$$

$$\text{Material B} = \frac{360}{810} \times 810 = 360 \text{ kg}$$

i. Material Cost Variance = SQ × SP – AQ × AP

Material A = (475 × 20) – (450 × 19)	= ₹ 950 (F)
Material B = (380 × 10) – (360 × 11)	= ₹ 160 (A)
	= ₹ 790 (F)

ii. Material Price Variance = (SP – AP) × AQ

Material A = (20 – 19) × 450	= ₹ 450 (F)
Material B = (10 – 11) × 360	= ₹ 360 (A)
	= ₹ 90 (F)

iii. Material Usage Variance = (SQ – AQ) × SP

Material A = (475 – 450) × 20	= ₹ 500 (F)
Material B = (380 – 360) × 10	= ₹ 200 (F)
	= ₹ 700 (F)

iv. Material Mix Variance = (RSQ – AQ) × SP

Material A = (450 – 450) × 20	= Nil
Material B = (360 – 360) × 10	= Nil
	= Nil

v. Material Yield Variance = (SQ – RSQ) × SP

Material A = (475 – 450) × 20	= ₹ 500 (F)
Material B = (380 – 360) × 10	= ₹ 200 (F)
	= ₹ 700 (F)

Labour Variances

SH – Standard Hours for Actual Output

$$\text{Skilled} = \frac{2,400}{3,600} \times 3,600 = 2,533.33 \text{ hours}$$

$$\text{Unskilled} = \frac{1,200}{3,600} \times 3,600 = 1,266.67 \text{ hours}$$

SR – Standard Rate per hour

Skilled = ₹ 2 per hour Semi-skilled = ₹ 1 per hour

AH – Actual Hours

Skilled = 2,400 hours Semi-skilled = 1,200 hour

AR – Actual Rate

Skilled = ₹ 2.25 per hour Semi-skilled = ₹ 1.25 per hour

RSH – Revised Standard Hour for Actual Input

$$\text{Skilled} = \frac{2,400}{3,600} \times 3,600 = 2,400 \text{ hours}$$

$$\text{Unskilled} = \frac{1,200}{3,600} \times 3,600 = 1,200 \text{ hours}$$

i. Labour Cost Variances = SH × SR – AH × AR

Skilled = (2,533.33 × 2) – (2,400 × 2.25)	= ₹ 333.34	(A)
Unskilled = (1,266.67 × 1) – (1,200 × 1.25)	= ₹ 233.33	(A)
	= ₹ 566.67	**(A)**

ii. Labour Rate Variances = (SR – AR) × AH

Skilled = (2 – 2.25) × 2,400	= ₹ 600	(A)
Unskilled = (1 – 1.25) × 1,200	= ₹ 300	(A)
	= ₹ 900	**(A)**

iii. Labour Efficiency Variances = (SH – AH) × SR

Skilled = (2,533.33 – 2,400) × 2	= ₹ 266.66	(F)
Unskilled = (1,266.67 – 1,200) × 1	= ₹ 66.67	(F)
	= ₹ 333.33	**(F)**

iv. Labour Mix Variances = (RSH –AH) × SR

Skilled = (2,400 – 2,400) × 2	= Nil
Unskilled = (1,200 – 1,200) × 1	= Nil
	= Nil

v. Labour Yield Variances = (SH – RSH) × SR

Skilled = (2,533.33 – 2,400) × 2	= ₹ 266.66	(F)
Unskilled = (1,266.67 – 1,200) × 1	= ₹ 66.67	(F)
	= ₹ 333.33	**(F)**

Illustration 25

The standard output of Production 'ABY' is 25 units per hour in manufacturing department of STR Ltd employing 100 workers. The standard wages rate per labour hour is ₹ 30.

In a 42 hour week of September 2021, the department produced 1,040 units of ABY despite 5% of the time paid was lost due to an abnormal reason. The hourly wage rate actually paid were ₹ 31, ₹ 30 and ₹ 28.50 respectively to 10, 30 and 60 of the workers.

Based on the above information calculate labour variances.

Solution:

1. SH – Standard Hours for Actual Production

   = Standard hour per worker × Number of workers

   $$= \frac{\text{Actual Production}}{\text{Standard output per hour per labour}} \times \text{Number of workers}$$

   $$= \frac{1{,}040 \text{ units}}{25 \text{ units per hour}} \times 100 \text{ workers}$$

   = 4,160 hours

2. SR – Standard Rate = ₹ 30 per hour

3. AH – Actual Hours paid = 42 × 100 = 4,200 hours

4. AR – Actual Rate per hour

   Worker Type I - ₹ 31 per hour (Number of Type I worker = 10)

   Worker Type II - ₹ 30 per hour (Number of Type II worker = 30)

   Worker Type III - ₹ 28.50 per hour (Number of Type III worker = 60)

5. AHW – Actual Hours worked = 4,200 hours × 95% = 3,990 hours

6. Idle time = AH – AHW = 4,200 – 3,990 = 210 hours or 4,200 × 5% = 210 hours

i. Labour Cost Variance = SH × SR – AH × AR

   = 4,160 × 30 – (42 × 10 × 31 + 42 × 30 × 30 + 42 × 60 × 28.50)

   = 1,24,800 – (13,020 + 37,800 + 71,820) = **₹ 2,160 (F)**

ii. Labour Rate Variance = (SR – AR) × AH

   For Type I workers = (30 – 31) × 42 × 10 = ₹ 420 (A)

   For Type II workers = (30 – 30) × 42 × 30 = Nil

   For Type III workers = (30 – 28.50) × 42 × 60 = ₹ 3,780 (F)

   = ₹ 3,360 (F)

iii. Labour Efficiency Variance = (SH – AHW) × SR

   = (4,160 – 3,990) × ₹30 = ₹ 5,100 (F)

iv. Labour Idle time Variance = (AHW – AH) × SR

   = (3,990 – 4,200) × ₹30 = ₹ 6,300 (A)

Budget and Budgetary Control 6.3

6.3.1 Concepts, Types of Budget

Introduction

Budgeting is a fundamental process in cost and management accounting that involves the formulation of a comprehensive plan for allocating resources and achieving organizational goals within a specified period. It serves as a financial roadmap, outlining expected revenues, expenses, and cash flows, while also providing a framework for decision-making, performance evaluation, and resource allocation. It plays a crucial role in organizational management by providing a structured approach to financial planning and control. It enables businesses to set clear financial objectives, allocate resources effectively, and measure performance against predefined benchmarks.

Budgetary control, on the other hand, is the systematic process of planning, coordinating, and monitoring financial activities to ensure that actual performance aligns with budgeted targets. It facilitates the implementation of strategic initiatives, fosters accountability among stakeholders, and enhances transparency in financial management practices.

What 'budget' means?

CIMA Official Terminology[1] defines a budget as a quantitative expression of a plan for a defined period of time. It may include planned sales volumes and revenues; resource quantities, costs and expenses; assets, liabilities and cash flows.

A budget, since it has different purposes, might mean different things to different people. A budget is either considered as a forecast, a means of allocating resources, a yardstick or a target. The details of each of them are mentioned in the below mentioned lines.

Forecast

A budget typically includes forecasts of expected revenues, expenses, and other financial aspects for a specific period, such as a fiscal year.

It helps managers to plan for the future. Given uncertainty about the future, however, it is quite likely that a budget will become outdated as events occur and so the budget will cease to be a realistic forecast. New forecasts might be prepared that differ from the budget. While a forecast is what is likely to happen; a budget is what an organisation wants to happen.

There is significant difference between the two concepts. The differences are categorised below:

Both budgets and forecasts refer to the anticipated actions and events, but still there are wide differences between budgets and forecasts as given below :

1 CIMA Official Terminology, 2005, The Chartered Institute of Management Accountants (CIMA Publishing, an imprint of Elsevier).

Forecasts	Budgets
• Forecasts is mainly concerned with anticipated or probable events.	• Budget is related to planned events.
• Forecasts may cover for longer period (often in excess of a year).	• Budget is planned or prepared for a shorter period.
• Forecast is only a tentative estimate.	• Budget is a target fixed for a period.
• Forecast results in planning.	• Result of planning is budgeting.
• The function of forecast ends with the forecast of likely events.	• The process of budget starts where forecast ends and converts it into a budget.
• Forecast usually covers a specific business function.	• Budget is prepared for the business as a whole.
• Forecasting does not act as a tool of controlling measurement.	• Purpose of budget is not merely a planning device but also a controlling tool.

Essentials of a Budget

An analysis of the above issues reveals the following essentials of a budget:

1. It is prepared for a definite future period.
2. It is a statement prepared prior to a defined period of time.
3. The Budget is monetary or quantitative statement of policy.
4. The Budget is a predetermined statement and its purpose is to attain a given objective.

A budget, therefore, be taken as a document which is closely related to both the managerial as well as accounting functions of an organisation.

Objectives of Budgeting

The objectives of budgeting revolve around strategic planning, resource optimization, performance management, and organizational effectiveness. By fulfilling these objectives, budgeting contributes to the achievement of long-term sustainability and growth.

The specific objectives are discussed below;

- Planning: Budgeting facilitates the formulation of comprehensive financial plans that outline the allocation of resources to achieve organizational goals. It helps in setting specific targets for revenues, expenses, and investments, thereby providing a roadmap for future actions.
- Coordination: Budgeting promotes coordination among different departments and functions within an organization by aligning their activities with overall strategic objectives. It ensures that various departments work towards common goals and avoid conflicts in resource allocation.
- Control: Budgeting serves as a tool for monitoring and controlling financial activities by comparing actual performance against budgeted targets. It helps in identifying variances, analyzing their causes, and taking corrective actions to ensure that resources are used efficiently and effectively.
- Evaluation: Budgeting facilitates the evaluation of organizational performance by providing benchmarks for measuring progress and success. It enables management to assess the effectiveness of strategies, identify areas for improvement, and make informed decisions to enhance future performance.

- Communication: Budgeting enhances communication and transparency within the organization by clearly articulating financial goals, priorities, and expectations. It ensures that all stakeholders understand their roles and responsibilities in achieving budgeted targets, fostering accountability and collaboration.

Benefits of Budgeting

Budgeting plays an important role in planning and controlling. It helps in directing the scarce resources to the most productive use and thus ensures overall efficiency in the organisation. The benefits derived by an organisation from an effective system of budgeting can be summarized as given below:

i. Budgeting facilitates planning of various activities and ensures that the working of the organisation is systematic and smooth.

ii. Budgeting is a coordinated exercise and hence combines the ideas of different levels of management in preparation of the same.

iii. Any budget cannot be prepared in isolation and therefore coordination among various departments is facilitated automatically.

iv. Budgeting helps planning and controlling income and expenditure so as to achieve higher profitability and also act as a guide for various management decisions.

v. Budgeting is an effective means for planning and thus ensures sufficient availability of working capital and other resources.

vi. It is extremely necessary to evaluate the actual performance with predetermined parameters. Budgeting ensures that there are well-defined parameters and thus the performance is evaluated against these parameters.

vii. As the resources are directed to the most productive use, budgeting helps in reducing the wastages and losses.

The Budget Framework

In this section, some important aspects of the budget and the framework under which the budget is prepared are taken up for discussion. The following are considered as important aspect of the budget framework.

Budget committee - The budget committee is the coordinating body in the preparation and administration of budgets. It is usually headed up by the managing director as chairman of the committee and is assisted by a budget officer who is usually a Cost Accountant. Every part of the organisation should be represented on the committee, so there should be a representative from sales, production, marketing and so on.

The Budget Period[2] - The conventional approach is that once per year the manager of each budget centre prepares a detailed budget for one year. The budget is divided into either twelve monthly for control purposes. The preparation of budgets on an annual basis has been strongly criticized on the grounds of rigidity as it entails a commitment for a period of 12 months. This is risky as the budget is based on uncertain forecasts. An alternative approach is for the annual budget to be broken down by months (quarterly basis). This may also result in a rolling budget which is also referred as a continuous budget that is updated regularly when the earlier budget expires, or we can say it is an extension of the current budget. A rolling budget is also known as a budget rollover.

CIMA Official Terminology[1] defines the budget period as a period for which a budget is prepared and used, which may then be subdivided into control periods.

The Budget Manual - A budget manual is prepared by the Cost Accountant. It describes the objectives and procedures involved in the budgeting process and provides a useful reference source for managers responsible for budget preparation. The manual may include a timetable specifying the order in which the budgets should be

2 Except for capital expenditure budgets, the budget period is usually the accounting year (sub-divided control periods).

prepared and the dates when they should be presented to the budget committee. The manual should be circulated to all individuals who are responsible for preparing budgets.

CIMA Official Terminology[1] defines the budget manual as a detailed set of guidelines and information about the budget process typically including a calendar of budgetary events, specimen budget forms, a statement of budgetary objectives and desired results, listing of budgetary activities and budget assumptions regarding, for example, inflation and interest rates.

A budget manual generally contains the following:

a. An explanation of the objectives of the budgetary process
b. Organisational structures consisting of the organisational chart.
c. An outline of the principal budgets and the relationship between them.
d. Administrative details of budget preparation.
e. Procedural matters.

Responsibility for budgets – The person with whom the responsibility for budget lies is also known as the Budget holder. The manager responsible for preparing each budget should ideally be the manager responsible for carrying out the budget. For example, the preparation of particular budgets might be allocated as follows:

a. The sales manager should draft the sales budget and the selling overheads cost centre budgets.
b. The purchasing manager should draft the material purchases budget.
c. The production manager should draft the direct production cost budgets.

Budgetary Control

Before detailing the computational issues of budgets, in this section, aspects of budgetary control is being discussed. Budgetary Control is the systematic process where management uses the budgets prepared at the beginning of the accounting period to compare and analyse the actual results at the end of the accounting period and to set improvement measures for the next accounting year. Thus, the whole gamut of preparation of budget and using the same for control purpose is being considered in the budgetary control. It is applied to a system of management and accounting control by which all operations and output are forecasted as far ahead as possible and actual results when known are compared with budget estimates. Budgetary control is defined as the establishment of the budgets relating to the responsibilities of executives to the requirements of a policy and the continuous comparison of actual with budgeted result either to secure by individual action the objectives of that policy or to provide a firm basis for its revision. The following steps are involved in budgetary control:

- Establishments of budgets for each function and section of the organisation.
- Continuous comparison of the actual performance with that of the budget so as to know the variation from budget and placing the responsibility of executives for failure to achieve the desired results as given in the budget.
- Taking suitable remedial action to achieve the desired objective if there is a variation of the actual performance from the budgeted performance.
- Revision of budgets in the light of changed circumstances.

Objectives of Budgetary Control

Budgetary Control is planned to assist the management for policy formulation, planning, controlling and co-ordinating the general objectives of budgetary control and can be stated in the following ways:

- Planning: A budget is a plan of action. Budgeting ensures a detailed plan of action for a business over a period of time.

- Co-ordination: Budgetary control co-ordinates the various activities of the entity or organisation and secure co-operation of all concerned towards the common goal.
- Control: Control is necessary to ensure that plans and objectives are being achieved. Control follows planning and co-ordination. No control performance is possible without predetermined standards. Thus, budgetary control makes control possible by continuous measures against predetermined targets. If there is any variation between the budgeted performance and the actual performance, the same is subject to analysis and corrective action.

6.3.2 Budgetary Control vs Standard Costing

Details	Standard Costing	Budgetary Control
Meaning	It is a system of accounting where predetermined costs are used for analysis of variance and control of the entire organisation.	It is planning exercise made by the management in setting budget for the forthcoming period and analysis of actual with budgeted figure.
Expressed	It may be expressed both in terms of quantitative and monetary measure.	It is expressed in monetary terms only.
Objective	It is ascertained and control of cost.	It is concerned with the overall profitability and financial position of the concern.
Emphasis	It emphasizes on what should be the cost.	It emphasizes on the level of cost not to be exceeded.
Projection	It is projection of cost accounts.	It is projection of financial accounts.
Used by	Standards are usually limited to manufacturing activities only.	Budgets are used by all departments.

6.3.3 Advantages and Limitations

Advantages of Budgetary Control

The advantages of budgetary control may be summarized as follows:

1. Budgetary control facilitates reduction of cost.
2. Top management uses budgetary control in planning and formulation of policies.
3. Budgetary control facilitates effective co-ordination of activities of the various departments and functions by setting their limits and goals.
4. Budgetary control ensures maximization of profits through cost control
5. Budgetary control evaluates the performance of different budget centers on a continuous basis.
6. Budgetary control facilitates adoption of standard costing.

Limitations of Budgetary Control

It is clear that budgetary control is an effective tool for management regarding the control aspect. However, it has certain important limitations which are identified below:

1. Budgets are based on estimates and forecasting. There are various limitations of forecasting as it cannot be considered as an exact science. Thus budgets are tentatively defined plan of action.

2. Budget may prove short or excess of actual requirement. This is more noticeable in a VUCA world where uncertainty in business environment has become the order of the day.
3. Effective implementation of budgetary control depends upon willingness, co-operation and understanding among people.
4. Budgeting is a time consuming process which often becomes less cost effective when changes in business environment occur rapidly.

6.3.4 Preparation of Budgets

The Budgeting Process

Types of budgeting process

This budgeting process involves preparing the budget by the company's senior management based on the company's objectives. The departmental managers are assigned the responsibility for its successful implementation. Every department can opt to create its own budget based on the company's broader budget allocation and goals. The following are the four budgeting processes which are classified on the basis of the participation of the budget holders[3].

- Bottom-Up Budgeting – this is the budgeting process where all budget holders have the opportunity to participate in setting their own budgets.
- Imposed/Top-Down Budgeting – this is the budgeting process where budget allowances are set without permitting ultimate budget holders the opportunity to participate in the process.
- Negotiated Budget – this is the budgeting process in which budget allowances are set largely on the basis of negotiations between budget holders and those to whom they report.
- Participative Budgeting – Participative bedgeting involves employees from lower levels who give their input about the cost allocation. It allows lower-level employees to feel a sense of ownership and belonging to the organisation, as they feel that they are an important part of the budgeting process. Thus, it is often reffred as bottom – up budgeting.

Stages in the budgeting process

The important stages of the budgeting process are as follows:

1. communicating details of budget policy and guidelines to those people responsible for the preparation of budgets;
2. determining the factor that restricts output;
3. the order of preparation of budget;
4. negotiation of budgets with superiors;
5. final acceptance of budgets;
6. ongoing review of budgets.

Step One - Communicating details of the budget policy

The annual budget is only an implementation part of the long-range plan. Top management must communicate the

3 The person who is ultimately responsible for ensuring that the budget is followed is known as the Budget Holder. Budget holders are usually the managers and operational directors of companies who are tasked by the owners/shareholders or the board of directors to ensure that the company follows whatever budget is laid out for them. [https://corporatefinanceinstitute.com/resources/careers/jobs/budget-holder/].

policy effects of the long-term plan to those responsible for preparing the current year's budgets. Policy effects includes planned changes in sales mix, or the expansion or contraction of certain activities. Thus, preparation of the sales budget is the starting point.

Step Two - Determining the factor that restricts performance

In every organisation there are factors that restricts performance for a given period. In the majority of organisations this factor is sales demand. These factors that restrict performance are referred as principal budget factor. CIMA Official Terminology[1] defines the principal budget factor as factors that limits the activities of an undertaking. The document states that identification of the principal budget factor is often the starting point in the budget setting process. Often the principal budget factor will be sales demand but it could be production capacity or material supply. The principal budget factor may also be machine capacity, distribution and selling resources, the availability of key raw materials or the availability of cash. Once this factor is defined then the remainder of the budgets can be prepared. For example, if sales are the principal budget factor then the production manager can only prepare his budget after the sales budget is complete.

Step Three - The order of budget preparation

Assuming that the principal budget factor has been identified as being sales, the order of budget preparation is summarised as follows:

a. The sales budget is prepared in units of product and sales value. Along with this the finished goods inventory budget should have to be prepared simultaneously.

b. With the information from the sales and inventory budgets, the production budget is to be prepared. The production budget will be stated in terms of units.

c. This leads on logically to budgeting the resources for production. This involves preparing a materials usage budget, machine usage budget and a labour budget.

d. Sequentially, a materials inventory budget will have to be prepared, to decide the planned increase or decrease in the level of inventory held. Once the raw materials usage requirements and the raw materials inventory budget are known, the purchasing department can prepare the raw material purchases budget.

e. During the preparation of the sales and production budgets, the managers of the cost centres of the organisation will prepare their draft the department overheads costs budgets. Such overheads will include maintenance, stores, administration, selling and research and development.

f. From the above information a budgeted income statement has to be prepared.

g. For the preparation of budgeted statement of financial position, the capital expenditure budget (for non-current assets), the working capital budget (for budgeted increases or decreases in the level of receivables and accounts payable as well as inventories), and a cash budget have to be prepared.

Step Four - Negotiation of budgets

To implement a participative approach to budgeting, the budget should be originated at the lowest level of management and the managers at this level should submit their budget to their superiors for approval.

Step Five - Final acceptance of the budgets

When all the budgets are in harmony with each other, they are summarized into a master budget consisting of a budgeted profit and loss account, a balance sheet and a cash flow statement. Only when the master budget is accepted by the top management and is in consonance with all the other budgets, the top management is nods its final acceptance. This is possible only after sufficient negotiation has taken place over the budgets between the budget holder and the superiors.

Step Six - Budget review

The budget process should not stop when the budgets have been agreed. Periodically, the actual results should be compared with the budgeted results. This is a continuous process and is like the feedback loop.

It can be concluded that the most important aspect of the process is the identification of the principal budget factor or key budget factor. If it is not stated specifically then sales are considered as the principal budget factor. On the basis of this, the preparation stage of the process ensues with the preparation of the sales budget and ends with the preparation of the master budget.

Types of Budget

Budgets can be classified based on various criteria including the following;

1. **Functional Classification -** Budgets can be classified according to the function or purpose they serve within an organization.
2. **Time Period Classification:** Budgets can be classified based on the time period they cover.
3. **Static vs. Flexible Classification:** This is based on the capacity for which the budget is developed. On the basis of capacity, budgets can be classified based on their flexibility to adjust to changing circumstances

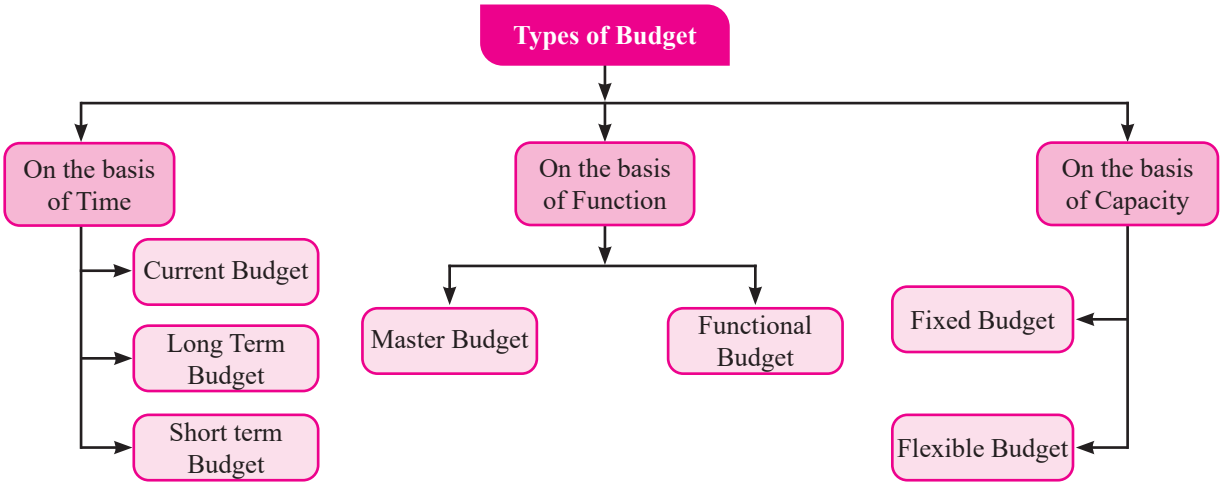


Figure 6.16: Classification of Various of Budgets

Classification on the basis of Time

- Long-Term budgets – These budgets are prepared for a longer period (more than one year). It is usually developed by the top level management. These budgets summarise the general plan of operations and its expected consequences. Long-Term Budgets are prepared for important activities like composition of its capital expenditure, new product development and research, long-term finance etc.
- Short-Term Budgets – These budgets are usually prepared for a period of one year. Sometimes they may be prepared for shorter period as for quarterly or half yearly.
- Current Budgets – These budgets are prepared for the current operations of the business. The planning period of a budget generally in months or weeks.

Classification on the basis of Function

Functional Budget : The functional budget, also referred as a departmental budget, is one which relates to any of the functions of an organisation. The number of functional budgets depend upon the size and nature of business. The following are the commonly used:

- Sales Budget
- Purchase Budget
- Production Budget
- Selling and Distribution Cost Budget
- Labour Cost Budget
- Cash Budget
- Capital Expenditure Budget

CIMA Official Terminology[1] defines a functional budget is a budget of income and/or expenditure applicable to a particular function frequently including sales budget, production cost budget (based on budgeted production, efficiency and utilisation), purchasing budget, human resources budget, marketing budget and research and development budget.

Master Budget: The master budget provides a consolidation of all the subsidiary budgets and normally consists of:

- a budgeted income statement
- budgeted statement of financial position
- a cash budget.

Master Budget may be defined as a summary budget incorporating all the functional budgets, which has been finally approved and adopted.

Classification on the Basis of Capacity

- Fixed Budget : A fixed budget is designed to remain unchanged irrespective of the level of activity actually attained.
- Flexible Budget : A flexible budget is a budget which is designed to change in accordance with the various level of activity actually attained. The flexible budget also called as Variable Budget or Sliding Scale Budget, takes both fixed, variable and semi fixed manufacturing costs into account.

Functional Budget

The functional budgets are prepared for each function of the organisation. These budgets are normally prepared for a period of one year and then broken down to each month. The CIMA definition and the categorisation of the functional budget are discussed in the previous section. Some illustration on preparation of functional budget are given in the next section.

Illustration 26

The Barker Company manufactures two models of adding machines, A and B. The following production and sales data for the month of June 2022 are given below :

Particulars	A	B
Estimated inventory (units) June 1	4500	2250
Desired inventory (units) June 30	4000	2500
Expected Sales Volume (units)	7500	5000
Unit sale price (₹)	75	120

Prepare a sales budget and a production budget for June 2022.

Solution:

Barker Company

(Sales Budget for June 2022)

Product	Sales Volume (Unit)	Unit Selling Price (₹)	Total Sales Price (₹)
A	7,500	75	5,62,500
B	5,000	120	6,00,000
			11,62,500

Barker Company

(Production Budget for June 2022)

Particulars	Products A (units)	Product B (units)
Expected Sales	7,500	5,000
Ending inventory, desired	4,000	2,500
Total	11,500	7,500
Less : Beginning inventory	4,500	2,250
Total production (In units)	7,000	5,250

Illustration 27

Prepare a Production Budget for three months ending March 31, 2022 for a factory producing four products, on the basis of the following information:

Type of Product	Estimated Stock on January 1, 2022	Estimated Sales during January to March 2022	Desired Stock on March 31, 2022
A	2,000	10,000	3,000
B	3,000	15,000	5,000
C	4,000	13,000	3,000
D	3,000	12,000	2,000

Solution :

Opening Stock + Production = Sales + Closing Stock

or, Production = Sales + Closing Stock – Opening Stock

Particulars	Product A	Product B	Product C	Product D
Sales	10,000	15,000	13,000	12,000
Add: Closing Stock	3,000	5,000	3,000	2,000
	13,000	20,000	16,000	14,000
Less: Opening Stock	2,000	3,000	4,000	3,000
Production (units)	11,000	17,000	12,000	11,000

Illustration 28

Budgeted production and production costs for the year ending 31st December are as follows:

	Product X	Product Y
Production (units)	2,20,000	2,40,000
Direct material / unit	₹12.50	₹ 19.00
Direct wages / unit	₹ 4.50	₹ 7.00
Total factory overheads for each type of product (variable)	₹ 6,60,000	₹ 9,60,000

A company is manufacturing two products X and Y. A forecast about the number of units to be sold in the first seven months is given below :

Month	January	February	March	April	May	June	July
Product X	10,000	12,000	16,000	20,000	24,000	24,000	20,000
Product Y	28,000	28,000	24,000	20,000	16,000	16,000	18,000

It is anticipated that:

- There will be no work-in-progress at the end of any month.
- Finished units equal to half the sales for the next month will be in stock at the end of each month (including December of previous year).

Prepare for 6 months ending 30th June, a Production Budget and a summarized cost of production budget.

Solution:

Production Budget for 6 months ending 30th June - Product X

Particulars	January	February	March	April	May	June
Sales	10,000	12,000	16,000	20,000	24,000	24,000
Add: Closing Stock	6,000	8,000	10,000	12,000	12,000	10,000
	16,000	20,000	26,000	32,000	36,000	34,000
Less: Opening Stock	5,000	6,000	8,000	10,000	12,000	12,000
Product (units)	11,000	14,000	18,000	22,000	24,000	22,000

Closing Stock of December = Opening Stock of January = $\frac{50}{100}$ × Sales of February

and Closing Stock of January = $\frac{50}{100}$ × Sales of February

Total Production of Product X for 6 months = 11,000 + 14,000 + 18,000 + 22,000 + 24,000 + 22,000
= 1,11,000 units

Production Budget for 6 months ending 30th June - Product Y

Particulars	January	February	March	April	May	June
Sales	28,000	28,000	24,000	20,000	16,000	16,000
Add: Closing Stock	14,000	12,000	10,000	8,000	8,000	9,000
	42,000	40,000	34,000	28,000	24,000	25,000
Less: Opening Stock	14,000	14,000	12,000	10,000	8,000	8,000
Product (units)	28,000	26,000	22,000	18,000	16,000	17,000

Total Production of Product Y for 6 months = 28,000 + 26,000 + 22,000 + 18,000 + 16,000 + 17,000 = 1,27,000 units

Summarized Cost of Production Budget for 6 month ending 30th June

Particulars	Product X (1,11,000 units) (₹)	Product Y (1,27,000 units) (₹)	Total (₹)
Materials	@ ₹ 12.50 = 13,87,500	@ ₹ 19 = 24,13,000	38,00,500
Direct Wages	@ ₹ 4.50 = 4,99,500	@ ₹ 7 = 8,89,000	13,88,500
Variable Overheads [WN]	@ ₹ 3 = 3,33,000	@ ₹ 4 = 5,08,000	8,41,000
Cost of Production	22,20,000	38,10,000	60,30,000

Working Notes:

Computation of Variable Factory Overheads Rate per unit

Product X = $\frac{₹\ 6,60,000}{2,20,000 \text{ units}} = ₹\ 3$

Product Y = $\frac{₹\ 9,60,000}{2,40,000 \text{ units}} = ₹\ 4$

Illustration 29

From the following figures prepare the raw material purchase budget for January 2022:

	Materials					
	A	B	C	D	E	F
Estimated Stock on 1st Jan	16,000	6,000	24,000	2,000	14,000	28,000
Estimated Stock on 31st Jan	20,000	8,000	28,000	4,000	16,000	32,000
Estimated Consumption	1,20,000	44,000	1,32,000	36,000	88,000	1,72,000
Standard Price per unit	25 paise	5 paise	15 paise	10 paise	20 paise	30 paise

Solution :

Opening Stock + Purchase = Consumption + Closing Stock

or, Purchase = Consumption + Closing Stock – Opening Stock

Raw Materials Purchase Budget for January 2022

Particulars	A	B	C	D	E	F
Budgeted Consumption (units)	1,20,000	44,000	1,32,000	36,000	88,000	1,72,000
Add: Estimated Stock on 31st Jan (units)	20,000	8,000	28,000	4,000	16,000	32,000
	1,40,000	52,000	1,60,000	40,000	1,04,000	2,04,000
Less: Estimated Stock on 1st Jan (units)	16,000	6,000	24,000	2,000	14,000	28,000
Budgeted Purchase (units)	1,24,000	46,000	1,36,000	38,000	90,000	1,76,000
Standard Price per unit	25 paise	5 paise	15 paise	10 paise	20 paise	30 paise
Budgeted Purchase Cost (₹)	31,000	2,300	20,400	3,800	18,000	52,800

Illustration 30

The following data on production, materials required for products X and Y, and Inventory pertain to the budget of LMN Company:

Particulars	Product X	Product Y
Production (Units)	2000	3000
Material (Units)		
A	3.0	1.0
B	4.0	6.5

Particulars	Beginning	Desired Ending	Price / unit (₹)
Material Inventory :			
A	2000	3000	2
B	6000	6000	1.2

a. Determine the number of material units needed to produce products X and Y

b. Calculated the cost of materials used for production.

c. Determine the number of materials units to be pruchased.

d. Calculate the cost of materials to be purchased.

Solution:

(a) Number of material units needed to produce products X and Y

Particulars	Material A	Material B
Number of Product X to be produced (a)	2000	2000
Number of material units needed per product X (b)	3.0	4.0
Material required (a × b)	6000	8000

Particulars	Material A	Material B
Number of Product Y to be produced (a)	3000	3000
Number of material units needed per product Y (b)	1.0	6.5
Material required (a × b)	3000	19500

Particulars	Material A	Material B
Total number of material units needed for Production of Product X and Product Y		
(6000 + 3000)	9000	
(8000 + 19500)		27500

(b) Cost of materials used for production

Particulars	Material A	Material B
Total number of material units	9,000	27,500
Unit Price (₹)	2	1.20
Cost of materials used for production (₹)	18,000	33,000

(c) Number of materials units to be purchased

Particulars	Material A	Material B
Total number of material units required for production	9000	27500
Add : Desire ending inventory	3000	6000
	12000	33500
Less : Beginning inventory	2000	6000
Material to be purchased	10000	27500

(d) Cost of materials units to be purchased

Particulars	Material A	Material B
Materials to be purchased	10000	27500
Unit Price (₹)	2.00	1.20
Material to be purchased (₹)	20,000	33,000

Illustration 31

Long Beach Tools Corporation has the following direct labour requirements for the production of a machine tool set:

Direct Labour	Required Time (Hours)	Hourly Rate (₹)
Machining	6	10
Assembly	10	8

Forecasted sales of for June, July, August and September are 6000, 5000, 8000, 7000 units respectively. On June 1, beginning Inventory of the tool set was 1500. The Closing inventory (desired) each month is one-half of the forecasted sales for the following month.

a. Prepare a production budget for the months of June, July and August.

b. Develop a direct labour budget for the months of June, July and August and for each type of direct labour.

Solution :

Long Beach Tool Corporation

Production Budget

Particulars	June (units)	July (units)	August (units)
Forecasted Sales	6000	5000	8000
Add : Closing Inventory (Desired)	2500	4000	3500
Total Requirement	8500	9000	11500
Less : Opening Inventory	1500	2500	4000
Number of Units to be produced	7000	6500	7500

Long Beach Tool Corporation
Direct Labour Budget

Particulars	June (units)	July (units)	August (units)
Machining:			
a. Budgeted Production	7000 units	6500 units	7500 units
b. Direct Labour Hours per unit	6 hours	6 hours	6 hours
c. Total direct Labour hours required (a × b = c)	42000 hrs.	39000 hrs.	45000 hrs.
d. Direct Labour Cost [c × ₹ 10)	₹ 4,20,000	₹ 3,90,000	₹ 4,50,000

Particulars	June (units)	July (units)	August (units)
Assembly :			
Budgeted Production	7000 units	6500 units	7500 units
Direct Labour Hours per unit	10 hours	10 hours	10 hours
Total direct Labour hours required (a × b = c)	70000 hrs.	65000 hrs.	75000 hrs.
Direct Labour Cost [c (as calculated) × ₹ 8)	₹ 5,60,000	₹ 5,20,000	₹ 6,00,000

Illustration 32

You are required to prepare a Selling Overheads Budget from the estimates given below:

	Amount (₹)
Advertisement (Fixed)	1,000
Salaries of the Sales Department (Fixed)	1,000
Expenses of the Sales Department (Fixed)	750
Salesmen's Remuneration (Fixed)	3,000

Salesmen's Commission @ 1% on sales excluding Agent's Sales

Carriage Outwards: Estimated @ 5% on sales

Agent's Commission: 7½ % on Agent's sales

The sales during the period were estimated as follows:

- ₹ 80,000 including Agent's Sales ₹ 8,000
- ₹ 90,000 including Agent's Sales ₹ 10,000
- ₹ 1,00,000 including Agent's Sales ₹ 10,500

Solution :

Selling Overheads Budget

Particulars	₹	₹	₹
Sales	80,000	90,000	1,00,000
A. Fixed Overheads			
Advertisement	1,000	1,000	1,000
Salaries of Sales Dept.	1,000	1,000	1,000
Expenses of Sales Dept.	750	750	750
Salesmen Remuneration	3,000	3,000	3,000
Total (A)	5,750	5,750	5,750
B. Variable Overheads			
Salesmen Commission	720 [(80,000 – 8,000) × 1%]	800 [(90,000 – 10,000) × 1%]	895 [(1,00,000 – 10,500) × 1%]
Carriage Outward	4,000 [80,000 × 5%]	4,500 [9,00,000 × 5%]	5,000 [1,00,000 × 5%]
Agent's Commission	600 [8,000 × 7.5%]	750 [10,000 × 7.5%]	788 [10,500 × 7.5%]
Total (B)	**5,320**	**6,050**	**6,683**
Grand Total (A + B)	**11,070**	**11,800**	**12,433**

Cash Budget

A cash budget is a statement in which estimated future cash receipts and payments are tabulated in such a way as to show the forecast cash balance of a business at defined intervals. It is an estimate of cash receipts and cash payments prepared for each month. In this budget all expected payments, revenue as well as capital and all receipts, revenue and capital are taken into consideration. The main purpose of cash budget is to predict the receipts and payments in cash so that the firm will be able to find out the cash balance at the end of the budget period. This will help the firm to know whether there will be surplus cash or deficit at the end of the budget period. It will help them to plan for either investing the surplus or raise necessary amount to finance the deficit. Cash Budget is prepared in various ways, but the most popular form of the same is by the method of Receipt and Payment method.

CIMA Official Terminology[1] defines a cash budget as a detailed budget of estimated cash inflows and outflows incorporating both revenue and capital items. The following illustrates the preparation of a cash budget.

The usefulness of cash budgets

The cash budget is a very important planning tool that an organisation can use. It acts as a cash summary and shows the cash effect of all plans made within the budgetary process. Preparing a cash budget is an essential aspect of financial planning and control, offering valuable insights into the organization's cash flow dynamics and enabling proactive management of liquidity, budgetary performance, and financial risks. The cash position and the appropriate action for each are classified below:

i. Short term surplus – in case this is projected by the cash budget, the management may take the following actions:
   - make short term investments
   - make early payments to the suppliers to obtain discount
   - invest in receivables and inventories to increase sales.

ii. Short-term shortfall - in case this is projected by the cash budget, the management may take the following actions:
   - arrange for overdraft if the situation demands
   - take necessary arrangements to reduce receivables
   - delay payments of accounts payable to the extent possible without incurring additional costs like forgoing of discount.

iii. Long-term surplus - in case this is projected by the cash budget, the management may be said to be in suitable position and should take up the following actions:
   - make strategic plans to expand and diversify
   - the firm should make arrangements to make long term investments
   - Acquisition of fixed assets can also be considered.

iv. Long-term shortfall – in case this is projected by the cash budget, the management may be said to be in suitable position and should take up the following actions:
   - Raise long term finance by issue of equity and other long term source
   - Consider shut down of operations or divestment
   - Consider other retrenchment strategies.

Illustration on Cash Budget

Illustration 33

The following sales budget is given for Van Dyke Sales Company for the second quarter of 2022 :

Particulars	April	May	June	Total
Sales Budget (₹)	45000	50000	60000	155000

Credit sales are collected as follows:

70 percent in month of sale, 20 percent in month following sale, 8 percent in second month following sale, and 2 percent uncollectible. The accounts receivable balance at the beginning of the second quarter is ₹ 18,000, ₹ 3,600 of which represents uncollected February sales, and ₹ 14,400 uncollected March sales.

1. Calculate the total sales for February and March.
2. Compute the budgeted cash collections from sales for each month. (Without prejudice to the answer to part 1, assume that February sales equal ₹ 40,000 and March sales equal ₹ 50,000.)

Solution

1. February Sales ⇒ (1 – 0.7 – 0.2) = ₹ 3600 ⇒ 3600 ÷ (1 – 0.9) = ₹ 36000
   March Sales ⇒ (1 – 0.7) = ₹ 14400 ⇒ ₹ 14400 ÷ 0.3 = ₹ 48000

2. **Budgeted Cash Collections from Sales**

Details		April	May	June
Cash collection				
February :	40000 (8%)	3200		
March :	50000 (20%)	10,000		
	50000 (8%)		4000	
April :	45000 (70%)	31500		
	45000 (20%)		9000	
	45000 (8%)			3600
May :	50000 (70%)		35000	
	50000 (20%)			10000
June :	60000 (70%)			42000
		44700	**48000**	**55600**

Illustration 34

ABC Ltd a newly started company wishes to prepare Cash Budget from January. Prepare a cash budget for the first six months from the following estimated revenue and expenses.

Month	Total Sales (₹)	Materials (₹)	Wages (₹)	Overheads	
				Production (₹)	Selling & Distribution (₹)
January	20,000	20,000	4,000	3,200	800
February	22,000	14,000	4,400	3,300	900
March	28,000	14,000	4,600	3,400	900
April	36,000	22,000	4,600	3,500	1,000
May	30,000	20,000	4,000	3,200	900
June	40,000	25,000	5,000	3,600	1,200

Cash balance on 1st January was ₹ 10,000. A new machinery is to be installed at ₹ 20,000 on credit, to be repaid by two equal installments in March and April, sales commission @ 5% on total sales is to be paid within a month following actual sales.

₹ 10,000 being the amount of 2nd call may be received in March. Share premium amounting to ₹ 2,000 is also obtained with the 2nd call may be received in March. Period of credit allowed by suppliers – 2 months; period of credit allowed to customers – 1 month, delay in payment of overheads 1 month. Delay in payment of wages ½ month. Assume cash sales to be 50% of total sales.

Solution :

Cash Budget for the period January to June (for first 6 month) **(in ₹)**

Particulars	January	February	March	April	May	June
Opening Balance (A)	10,000	18,000	29,800	27,000	24,700	33,100
Add: Receipts (B)						
Cash Sales [WN 1]	10,000	11,000	14,000	18,000	15,000	20,000
Collection from Debtors [WN 1]	-	10,000	11,000	14,000	18,000	15,000
Share Call Money	-	-	10,000	-	-	-
Share Premium	-	-	2,000	-	-	-
Total (A + B)	**20,000**	**39,000**	**66,800**	**59,000**	**57,700**	**68,100**
Payments (C)						
Creditors for Materials	-	-	20,000	14,000	14,000	22,000
Wages [WN 2]	2,000	4,200	4,500	4,600	4,300	4,500
Production O/H	-	3,200	3,300	3,400	3,500	3,200
Selling & Distribution	-	800	900	900	1,000	900
Sales Commission	-	1,000	1,100	1,400	1,800	1,500
Installment of Machinery	-	-	10,000	10,000	-	-
Total (C)	**2,000**	**9,200**	**39,800**	**34,300**	**24,600**	**32,100**
Closing Balance (A + B – C)	**18,000**	**29,800**	**27,000**	**24,700**	**33,100**	**36,000**

Working Notes :

1. Calculation of Cash Sales and Collection from Debtors

Month	Total Sales (₹)	Cash Sales (50%) (₹)	Credit Sales (50%) (₹)	Collection Month
January	20,000	10,000	10,000	February
February	22,000	11,000	11,000	March
March	28,000	14,000	14,000	April
April	36,000	18,000	18,000	May
May	30,000	15,000	15,000	June
June	40,000	20,000	20,000	July

2. Calculation of Payment of Wages **(in ₹)**

Month	Wages	Payment Month					
		January	February	March	April	May	June
January	4,000	2,000	2,000	-	-	-	-
February	4,400	-	2,200	2,200	-	-	-
March	4,600	-	-	2,300	2,300	-	-
April	4,600	-	-	-	2,300	2,300	-
May	4,000	-	-	-	-	2,000	2,000
June	5,000	-	-	-	-	-	2,500
		2,000	**4,200**	**4,500**	**4,600**	**4,300**	**4,500**

Fixed and Flexible Budget

It has been discussed previously that on the basis of capacity, budgets can also be classified as fixed or flexible.

When a budget is prepared by assuming a fixed percentage of capacity utilization, it is called as a fixed budget. For example, a firm may decide to operate at 80% of its total capacity and prepare a budget showing the projected profit or loss at that capacity, then it prepares a fixed budget.

CIMA official terminology[1] defines a fixed budget as a budget set prior to the control period and not subsequently changed in response to changes in activity, costs or revenues. It may serve as a benchmark in performance evaluation.

For preparation of the fixed budget, sales forecast will have to be prepared along with the cost estimates. Cost estimates can be prepared by segregating the costs according to their behavior i.e. fixed and variable. Cost predictions should be made element wise and the projected profit or loss can be worked out by deducting the costs from the sales revenue.

A fixed budget is a budget which is set for a single activity level. While a flexible budget is a budget which recognises different cost behaviour patterns and is designed to change as volume of activity changes. It is important to note that Master budgets are based on planned volumes of production and sales but do not include any provision for the event that actual volumes may differ from the budget. In this sense they may be described as fixed budgets.

As such preparation of flexible budgets are significantly different from what has been discussed so far. The functional budgets which has been discussed so far are all based on a single level of activity and, as such, are fixed budgets.

Advantages of Flexible Budget

Flexible budget, as such, is preferred way of budgeting as it gives a projection of profit at various activity levels. The following is a list of various advantages of the flexible budget.:

1. In flexible budget, all possible volume of output or level of activity can be covered.
2. Overheads costs are analysed into fixed variable and semi-variable costs.
3. Expenditure can be forecasted at different levels of activity.
4. It facilitates comparison of related activities which are essential for intelligent decision making.
5. A flexible budget can be prepared with standard costing or without standard costing.
6. Flexible budget facilitates ascertainment of costs at different levels of activity. Thus, fixation of price, placing tenders and acceptance of quotations can be based on flexible budgets.

Preparation of flexible budgets[4]

There are basically two steps in preparing the flexible budget which are stated below:

Step 1

The first step in the preparation of a flexible budget is the determination of cost behaviour patterns, which means deciding whether costs are fixed, variable or semi-variable.

- Fixed costs remain constant over various activity levels.
- For non-fixed costs, divide each cost figure by the related activity level. If the cost is a variable cost, the cost per unit will remain constant. If the cost is a semi-variable cost, the unit rate will reduce as activity levels increase.

4 For preparation of flexible budget, students are advised to:

1. Observe the various costs given and classify them as fixed or variable.
2. If the costs are semi variable, then students would have to segregate the cost into its variable element and its fixed element. (the methods of segregation is specified in previous modules)

Step 2

The second step in the preparation of a flexible budget is to calculate the budget cost allowance for each cost item.

Budget cost allowance = budgeted fixed cost* + (number of units × variable cost per unit)**

* nil if the cost is variable in nature.

** nil for fixed cost

It is very important to note that semi-variable costs need to be segregated into their fixed and variable components so that the budget cost allowance can be calculated.

Illustration 35

A company manufactures a single product and has produced the following flexible budget for the year

Particulars	Level of activity		
	70% (₹)	80% (₹)	90% (₹)
Turnover	2,10,000	2,40,000	2,70,000
Direct Material	17,780	20,320	22,860
Direct labour	44,800	51,200	57,600
Production overheads	30,500	32,000	33,500
Administrative Overheads	17,000	17,000	17,000
Total Cost	**1,10,080**	**1,20,520**	**1,30,960**
Profit	**99,920**	**1,19,480**	**1,39,040**

Calculate the (a) Direct material Cost, (b) Direct labour cost, and (c) Production overheads, if the budget is fixed at 45% level of activity.

Solution:

(a) Direct materials cost is variable cost.

Check :

Cost per %

$70\% : \frac{17,780}{70} = 254$

$80\% : \frac{20,320}{80} = 254$

$90\% : \frac{22,860}{90} = 254$

So, Direct materials at 45% level of activity = 254 × 45 = ₹ 11,430

(b) Direct labour is a variable cost.

Check :

Cost per %

70% : $\frac{44,800}{70} = 640$

80% : $\frac{51,200}{80} = 640$

90% : $\frac{57,600}{90} = 640$

So, Direct labour at 45% level of activity = 640 × 45 = ₹ 28,800

(c) Production overheads is a semi-variable cost.

Check :

Cost per %

70% : $\frac{30,500}{70} = 436$

80% : $\frac{32,000}{80} = 400$

90% : $\frac{33,500}{90} = 372$

Variable cost of (90% – 70%) activity = (33,500 – 30,500)

Or, Variable cost portion in Production overheads of 20% = ₹ 3,000

Or, Variable cost of 1% change in activity = 3,000/20 = ₹ 150

Now, Fixed cost portion in Production overheads = 33,500 – (90 × 150) = ₹ 20,000

Therefore, Total Production overheads cost at 45% level of activity = 20,000 + (45 × 150) = ₹ 26,750

Illustration 36

The monthly budgets for manufacturing overheads of a concern for two levels of activity were as follows :

Capacity	60%	100%
Budgeted Production (units)	**600**	**1,000**
	(₹)	**(₹)**
Wages	1,200	2,000
Consumable stores	900	1,500
Maintenance	1,100	1,500
Power and fuel	1,600	2,000
Depreciation	4,000	4,000
Insurance	1,000	1,000
Total Cost	**9,800**	**12,000**

You are required to:

i. Indicate which of the items are fixed, variable and semi-variable.
ii. Prepare a budget for 80% capacity, and
iii. Find the total cost, both fixed and variable per unit of output at 60%, 80% and 100% capacity.

Solution:

(i) Statement showing segregation of the items in Fixed, Variable and Semi-Variable

Items of Cost	Nature of Cost	Variable Cost p.u	Fixed
Wages	Variable	$\frac{1,200}{600}$ = ₹ 2. p.u.	
Consumable stores	Variable	$\frac{900}{600}$ = ₹ 1.50 p.u.	
Maintenance	Semi-Variable	$= \frac{\text{Change in total Cost}}{\text{Change in Output}}$ $= \frac{1,500 - 1,100}{1,000 - 600}$ $= \frac{400}{400}$ = ₹ 1. p.u.	Total Cost – Variable Cost = 1,100 – (600 × 1) = ₹ 500
Power and fuel	Semi-Variable	$= \frac{\text{Change in total Cost}}{\text{Change in Output}}$ $= \frac{2,000 - 1,600}{1,000 - 600}$ $= \frac{400}{400}$ = ₹ 1. p.u.	Total Cost – Variable Cost = 1,600 – (600 × 1) = ₹ 1,000
Depreciation	**Fixed**		**₹ 4,000**
Insurance	**Fixed**		**₹ 1,000**

(ii) Budget at 80% Capacity

Production	1,000 × 80% = 800 units (₹)
Wages	800 × 2 = 1,600
Consumable stores	800 × 1.50 = 1,200
Maintenance	800 × 1 + 500 = 1,300
Power and fuel	800 × 1 + 1,000 = 1,800
Depreciation	4,000
Insurance	1,000
Total Cost	**10,900**

(iii)

Capacity	60%		80%		100%	
Production	**600 units**		**800 units**		**1000 units**	
	p.u. (₹)	**Total (₹)**	**p.u. (₹)**	**Total (₹)**	**p.u. (₹)**	**Total (₹)**
Variable Costs						
Wages	2.00	1,200	2.00	1,600	2.00	2,000
Consumable stores	1.50	900	1.50	1,200	1.50	1,500
Maintenance	1.00	600	1.00	800	1.00	1,000
Power and Fuel	1.00	600	1.00	800	1.00	1,000
Total Variable Costs	5.50	3,300	5.50	4,400	5.50	5,500
Fixed Costs						
Maintenance		500		500		500
Power and Fuel		1,000		1,000		1,000
Depreciation		4,000		4,000		4,000
Insurance		1,000		1,000		1,000
Total Fixed Costs	$\frac{6,500}{600}$ = 10.83	6,500	$\frac{6,500}{800}$ = 8.125	6,500	$\frac{6,500}{1,000}$ = 6.50	6,500
Total Costs	16.33	9,800	13.625	10,900	12.00	12,000

Illustration 37

A factory engaged in manufacturing plastic toys is working at 40% capacity and produces 10,000 toys per month. The present cost break up for one toy is as under:

Material : ₹ 10

Labour : ₹ 3

Overheads : ₹ 5 [60% fixed]

The selling price is ₹ 20 per toy.

If it is decided to work the factory at 50% capacity, the selling price falls by 3%, at 90% capacity, the selling price falls by 5% accompanied by a similar fall in the price of material. You are required to prepare a statement showing the profits/losses at 40%, 50% and 90% capacity utilizations.

Solution:

Flexible Budget
At 40%, 50% and 90% Capacity Utilization

Partticulars	40% Capacity Uilization	50% Capacity Uilization	90% Capacity Uilization
Production - Units	10,000	12,500	22,500
Selling Price Per Unit	₹ 20	₹ 19.40	₹ 19
Sales Value [units × selling price]	₹ 2,00,000	₹ 2,42,500	₹ 4,27,500
Variable Costs :			
Material ₹ 10 per unit	₹ 1,00,000	₹ 1,21,250*	₹ 2,13,750**
Labour ₹ 3 per unit	₹ 30,000	₹ 37,500	₹ 67,500
Overheads ₹ 2 per unit (₹ 5 × 40%)	₹ 20,000	₹ 25,000	₹ 45,000
Total Variable Costs	₹ 1,50,000	₹ 1,83,750	₹ 3,26,250
Fixed Costs (₹ 5 × 60% × 10,000)	₹ 30,000	₹ 30,000	₹ 30,000
Total Costs [Variable Cost + Fixed Cost]	₹ 1,80,000	₹ 2,13,750	₹ 3,56,250
Profit/Loss [Sales – Total Costs]	₹ 20,000	₹ 28,750	₹ 71,250

* 12,500 units × ₹ 9.70 per unit = ₹ 1,21,500

** 22,500 units × ₹ 9.50 per unit = ₹ 2,13,750

Zero Base Budgeting (ZBB)

Zero Base Budgeting (ZBB) is method of budgeting whereby all activities are revaluated each time budget is formulated and every item of expenditure in the budget is fully justified. Thus, the ZBB involves from scratch or zero. ZBB (also known as priority based budgeting) actually emerged in the late 1960s as an attempt to overcome the limitations of incremental budgeting. This approach requires that all activities are justified and prioritized before decisions are taken relating to the amount of resources allocated to each activity. In incremental budgeting or traditional budgeting, previous year's figures are taken as base and based on the same the budgeted figures for the next year are worked out. Thus, the previous year is taken as the base for preparation of the budget. However, the main limitation of this system of budgeting is that an activity is continued in the future only because it is being continued in the past. Hence in ZBB, the beginning is made from scratch and each activity and function is reviewed thoroughly before sanctioning the same and all expenditures are analyzed and sanctioned only if they are justified. Besides adopting a 'Zero Based' approach, the ZBB also focuses on programs or activities instead of functional departments based on line items, which is a feature of traditional budgeting. It is an extension of program budgeting. In program budgeting, programs are identified and goals are developed for the organisation for the particular program. By inserting decision packages in the system and ranking the packages, the analysis is strengthened and priorities are determined.

Applications of Zero Based Budgeting: The following stages/steps are involved in the application of ZBB:

- Each separate activity of the organisation is identified and is called as a decision package. Decision package is actually nothing but a document that identifies and describes an activity in such a manner that it can be evaluated by the management and rank against other activities competing for limited resources and decide whether to sanction the same or not.

- It should be ensured that each decision package is justified in the sense it should be ascertained whether the package is consistent with the goal of the organisation or not.
- If the package is consistent with the overall objectives of the organisation, the cost of minimum efforts required to sustain the decision should be determined.
- Alternatives for each decision package are considered in order to select better and cheaper options.
- Based on the cost and benefit analysis a particular decision package/s should be selected and resources are allocated to the selected package.

Benefits from Zero Based Budgeting :

ZBB was first introduced by Peter A. Pyhrr, a staff control manager at Texas Instruments Corporation, U.S.A. He developed this technique and implemented it for the first time during the year 1969-70 in Texas in the private sector and popularized its wider use. He wrote an article on ZBB in Harvard Business Review and later wrote a book on the same. The ZBB concept was first applied in the State of Georgia, U.S.A. when Mr. Jimmy Carter was the Governor of the State. Later after becoming the President of U.S.A, Mr. Carter introduced and implemented the ZBB in the country in the year 1987. ZBB has a wide application not only in the Government Departments but also in the private sector in a variety of business. In India, the ZBB was applied in the State of Maharashtra in 80s and early 90s. Benefits from ZBB can be summarized in the following manner:

- ZBB facilitates review of various activities right from the scratch and a detailed cost benefit study is conducted for each activity. Thus an activity is continued only if the cost benefit study is favourable. This ensures that an activity will not be continued merely because it was conducted in the previous year.
- A detailed cost benefit analysis results in efficient allocation of resources and consequently wastages and obsolescence is eliminated.
- A lot of brainstorming is required for evaluating cost and benefits arising from an activity and this results into generation of new ideas and also a sense of involvement of the staff.
- ZBB facilitates improvement in communication and co-ordination amongst the staff.
- Awareness amongst the managers about the input costs is created which helps the organisation to become cost conscious.
- An exhaustive documentation is necessary for the implementation of this system and it automatically leads to record building.

Limitations of Zero Based Budgeting :

The following are the limitations of Zero Based Budgeting:

- It is a very detailed procedure and naturally if time consuming and lot of paper work is involved in the same.
- Cost involved in preparation and implementation of this system is very high.
- Morale of staff may be very low as they might feel threatened if a particular activity is discontinued.
- Ranking of activities and decision-making may become subjective at times.
- It may not advisable to apply this method when there are non-financial considerations, such as ethical and social responsibility because this will dictate rejecting a budget claim on low ranking projects.

Performance Budgeting

It is budgetary system where the input costs are related to the performance i.e. the end results. This budgeting is used extensively in the Government and Public Sector Undertakings. It is essentially a projection of the Government activities and expenditure thereon for the budget period. This budgeting starts with the broad classification of expenditure according to functions such as education, health, irrigation, social welfare etc. Each of the functions is then classified into programs sub classified into activities or projects. The main features of performance budgeting are as follows:

- Classification into functions, programs or activities
- Specification of objectives for each program
- Establishing suitable methods for measurement of work as far as possible
- Fixation of work targets for each program.

Objectives of each program are ascertained clearly and then the resources are applied after specifying them clearly. The results expected from such activities are also laid down. Annual, quarterly and monthly targets are determined for the entire organisation. These targets are broken down for each activity centre. The next step is to set up various productivity or performance ratios and finally target for each program activity is fixed. The targets are compared with the actual results achieved. Thus, the procedure for the performance budgets include allocation of resources, execution of the budget and periodic reporting at regular intervals.

The budgets are initially compiled by the various agencies such as Government Department, public undertakings etc. Thereafter these budgets move on to the authorities responsible for reviewing the performance budgets. Once the higher authorities decide about the funds, the amount sanctioned are communicated and the work is started. It is the duty of these agencies to start the work in time, to ensure the regular flow of expenditure, against the physical targets, prevent over runs under spending and furnish report to the higher authorities regarding the physical progress achieved.

In the final phase of performance budgetary process, progress reports are to be submitted periodically to higher authorities to indicate broadly, the physical performance to be achieved, the expenditure incurred and the variances together with explanations for the variances.

Further Illustrations

Illustration 38

Draw a Material Procurement Budget (Quantitative) from the following information:

Estimated sales of a Product 40,000 units. Each unit of the Product requires 3 units of Material A and 5 units of Material B.

Estimated opening balances at the commencement of the next year:

Finished product = 5,000 units

Material A = 12,000 units

Material B = 20,000 units

Opening stock of Material on order:

Material A = 7,000 units

Material B = 11,000 units

The desirable closing balance at the end of the next year:

Finished product = 7,000 units

Material A = 15,000 units

Material B = 25,000 units

Material on order:

Material A = 8,000 units

Material B = 10,000 units

Solution:

Production = Sales + Closing Stock – Opening Stock

= 40,000 +7,000 – 5,000 = 42,000 units

Raw Materials Purchase Budget

Particulars	Product A units	Product B units
Materials Required	42,000 × 3 = 1,26,000	42,000 × 5 = 2,10,000
Add: Closing Stock	15,000	25,000
Add: Closing Stock of Material on Order	8,000	10,000
	1,49,000	2,45,000
Less: Opening Stock	12,000	20,000
Less: Opening Stock of Material on Order	7,000	11,000
Raw Material Purchase	1,30,000	2,14,000

Illustration 39

A company manufactures Product A and Product B during the year 31st December, 2021, it is expected to sell 15,000 kg of Product A and 75,000 kg of Product B at ₹ 30 and ₹ 16 per kg respectively. The direct materials P, Q and R are mixed in the proportion of 3 : 5 : 2 in the manufacture of Product A, and Materials Q and R are mixed in the proportion of 1 : 2 in the manufacture of Product B. The actual and budgeted inventories for the year are given below:

	Opening Stock	Estimated Closing Stock	Anticipated cost per kg
	(kg)	(kg)	(₹)
Material P	4,000	3,000	12
Material Q	3,000	4,000	10
Material R	30,000	9,000	8
Product A	3,000	1,500	–
Product B	4,000	4,500	–

Prepare the Production Budget and Materials Budget showing the expenditure on purchase of materials for the year ending 31st December, 2021.

Solution:

Production Budget for Product A and Product B

Particulars	Product A units	Product B units
Sales	15,000	75,000
Add: Closing Stock	1,500	4,500
	16,500	79,500
Less: Opening Stock	3,000	4,000
Production	13,500	75,500

Material Purchase Budget for the year ending December 31st, 2021

Particulars	P	Q	R	Total
Materials required for Product A in the ratio of 3 : 5 : 2	4,050	6,750	2,700	13,500
Materials required for Product B in the ratio of 1 : 2	–	25,167	50,333	75,500
Total requirement	4,050	31,917	53,033	89,000
Add: Closing Stock	3,000	4,000	9,000	16,000
	7,050	35,917	62,033	1,05,000
Less: Opening Stock	4,000	3,000	30,000	37,000
Purchases (in units)	3,050	32,917	32,033	68,000
Cost per kg	12	10	8	
Total Purchase Cost (₹)	36,600	3,29,170	2,56,264	6,22,034

Illustration 40

The following details apply to an annual budget for a manufacturing company:

Quarter	1st	2nd	3rd	4th
Working Days	65	60	55	60
Production (units per working day)	100	110	120	105
Raw material purchases (% by weight of annual total)	30%	50%	20%	–
Budgeted purchase price / kg (₹)	1	1.05	1.125	–

Quantity of raw material per unit of production 2 kg. Budgeted closing stock of raw material 2,000 kg. Budgeted opening stock of raw material 4,000 kg (Cost ₹ 4,000).

Issues are pried on FIFO Basis. Calculate the following budgeted figures:

(a) Quarterly and annual purchase of raw material by weight and value.

(b) Closing quarterly stocks by weight and value.

Solution:

(a) Quarterly and annual purchase of raw material by weight and value

Quarter	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Production (units)	65 × 100 = 6,500	60 × 110 = 6,600	55 × 120 = 6,600	60 × 105 = 6,300	26,000
Material Required (kg) (Production × 2 kg p.u)	13,000	13,200	13,200	12,600	52,000
Add: Closing Stock (kg)					2,000
					54,000
Less: Opening Stock (kg)					4,000
Annual Purchase by weight (kg)					50,000
Quarterly Purchase by weight (kg)	30% × 50,000 = 15,000	50% × 50,000 = 25,000	20% × 50,000 = 10,000	–	
Budgeted Purchase Price per kg (₹)	1	1.05	1.125		
Quarterly and Annual Purchase by Value (₹)	15,000 × 1 = 15,000	25,000 × 1.05 = 26,250	10,000 × 1.125 = 11,250		52,500

(b) Closing quarterly stock by weight and value

Store Ledger (FIFO)

Quarter	Receipt			Issue			Balance (Closing Stock)		
	Quantity (kg)	Rate	Amount (₹)	Quantity (kg)	Rate	Amount (₹)	Quantity (kg)	Rate	Amount (₹)
Opening							4,000	1	4,000
1	15,000	1	15,000	13,000	1	13,000	6,000	1	6,000
2	25,000	1.05	26,250	13,200 (6,000 / 7,200)	(1 / 1.05)	13,560 (6,000 / 7,560)	17,800	1.05	18,690
3	10,000	1.125	11,250	13,200	1.05	13,860	14,600 (4,600 / 10,000)	(1.05 / 1.125)	16,080 (4,830 / 11,250)
4	–	–	–	12,600 (4,600 / 8,000)	(1.05 / 1.125)	13,830 (4,830 / 9,000)	2,000	1.125	2,250

Illustration 41

Prepare a Cash Budget for the three months ending 30th June, 2022 from the information given below:

(a)

Month	Sales (₹)	Materials (₹)	Wages (₹)	Overheads (₹)
February	14,000	9,600	3,000	1,700
March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

(b) Credit terms are:

Sales / Debtors: 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

Creditors: Materials after 2 month

Wages : $\frac{1}{4}$ in next month

Overheads: $\frac{1}{2}$ in next month

(c) Cash and bank balance on 1st April, 2022 is expected to be ₹ 6,000.

(d) Other relevant information are:

(i) Plant and machinery will be installed in February, 2022 at a cost of ₹ 96,000. The monthly installment of ₹ 2,000 is payable from April onwards.

(ii) Dividend @ 5% on preference share capital of ₹ 2,00,000 will be paid on 1st June.

(iii) Advance to be received for sale of vehicles ₹ 9,000 in June.

(iv) Dividends from investments amounting to ₹ 1,000 are expected to be received in June.

Solution:

Cash Budget for the 3 months ending 30th June, 2022

Particulars	April (₹)	May (₹)	June (₹)
Opening Balance (A)	6,000	3,950	3,000
Add: Receipts (B)			
Cash Sales [WN 1]	1,600	1,700	1,800
Collection from Debtors [WN 1]	13,050	13,950	14,850
Advance from Sale of Vehicles	–	–	9,000
Dividend	–	–	1,000
Total (A + B)	20,650	19,600	29,650
Payments (C)			
Creditors for			
Materials	9,600	9,000	9,200
Wages [WN 2]	3,150	3,500	3,900
Overheads [WN 3]	1,950	2,100	2,250
Installment of Plant and Machinery	2,000	2,000	2,000
Preference Dividend	–	–	10,000

Particulars	April (₹)	May (₹)	June (₹)
Total (C)	16,700	16,600	27,350
Closing Balance (A + B – C)	3,950	3,000	2,300

Working Notes:

1. Calculation of Cash Sales and Collection from Debtors **Amount (₹)**

Month	Total Sales	Cash Sales	Credit Sales	Collection			
				March	April	May	June
February	14,000	1,400	12,600	6,300	6,300	_	_
March	15,000	1,500	13,500	_	6,750	6,750	_
April	16,000	1,600	14,400	_	_	7,200	7,200
May	17,000	1,700	15,300	_	_	_	7,650
June	18,000	1,800	16,200	_	_	_	_
					13,050	13,950	14,850

2. Calculation of Payment of Wages **(Amount in ₹)**

Month	Wages (₹)	March (₹)	April (₹)	May (₹)	June (₹)
March	3,000	2,250	750	–	–
April	3,200	–	2,400	800	–
May	3,600	–	–	2,700	900
June	4,000	–	–	–	3,000
			3,150	3,500	3,900

3. Calculation of Payment of Overheads

Month	Overheads (₹)	Overheads			
		March (₹)	April (₹)	May (₹)	June (₹)
March	1,900	950	950	1,000	1,100
April	2,000		1,000	1,100	1,150
May	2,200				
June	2,300				
			1,950	2,100	2,250

Illustration 42

For production of 10,000 units the following are budgeted expenses:

	Cost Per unit (₹)
Direct Materials	48
Direct Labour	24
Variable Overheads	20
Fixed Overheads (₹ 1,20,000)	12
Variable Expenses (Direct)	4
Selling Expenses (10% Fixed)	12
Administration Expenses (₹ 40,000 Fixed)	4
Distribution Expenses (20% Fixed)	4
	128

Prepare a budget for production of 7,000 units and 9,000 units.

Solution:

Flexible Budget at Different Capacities and Determination of Overheads Rates

Particulars	10,000 units		7,000 units		9,000 units	
	Cost p.u. (₹)	Total (₹)	Cost p.u. (₹)	Total (₹)	Cost p.u. (₹)	Total (₹)
Variable Cost						
Direct Materials	48	4,80,000	48	3,36,000	48	4,32,000
Direct Labour	24	2,40,000	24	1,68,000	24	2,16,000
Variable Overheads	20	2,00,000	20	1,40,000	20	1,80,000
Variable Expenses	4	40,000	4	28,000	4	36,000
Selling Expenses (90% × 12)	10.80	1,08,000	10.80	75,600	10.80	97,200
Distribution Expenses (80% × 4)	3.20	32,000	3.20	22,400	3.20	28,800
Total Variable Cost (A)	110	11,00,000	110	7,70,000	110	9,90,000
Fixed Cost						
Fixed Overheads	12	1,20,000		1,20,000		1,20,000
Selling Expenses (10% × 12)	1.20	12,000		12,000		12,000
Administration Expenses	4	40,000		40,000		40,000
Distribution Expenses (20% × 4)	0.80	8,000		8,000		8,000
Total Fixed Cost (B)	18	1,80,000		1,80,000		1,80,000
Total Cost (A + B)	**128**	**12,80,000**		**9,50,000**		**11,70,000**

Illustration 43

Draw up a flexible budget for overheads expenses on the basis of the following data and determine the overheads rates at 70%, 80% and 90%

Plant Capacity	at 80% capacity
Variable Overheads:	₹
Indirect Labour	12,000
Stores including spares	4,000
Semi-Variable:	
Power (30% - Fixed, 70% - Variable)	20,000
Repairs (60% - Fixed, 40% - Variable)	2,000
Fixed overheads:	
Depreciation	11,000
Insurance	3,000
Salaries	10,000
Total Overheads	62,000
Estimated Direct Labour Hours	1,24,000

Solution:

Flexible Budget at Different Capacities and Determination of Overheads Rates

Plant Capacity	80% (₹)	70% (₹)	90% (₹)
Variable Overheads:			
Indirect Labour	12,000	$\frac{12,000}{80\%} \times 70\% = 10,500$	$\frac{12,000}{80\%} \times 90\% = 13,500$
Stores including spares	4,000	$\frac{4,000}{80\%} \times 70\% = 3,500$	$\frac{4,000}{80\%} \times 90\% = 4,500$
Total Variable Overheads (A)	16,000	14,000	18,000
Semi Variable: [WN 1]			
Power	20,000	18,250	21,750
Repairs	2,000	1,900	2,100
Total Semi Variable (B)	22,000	20,150	23,850

Plant Capacity	80% (₹)	70% (₹)	90% (₹)
Fixed:			
Depreciation	11,000	11,000	11,000
Insurance	3,000	3,000	3,000
Salaries	10,000	10,000	10,000
Total Fixed (C)	24,000	24,000	24,000
Total (A + B + C)	62,000	58,150	65,850
Labour Hours	1,24,000	$\frac{1,24,000}{80\%} \times 70\% = 1,08,500$	$\frac{1,24,000}{80\%} \times 90\% = 1,39,500$
Labour Hour Rate (₹ / hour)	0.50 $\left(\frac{62,000}{1,24,000 \text{ hr}}\right)$	0.536 $\left(\frac{58,150}{1,08,500 \text{ hr}}\right)$	0.472 $\left(\frac{65,850}{1,39,500 \text{ hr}}\right)$

Working Notes:

1. Calculation of Semi Variable Costs

Plant Capacity	80% (₹)	70% (₹)	90% (₹)
Semi Variable:			
a. Power –			
Variable 70%	**14,000**	$\frac{14,000}{80\%} \times 70\% = 12,250$	$\frac{14,000}{80\%} \times$ **90% = 15,750**
Fixed 30%	**6,000**	**6,000**	**6,000**
	20,000	**18,250**	**21,750**
b. Repairs –			
Variable 40%	**800**	$\frac{800}{80\%} \times 70\% = 700$	$\frac{800}{80\%} \times 90\% = 900$
Fixed 60%	**1,200**	**1,200**	**1,200**
	2,000	**1,900**	**2,100**

Illustration 44

From the following information relating to 2021 and conditions expected to prevail in 2022, prepare a budget for 2022.

2021 Actual:	Amount (₹)
Sales (40,000 units)	1,00,000
Raw materials	53,000
Wages	11,000
Variable Overheads	16,000
Fixed Overheads	10,000
2022 Prospects:	
Sales (60,000 units)	1,50,000
Raw materials	5% increase in price
Wages	10% increase in wage rate
	5% increase in productivity
Additional Plant:	
One Lathe	25,000
One Drill	12,000
10% Depreciation to be considered	

Solution:

Budget showing Costs and Profits for the year 2022

		Amount (₹)
i.	Sales	1,50,000
ii.	Costs	
	Raw Materials $[53{,}000 \times \frac{60{,}000}{40{,}000} \times \frac{105}{100}]$	83,475
	Wages $[11{,}000 \times \frac{60{,}000}{40{,}000} \times \frac{110}{100} \times \frac{105}{100}]$	19,058
	Variable Overheads $[16{,}000 \times \frac{60{,}000}{40{,}000} \times \frac{105}{100}]$	24,000
	Fixed Overheads $[10{,}000 + (25{,}000 + 12{,}000) \times \frac{10}{100}]$	13,700
	Total Cost	1,40,233
iii.	Profit (i. – ii.)	9,767

Illustration 45

Production costs of a factory for a year are as follows:

	Amount (₹)
Direct Wages	80,000
Direct Materials	1,20,000
Production Overheads: Fixed	40,000
Variable	60,000

During the forthcoming year it is anticipated that:

a. The average rate for direct labour remuneration will fall from ₹ 0.80 per hour to ₹ 0.75 per hour.

b. Production efficiency is currently at 5% less than the whole capacity, in the forth coming year it will be at full capacity.

c. Price per unit of direct material and of other materials and services which comprise overheads will remain unchanged.

d. Production in the coming year will increase by 331/3%. Draw up a production cost budget.

Solution:

Production Cost Budget for the forthcoming year

Particulars	₹
i. Wages $[80{,}000 \times 133^{1}/_{3}\% \times \frac{0.75}{0.80} \times \frac{100}{95}]$	1,05,263
ii. Materials $[1{,}20{,}000 \times 133^{1}/_{3}\%]$	1,60,000
iii. Variable Overheads $[60{,}000 \times 133^{1}/_{3}\%]$	80,000
iv. Fixed Overheads	40,000
Production Cost (i + ii + iii)	3,85,263

Illustration 46

A company manufacturers two products A and B and the budgeted data for the year are as follows:

	Product A (₹)	Product B (₹)
Sales price per unit	100	75
Direct materials per unit	20	10
Direct wages per unit	5	4
Total works overheads	10,105	9,009
Total marketing overheads	1,200	1,100

The sales manager forecasts the sales in units as follows:

	Product A	Product B
January	28	10
February	28	12
March	24	16
April	20	20
May	16	24
June	16	24
July to January (next year) per month	18	20

It is assumed that (i) there will be no work in progress at the end of any month, and (ii) finished units is equal to half the sales for the following month will be kept in stock.

Prepare (a) A Production Budget for each month and (b) A Summarized Profit and Loss Statement for the year ending in December.

Solution:

(a) **Production Budget (in units)**

Particulars	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
Product A													
Sales	28	28	24	20	16	16	18	18	18	18	18	18	240
Add: Cl. Stock	14	12	10	8	8	9	9	9	9	9	9	9	
	42	40	34	28	24	25	27	27	27	27	27	27	
Less: Op. Stock	14	14	12	10	8	8	9	9	9	9	9	9	
	28	26	22	18	16	17	18	18	18	18	18	18	235
Product B													
Sales	10	12	16	20	24	24	20	20	20	20	20	20	226
Add: Cl. Stock	6	8	10	12	12	10	10	10	10	10	10	10	
	16	20	26	32	36	34	30	30	30	30	30	30	
Less: Op. Stock	5	6	8	10	12	12	10	10	10	10	10	10	
	11	14	18	22	24	22	20	20	20	20	20	20	231

Closing Stock of January = $\frac{1}{2}$ × Sales of February

and, Opening Stock of January = Closing Stock of December = $\frac{1}{2}$ × Sales of January

or, Opening Stock of January = $\frac{1}{2}$ × Sales of January

(b) Summarised Production Cost Budget

Particulars	Product A	Product B	Total
Production	235 units	231 units	
	(₹)	(₹)	(₹)
Direct Material:	235 @ ₹ 20 = 4,700	231 @ ₹ 10 = 2,310	7,010
Direct Labour	235 @ ₹ 5 = 1,175	231 @ ₹ 4 = 924	2,099
Works Overheads	10,105	9,009	19,114
Total Production Cost	15,980	12,243	28,223
Production Cost p.u.	$\frac{15,980}{235 \text{ units}}$ = ₹ 68 p.u	$\frac{12,243}{231 \text{ units}}$ = ₹ 53 p.u	

Summarised Profit and Loss Statement for the year

Particulars	Product A (₹)	Product B (₹)	Total (₹)
Sales	240 × 100 = 24,000	226 × 75 = 16,950	40,950
Less: Cost of Goods Sold	240 × 68 = 16,320	226 × 53 = 11,978	28,298
Marketing Overheads	1,200	1,100	2,300
Profit	6,480	3,872	10,352

Illustration 47

Three Articles X, Y and Z are produced in a factory. They pass through two cost centers A and B. From the data furnished compile a statement for budgeted machine utilization in both the centers.

(a) Sales budget for the year

Product	Annual Budgeted Sales (units)	Opening Stock of finished products (units)	Closing Stock
X	4,800	600	Equivalent to 2 months sales
Y	2,400	300	-do-
Z	2,400	800	-do-

(b) Machine hours per unit of product

Product	Cost Centers	
	A	B
X	30	70
Y	200	100
Z	30	20

(c) Total number of machines

Cost Centre	
A	284
B	256
Total	540

(d) Total working hours during the year: Estimated 2,500 hours per machine.

Solution:

Calculation of units of Production of Different Products **(in units)**

Particulars	Product X	Product Y	Product Z
Sales	4,800	2,400	2,400
Add: Closing Stock	$\frac{4,800}{12 \text{ months}} \times 2 \text{ months} = 800$	$\frac{2,400}{12 \text{ months}} \times 2 \text{ months} = 400$	$\frac{2,400}{12 \text{ months}} \times 2 \text{ months} = 400$
Less: Opening Stock	600	300	800
Production	5,000	2,500	2,000

Machine Hours Utilisation Budget

Particulars	Cost Centers							
	A				B			
	X	Y	Z	Total	X	Y	Z	Total
Production (units)	5,000	2,500	2,000		5,000	2,500	2,000	
Hours required p.u.	30	200	30		70	100	20	
Total Machine hours required	1,50,000	5,00,000	60,000	7,10,000	3,50,000	2,50,000	40,000	6,40,000
Number of Machines required [WN]	60	200	24	284	140	100	16	256

Working Notes:

Number of Machines required:

Cost Centre A : Product X $= \frac{284}{7,10,000} \times 1,50,000 = 60$ machines

Product Y $= \frac{284}{7,10,000} \times 5,00,000 = 200$ machines

Product Z $= \frac{284}{7,10,000} \times 60,000 = 24$ machines

Cost Centre B : Product X $= \frac{256}{6,40,000} \times 3,50,000 = 140$ machines

Product Y $= \frac{256}{6,40,000} \times 2,50,000 = 100$ machines

Product Z $= \frac{256}{6,40,000} \times 40,000 = 16$ machines

Illustration 48

Prepare a Production Budget for three months ending March 31, 2022 for a factory producing four products, on the basis of the following information.

Type of Product	Estimated Stock on January 1, 2022	Estimated Sales during January to March 2022	Desired Stock on March 31, 2022
A	2,000	10,000	3,000
B	3,000	15,000	5,000
C	4,000	13,000	3,000
D	3,000	12,000	2,000

Solution:

Opening Stock + Production = Sales + Closing Stock

or, Production = Sales + Closing Stock – Opening Stock

Particulars	Product A	Product B	Product C	Product D
Sales	10,000	15,000	13,000	12,000
Add: Closing Stock	3,000	5,000	3,000	2,000
	13,000	20,000	16,000	14,000
Less: Opening Stock	2,000	3,000	4,000	3,000
Production (units)	11,000	17,000	12,000	11,000

Illustration 49

Budgeted production and production costs for the year ending 31st December are as follows:

	Product X	Product Y
Production (units)	2,20,000	2,40,000
Direct material / unit	₹12.50	₹ 19.00
Direct wages / unit	₹ 4.50	₹ 7.00
Total factory overheads for each type of product (variable)	₹ 6,60,000	₹ 9,60,000

A company is manufacturing two products X and Y. A forecast about the number of units to be sold in the first seven months is given below:

Month	January	February	March	April	May	June	July
Product X	10,000	12,000	16,000	20,000	24,000	24,000	20,000
Product Y	28,000	28,000	24,000	20,000	16,000	16,000	18,000

It is anticipated that:

(a) There will be no work-in-progress at the end of any month.

(b) Finished units equal to half the sales for the next month will be in stock at the end of each month (including December of previous year).

Prepare for 6 months ending 30th June a Production Budget and a summarised cost of production budget.

Solution

Production Budget for 6 months ending 30th June - Product X

Particulars	January	February	March	April	May	June
Sales	10,000	12,000	16,000	20,000	24,000	24,000
Add: Closing Stock	6,000	8,000	10,000	12,000	12,000	10,000
	16,000	20,000	26,000	32,000	36,000	34,000
Less: Opening Stock	5,000	6,000	8,000	10,000	12,000	12,000
Product (units)	11,000	14,000	18,000	22,000	24,000	22,000

Closing Stock of December = Opening Stock of January = $\frac{50}{100}$ × Sales of January

and Closing Stock of January = $\frac{50}{100}$ × Sales of February

Total Production of Product X for 6 months = 11,000+14,000+18,000+22,000+24,000+22,000 = 1,11,000 units

Production Budget for 6 months ending 30th June - Product Y

Particulars	January	February	March	April	May	June
Sales	28,000	28,000	24,000	20,000	16,000	16,000
Add: Closing Stock	14,000	12,000	10,000	8,000	8,000	9,000
	42,000	40,000	34,000	28,000	24,000	25,000
Less: Opening Stock	14,000	14,000	12,000	10,000	8,000	8,000
Product (units)	28,000	26,000	22,000	18,000	16,000	17,000

Total Production of Product Y for 6 months = 28,000+26,000+22,000+18,000+16,000+17,000 = 1,27,000 units

Summarised Cost of Production Budget for 6 month ending 30th June

Particulars	Product X (1,11,000 units) (₹)	Product Y (1,27,000 units) (₹)	Total (₹)
Materials	@ ₹ 12.50 = 13,87,500	@ ₹ 19 = 24,13,000	38,00,500
Direct Wages	@ ₹ 4.50 = 4,99,500	@ ₹ 7 = 8,89,000	13,88,500
Variable Overheads	@ ₹ 3 = 3,33,000	@ ₹ 4 = 5,08,000	8,41,000
Cost of Production	22,20,000	38,10,000	60,30,000

Working Notes:

1. Computation of Variable Factory Overhead Rate per unit

   Product X = $\frac{₹\ 6,60,000}{2,20,000 \text{ units}}$ = ₹ 3

   Product Y = $\frac{₹\ 9,60,000}{2,40,000 \text{ units}}$ = ₹ 4

Illustration 50

Draw a Material Procurement Budget (Quantitative) from the following information:

Estimated sales of a Product 40,000 units. Each unit of the Product requires 3 units of Material A and 5 units of Material B.

Estimated opening balances at the commencement of the next year:

Finished product = 5,000 units

Materia A = 12,000 units

Material B = 20,000 units

Material on order:

Material A = 7,000 units

Material B = 11,000 units

The desirable closing balance at the end of the next year:

Finished product = 7,000 units

Materia A = 15,000 units

Material B = 25,000 units

Material on order:

Material A = 8,000 units

Material B = 10,000 units

Solution:

Production = Sales + Closing Stock – Opening Stock

= 40,000 +7,000 – 5,000 = 42,000 units

Raw Materials Purchase Budget

Particulars	Product A (units)	Product B (units)
Materials Required	42,000 x 3 = 1,26,000	42,000 x 5 = 2,10,000
Add: Closing Stock	15,000	25,000
Add: Closing Stock on Order	8,000	10,000
	1,49,000	2,45,000
Less: Opening Stock	12,000	20,000
Less: Opening Stock on Order	7,000	11,000
Raw Material Purchase	1,30,000	2,14,000

Illustration 51

From the following figures prepare the raw material purchase budget for January 2022:

	Materials					
	A	B	C	D	E	F
Estimated Stock on 1st Jan	16,000	6,000	24,000	2,000	14,000	28,000
Estimated Stock on 31st Jan	20,000	8,000	28,000	4,000	16,000	32,000
Estimated Consumption	1,20,000	44,000	1,32,000	36,000	88,000	1,72,000
Standard Price per unit	25 p.	5 p.	15 p.	10 p.	20 p.	30 p.

Solution:

Opening Stock + Purchase = Consumption + Closing Stock

or, Purchase = Consumption + Closing Stock – Opening Stock

Raw Materials Purchase Budget for January 2022

Particulars	A	B	C	D	E	F	Total
Estimated Consumption (units)	1,20,000	44,000	1,32,000	36,000	88,000	1,72,000	
Add: Estimated Stock on 31st Jan (units)	20,000	8,000	28,000	4,000	16,000	32,000	
	1,40,000	52,000	1,60,000	40,000	1,04,000	2,04,000	
Less: Estimated Stock on 1st Jan (units)	16,000	6,000	24,000	2,000	14,000	28,000	
Estimated Purchase (units)	1,24,000	46,000	1,36,000	38,000	90,000	1,76,000	
Standard Price per unit	25 p.	5 p.	15 p.	10 p.	20 p.	30 p.	
Estimated Purchase Cost (₹)	31,000	2,300	20,400	3,800	18,000	52,800	1,28,300

Illustration 52

A company manufactures Product A and Product B during the year 31st December, 2021, it is expected to sell 15,000 kg of Product A and 75,000 kg of Product B at ₹ 30 and ₹ 16 per kg respectively. The direct materials P, Q and R are mixed in the proportion of 3 : 5 : 2 in the manufacture of Product A, and Materials Q and R are mixed in the proportion of 1 : 2 in the manufacture of Product B. The actual and budgeted inventories for the year are given below:

	Opening Stock	Estimated Closing Stock	Anticipated cost per kg
	kg	kg	₹
Material P	4,000	3,000	12
Material Q	3,000	6,000	10
Material R	30,000	9,000	8
Product A	3,000	1,500	-
Product B	4,000	4,500	-

Prepare the Production Budget and Materials Budget showing the expenditure on purchase of materials for the year ending 31st December, 2021.

Solution:

Production Budget for Product A and Product B

Particulars	Product A (units)	Product B (units)
Sales	15,000	75,000
Add: Closing Stock	1,500	4,500
	16,500	79,500
Less: Opening Stock	3,000	4,000
Production	13,500	75,500

Material Purchase Budget for the year ending December 31st, 2021

Particulars	P	Q	R	Total
Materials required for Product A in the ratio of 3 : 5 : 2	4,050	6,750	2,700	13,500
Materials required for Product B in the ratio of 1 : 2	-	25,167	50,333	75,500
Total requirement	4,050	31,917	53,033	
Add: Closing Stock	3,000	6,000	9,000	
	7,050	37,917	62,033	
Less: Opening Stock	4,000	3,000	30,000	
Purchases (in units)	3,050	34,917	32,033	
Cost per kg	12	10	8	
Total Purchase Cost (₹)	36,600	3,49,170	2,56,264	6,42,034

Illustration 53

The following details apply to an annual budget for a manufacturing company.

Quarter	1st	2nd	3rd	4th
Working Days	65	60	55	60
Production (units per working day)	100	110	120	105
Raw material purchases (% by weight of annual total	30%	50%	20%	-
Budgeted purchase price / kg (₹)	1	1.05	1.125	-

Quantity of raw material per unit of production 2 kg. Budgeted closing stock of raw material 2,000 kg. Budgeted opening stock of raw material 4,000 kg (Cost ₹ 4,000).

Issues are pried on FIFO Basis. Calculate the following budgeted figures.

(a) Quarterly and annual purchase of raw material by weight and value.

(b) Closing quarterly stocks by weight and value.

Solution:

a) **Quarterly and annual purchase of raw material by weight and value**

Particulars	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Production (units)	65 x 100 = 6,500	60 x 110 = 6,600	55 x 120 = 6,600	60 x 105 = 6,300	26,000
Material Required (kg) (Production x 2 kg p.u)	13,000	13,200	13,200	12,600	52,000
Add: Closing Stock (kg)					2,000
					54,000
Less: Opening Stock (kg)					4,000
Annual Purchase by weight (kg)					**50,000**
Quarterly Purchase by weight (kg)	30% x 50,000 = **15,000**	50% x 50,000 = **25,000**	20% x 50,000 = **10,000**	-	
Budgeted Purchase Price per kg	1	1.05	1.125		
Quarterly and Annual Purchase by Value (₹)	15,000 x 1 = 15,000	25,000 x 1.05 = 26,250	10,000 x 1.125 = 11,250		52,500

b) **Closing quarterly stock by weight and value**

Store Ledger (FIFO)

Quarter	Receipt			Issue			Balance (Closing Stock)		
	Quantity (kg)	Rate	Amount ₹	Quantity (kg)	Rate	Amount ₹	Quantity (kg)	Rate	Amount ₹
Opening							4,000	1	4,000
1	15,000	1	15,000	13,000	1	13,000	6,000	1	19,000
2	25,000	1.05	26,250	13,200		13,560	17,800	1.05	18,690
3	10,000	1.125	11,250	13,200	1.05	13,860	14,600		16,080
4	-	-	-	12,600		13,830	2,000	1.125	2,250

Illustration 54

You are required to prepare a Selling Overheads Budget from the estimates given below:

	Amount (₹)
Advertisement (Fixed)	1,000
Salaries of the Sales Department (Fixed)	1,000
Expenses of the Sales Department (Fixed)	750
Salesmen's Remuneration (Fixed)	3,000

Salesmen's Commission @ 1% on sales affected

Carriage Outwards: Estimated @ 5% on sales

Agent's Commission: 7 on sales

The sales during the period were estimated as follows:

a) ₹ 80,000 including Agent's Sales ₹ 8,000

b) ₹ 90,000 including Agent's Sales ₹ 10,000

c) ₹ 1,00,000 including Agent's Sales ₹ 10,500

Solution:

Selling Overheads Budget

Particulars	₹	₹	₹
Sales	80,000	90,000	1,00,000
(A) **Fixed Overheads**			
Advertisement	1,000	1,000	1,000
Salaries of Sales Dept.	1,000	1,000	1,000
Expenses of Sales Dept.	750	750	750
Salesmen Remuneration	3,000	3,000	3,000
Total (A)	5,750	5,750	5,750

(B) Variable Overheads			
Salesmen Commission	720	800	895
	[(80,000 – 8,000) x 1%]	[(90,000 – 10,000) x 1%]	[(1,00,000 – 10,500) x 1%]
Carriage Outward	4,000	4,500	5,000
	[80,000 x 5%]	[9,00,000 x 5%]	[1,00,000 x 5%]
Agent's Commission	600	750	788
	[8,000 x 7.5%]	[10,000 x 7.5%]	[10,500 x 7.5%]
Total (B)	5,320	6,050	6,683
Grand Total (A + B)	11,070	11,800	12,433

Illustration 55

Prepare a Cash Budget for the three months ending 30th June, 2022 from the information given below:

a)

Month	Sales (₹)	Materials (₹)	Wages (₹)	Overheads (₹)
February	14,000	9,600	3,000	1,700
March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

Credit terms are:

Sales / Debtors: 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

Creditors: Materials 2 month

Wages $^{1}/_{4}$ month

Overheads $^{1}/_{2}$ month

c) Cash and bank balance on 1st April, 2022 is expected to be ₹ 6,000.

d) Other relevant information are:

i) Plant and machinery will be installed in February, 2022 at a cost of ₹ 96,000. The monthly installment of ₹ 2,000 is payable from April onwards.

ii) Dividend @ 5% on preference share capital of ₹ 2,00,000 will be paid on 1st June.

iii) Advance to be received for sale of vehicles ₹ 9,000 in June.

iv) Dividends from investments amounting to ₹ 1,000 are expected to be received in June.

Solution:

Cash Budget for the 3 months ending 30th June, 2022

Particulars	April	May	June
	₹	₹	₹
Opening Balance (A)	6,000	3,950	3,000
Add: Receipts (B)			
Cash Sales	1,600	1,700	1,800
Collection from Debtors	13,050	13,950	14,850
Advance from Sale of Vehicles	-	-	9,000
Dividend	-	-	1,000
Total (A + B)	20,650	19,600	29,650
Payments (C)			
Creditors for			
Materials	9,600	9,000	9,200
Wages	3,150	3,500	3,900
Overheads	1,950	2,100	2,250
Installment of Plant and Machinery	2,000	2,000	2,000
Preference Dividend	-	-	10,000
Total (C)	16,700	16,600	27,350
Closing Balance (A + B – C)	3,950	3,000	2,300

Working Notes:

1. Calculation of Cash Sales and Collection from Debtors

Amount (₹)

Month	Total Sales	Cash Sales	Credit Sales	Collection Month			
				March	April	May	June
February	14,000	1,400	12,600	6,300	6,300	-	-
March	15,000	1,500	13,500	-	6,750	6,750	-
April	16,000	1,600	14,400	-	-	7,200	7,200
May	17,000	1,700	15,300	-	-	-	7,650
June	18,000	1,800	16,200	-	-	-	-
					13,050	13,950	14,850

2. Calculation of Payment of Wages

Month	Wages ₹	Payment Month			
		March ₹	April ₹	May ₹	June ₹
March	3,000	2,250	750	-	-
April	3,200	-	2,400	800	-
May	3,600	-	-	2,700	900
June	4,000	-	-	-	3,000
			3,150	3,500	3,900

3. Calculation of Payment of Overheads

Month	Overheads ₹	Payment Month			
		March ₹	April ₹	May ₹	June ₹
March	1,900	950	950		
April	2,000		1,000	1,000	
May	2,200			1,100	1,100
June	2,300				1,150
			1,950	2,100	2,250

Illustration 56

For production of 10,000 units the following are budgeted expenses:

	Cost Per unit ₹
Direct Materials	48
Direct Labour	24
Variable Overheads	20
Fixed Overheads (₹ 1,20,000)	12
Variable Expenses (Direct)	4
Selling Expenses (10% Fixed Fixed)	12
Administration Expenses (₹ 40,000 fixed)	4
Distribution Expenses (20% fixed)	4
	128

Prepare a budget for production of 7,000 units and 9,000 units.

Solution:

Flexible Budget

Particulars	10,000 units		7,000 units		9,000 units	
	Cost p.u. ₹	Total ₹	Cost p.u. ₹	Total ₹	Cost p.u. ₹	Total ₹
Variable Cost						
Direct Materials	48	4,80,000	48	3,36,000	48	4,32,000
Direct Labour	24	2,40,000	24	1,68,000	24	2,16,000
Variable Overheads	20	2,00,000	20	1,40,000	20	1,80,000
Variable Expenses	4	40,000	4	28,000	4	36,000
Selling Expenses (90% x 12)	10.80	1,08,000	10.80	75,600	10.80	97,200
Distribution Expenses (80% x 4)	3.20	32,000	3.20	22,400	3.20	28,800
Total Variable Cost (A)	110	11,00,000	110	7,70,000	110	9,90,000
Fixed Cost						
Fixed Overheads	12	1,20,000		1,20,000		1,20,000
Selling Expenses (10% x 12)	1.20	12,000		12,000		12,000
Administration Expenses	4	40,000		40,000		40,000
Distribution Expenses (20% x 4)	0.80	8,000		8,000		8,000
Total Fixed Cost (B)	18	1,80,000		1,80,000		1,80,000
Total Cost (A + B)	128	12,80,000		9,50,000		11,70,000

Illustration 57

Draw up a flexible budget for overhead expenses on the basis of the following data and determine the overhead rates at 70%, 80% and 90%

Plant Capacity	at 80% capacity
Variable Overheads:	₹
Indirect Labour	12,000
Stores including spares	4,000
Semi-Variable:	
Power (30% - Fixed: 70% - Variable)	20,000
Repairs (60% - Fixed: 40% - Variable)	2,000
Fixed overheads:	
Depreciation	11,000
Insurance	3,000
Salaries	10,000
Total Overheads	**62,000**
Estimated Direct Labour Hours	1,24,000

Solution:

Flexible Budget at Different Capacities and Determination of Overhead Rates

Plant Capacity	**80%** ₹	**70%** ₹	**90%** ₹
Variable Overheads:			
Indirect Labour	12,000	$\frac{12,000}{80\%} \times 70\% = 10,500$	$\frac{12,000}{80\%} \times 90\% = 13,500$
Stores including spares	4,000	$\frac{4,000}{80\%} \times 70\% = 3,500$	$\frac{4,000}{80\%} \times 90\% = 4,500$
Total Variable Overheads (A)	16,000	14,000	18,000
Semi Variable:			
Power	20,000	18,250	21,750
Repairs	2,000	1,900	2,100
Total Semi Variable (B)	22,000	20,150	23,850
Fixed:			
Depreciation	11,000	11,000	11,000
Insurance	3,000	3,000	3,000
Salaries	10,000	10,000	10,000
Total Fixed (C)	24,000	24,000	24,000
Total (A + B + C)	62,000	58,150	65,850
Labour Hours	1,24,000	$\frac{1,24,000}{80\%} \times 70\% = 1,08,500$	$\frac{1,24,000}{80\%} \times 90\% = 1,39,500$
Labour Hour Rate (₹ / hour)	0.50 $[\frac{₹62,000}{1,24,000 \text{ hr}}]$	0.536 $[\frac{₹58,150}{1,08,500 \text{ hr}}]$	0.472 $[\frac{₹68,850}{1,39,500 \text{ hr}}]$

Working Notes:

1. Calculation of Semi Variable Costs

Plant Capacity	**80% (₹)**	**70% (₹)**	**90% (₹)**
Semi Variable:			
Power			
Variable 70%	14,000	$\frac{14,000}{80\%} \times 70\% = 12,250$	$\frac{14,000}{80\%} \times 90\% = 15,750$
Fixed 30%	6,000	6,000	6,000
	20,000	18,250	21,750
Repairs			
Variable 40%	800	$\frac{800}{80\%} \times 70\% = 700$	$\frac{800}{80\%} \times 90\% = 900$
Fixed	1,200	1,200	1,200
	2,000	1,900	2,100

Illustration 58

From the following information relating to 2021 and conditions expected to prevail in 2022, prepare a budget for 2022.

2021 Actual:	Amount (₹)
Sales (40,000 units)	1,00,000
Raw materials	53,000
Wages	11,000
Variable Overheads	16,000
Fixed Overhead	10,000
2022 Prospects:	
Sales (60,000 units)	1,50,000
Raw materials	5% increase in price
Wages	10% increase in wage rate
	5% increase in productivity
Additional Plant:	
One Lathe	25,000
One Drill	12,000
10% Depreciation to be considered	

Solution:

Budget showing Costs and Profits for the year 2022

		₹
i.	Sales	1,50,000
ii.	Costs	
	Raw Materials $[53{,}000 \times \frac{60{,}000}{40{,}000} \times \frac{105}{100}]$	83,475
	Wages $[11{,}000 \times \frac{60{,}000}{40{,}000} \times \frac{110}{100} \times \frac{100}{105}]$	17,285
	Variable Overheads $[16{,}000 \times \frac{60{,}000}{40{,}000}]$	24,000
	Fixed Overheads $[10{,}000 + (25{,}000 + 12{,}000) \times \frac{10}{100}]$	13,700
	Total Cost	1,38,460
iii.	Profit (i. – ii.)	11,540

Illustration 59

Production costs of a factory for a year are as follows:

	Amount (₹)
Direct Wages	80,000
Direct Materials	1,20,000
Production Overheads: Fixed	40,000
Variable	60,000

During the forthcoming year it is anticipated that:

a. The average rate for direct labour remuneration will fall from ₹ 0.80 per hour to ₹ 0.75 per hour.

b. Production efficiency will be reduced by 5%.

c. Price per unit of direct material and of other materials and services which comprise overheads will remain unchanged, and

d. Production in the coming year will increase by $33^{1}/_{3}\%$ Draw up a production cost budget.

Solution:

Production Cost Budget for the forthcoming year

Particulars	₹
i. Wages $(80{,}000 \times 133^{1}/_{3}\% \times \frac{0.75}{0.80} \times \frac{100}{95})$	1,05,263
ii. Materials $(1{,}20{,}000 \times 133^{1}/_{3}\%)$	1,60,000
iii. Variable Overhead $(60{,}000 \times 133^{1}/_{3}\%)$	80,000
iv. Fixed Overhead	40,000
Production Cost	3,85,263

Illustration 60

A company manufacturers two products A and B and the budgeted data for the year are as follows:

	Product A ₹	Product B ₹
Sales price per unit	100	75
Direct materials per unit	20	10
Direct wages per unit	5	4
Total works overheads	10,105	9,009
Total marketing overheads	1,200	1,100

The sales manager forecasts the sales in units as follows:

	Product A	Product B
January	28	10
February	28	12
March	24	16
April	20	20
May	16	24
June	16	24
July to January (next year) per month	18	20

It is assumed that (i) there will be no work in progress at the end of any month, and (ii) finished unis equal to half the sales for the following month will be kept in stock.

Prepare (a) A Production Budget for each month and (b) A Summarized Profit and Loss Statement for the year.

Solution:

(a) **Production Budget (in units)**

Particulars	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
Product A													
Sales	28	28	24	20	16	16	18	18	18	18	18	18	240
Add: Cl. Stock	14	12	10	8	8	9	9	9	9	9	9	9	
	42	40	34	28	24	25	27	27	27	27	27	27	
Less: Op. Stock	14	14	12	10	8	8	9	9	9	9	9	9	
	28	26	22	18	16	17	18	18	18	18	18	18	235
Product B													
Sales	10	12	16	20	24	24	20	20	20	20	20	20	226
Add: Cl. Stock	6	8	10	12	12	10	10	10	10	10	10	10	
	16	20	26	32	36	34	30	30	30	30	30	30	
Less: Op. Stock	5	6	8	10	12	12	10	10	10	10	10	10	
	11	14	18	22	24	22	20	20	20	20	20	20	231

Closing Stock of January = $^1/_2$ × Sales of February

And, Opening Stock of January = Closing Stock of December = $^1/_2$ × Sales of January

or, Opening Stock of January = $^1/_2$ × Sales of January

(b) Summarised Production Cost Budget

Particulars	Product A	Product B	Total
Production	235 units	231 units	
	₹	₹	₹
Direct Material:	235 @ ₹ 20 = 4,700	231 @ ₹ 10 = 2,310	7,010
Direct Labour	235 @ ₹ 5 = 1,175	231 @ ₹ 4 = 924	2,099
Works Overheads	10,105	9,009	19,114
Total Production Cost	15,980	12,243	28,223
Production Cost p.u.	[₹15,980 / 235 units] = ₹ 68 p.u.	[₹12,243 / 231 units] = ₹ 53 p.u.	

Summarised Profit and Loss Statement for the year

Particulars	Product A (₹)	Product B (₹)	Total (₹)
Sales	240 × 100 = 24,000	226 × 75 = 16,950	40,950
Less: Cost of Goods Sold	240 × 68 = 16,320	226 × 53 = 11,978	28,298
Marketing Overheads	1,200	1,100	2,300
Profit	6,480	3,872	10,352

Illustration 61

Three Articles X, Y and Z are produced in a factory. They pass through two cost centers A and B. From the data furnished compile a statement for budgeted machine utilization in both the centers.

(a) Sales budget for the year

Product	Annual Budgeted Sales (units)	Opening Stock of finished products (units)	Closing Stock
X	4,800	600	Equivalent to 2 months sales
Y	2,400	300	-do-
Z	2,400	800	-do-

(b) Machine hours per unit of product

Product	Cost Centers	
	A	B
X	30	70
Y	200	100
Z	30	20

(c) Total number of machines

Cost Centre	
A	284
B	256
Total	540

(d) Total working hours during the year: Estimated 2,500 hours per machine.

Solution:

Calculation of units of Production of Different Products

Particulars	Product X (Units)	Product Y (Units)	Product Z (Units)
Sales	4,800	2,400	2,400
Add: Closing Stock	$\frac{4,800}{12} \times 2 = 800$	$\frac{2,400}{12} \times 2 = 400$	$\frac{2,400}{12} \times 2 = 400$
Less: Opening Stock	600	300	800
Production	5,000	2,500	2,000

Machine Hours Utilisation Budget

Particulars	Cost Centers							
	A				B			
	X	Y	Z	Total	X	Y	Z	Total
Production (units)	5,000	2,500	2,000		5,000	2,500	2,000	
Hours required p.u.	30	200	30		70	100	20	
Total Machine hours required	1,50,000	5,00,000	60,000	7,10,000	3,50,000	2,50,000	40,000	6,40,000
Number of Machines required	60	200	24	284	140	100	16	256

Working Notes:

Cost Centre A

Product X $= \frac{284}{7,10,000} \times 1,50,000 = 60$ machines

Product Y $= \frac{284}{7,10,000} \times 5,00,000 = 200$ machines

Product Z $= \frac{284}{7,10,000} \times 60,000 = 24$ machines

Cost Centre B

Product X $= \frac{256}{6,40,000} \times 3,50,000 = 140$ machines

Product Y $= \frac{256}{6,40,000} \times 2,50,000 = 100$ machines

Product Z $= \frac{256}{6,40,000} \times 40,000 = 16$ machines

Exercise

A. Theoretical Questions:

Multiple Choice Questions

1. The cost of a product under marginal costing system includes
   a. Prime cost plus variable overheads
   b. Prime cost plus fixed overheads
   c. Prime cost plus factory overheads
   d. Only prime cost
2. The difference between absorption costing and marginal costing is in regard to the treatment of
   a. Direct materials
   b. Fixed overheads
   c. Prime cost
   d. Variable overheads
3. Fixed costs are treated as
   a. Overheads costs
   b. Prime costs
   c. Period costs
   d. Conversion costs
4. When sales and production (in units) are same then profits under
   a. Marginal costing is lower than that of absorption costing
   b. Marginal costing is higher than that of absorption costing
   c. Marginal costing is equal to that of absorption costing
   d. None of the above
5. When sales exceed production (in units) then profit under
   a. Marginal costing is higher than that of absorption costing
   b. Marginal costing is equal to that of absorption costing
   c. Marginal costing is lower than that of absorption costing
   d. None of the above

6. Which of the following factors responsible for change in the break-even point?
   a. Change in selling price
   b. Change in variable cost
   c. Change in fixed cost
   d. All of the above

7. Variable cost
   a. Remains fixed in total
   b. Remains fixed per unit
   c. Varies per unit
   d. Nor increase or decrease

8. Marginal Costing technique follows the following basic of classification
   a. Element wise
   b. Function Wise
   c. Behaviour wise
   d. Identifiability wise

9. P/V ratio will increase if the
   a. There is a decrease in fixed cost
   b. There is an increase in fixed cost
   c. There is a decrease in selling price per unit.
   d. There is a decrease in variable cost per unit.

10. The technique of differential cost is adopted when
    a. To ascertain P/V ratio
    b. To ascertain marginal cost
    c. To ascertain cost per unit
    d. To make choice between two or more alternative courses of action

11. Which of the following would not be used to estimate standard direct material prices?
    a. The availability of bulk purchase discounts
    b. Purchase contracts already agreed
    c. The forecast movement of prices in the market
    d. Performance standards in operation

12. What is an attainable standard?

a. A standard which includes no allowance for losses, waste and inefficiencies. It represents the level of performance which is attainable under perfect operating conditions

b. A standard which includes some allowance for losses, waste and inefficiencies. It represents the level of performance which is attainable under efficient operating conditions

c. A standard which is based on currently attainable operating conditions

d. A standard which is kept unchanged, to show the trend in costs

13. Budgets are shown in-Terms

a. Qualitative

b. Quantitative

c. Materialistic

d. both (b) and (c)

14. Which of the following is not an element of master budget?

a. Capital Expenditure Budget

b. Production Schedule

c. Operating Expenses Budget

d. All above

15. Which of the following is not a potential benefit of using a budget?

a. Enhanced coordination of firm activities

b. More motivated managers

c. Improved inter-departmental communication

d. More accurate external financial statements

16. Which of the following is a long-term budget?

a. Master Budget

b. Flexible Budget

c. Cash Budget

d. Capital Budget

17. Materials become key factor, if

a. quota restrictions exist

b. insufficient advertisement prevails

c. there is low demand

d. there is no problem with supplies of materials

18. The difference between fixed cost and variable cost assumes significance in the preparation of the

following budget

a. Master Budget

b. Flexible Budget

c. Cash Budget

d. Capital Budget

19. The budget that is prepared first of all is _____.

a. Master budget

b. Sales budget assuming that it is the key factor

c. Cash Budget

d. Capital expenditure budget

20. Sales budget is a _____ .

a. expenditure budget

b. functional budget

c. master budget

d. None of these

21. When a company wants to prepare a factory overheads budget in which the estimated costs are directly derived from the estimates of activity levels, which of the following budget should be prepared by the company?

a. Flexible budget

b. Fixed budget

c. Master budget

d.. R & D budget

22. Which of the following budgets facilitates classification of fixed and variable costs:

a. Capital expenditure budget

b. Flexible budget

c. Cash budget

d. Raw materials budget

23. The entire budget organisation is controlled and headed by a senior executive known as:

a. General Manager

b. Accountant

c. Budget Controller

d. None of the above

24. Which of the following is generally a long term budget:
    a. Cash budget
    b. Sales budget
    c. Research and Development budget
    d. Capital expenditure budget

25. A flexible budget requires a careful study of
    a. Fixed, semi-fixed and variable expenses
    b. Past and current expenses
    c. Overheads, selling and administrative expenses.
    d. None of these.

26. The basic difference between a fixed budget and flexible budget is that a fixed budget _____
    a. is concerned with a single level of activity, while flexible budget is prepared for different levels of activity
    b. Is concerned with fixed costs, while flexible budget is concerned with variable costs.
    c. is fixed while flexible budget changes
    d. None of these.

Answer:

1	A	**2**	B	**3**	C	**4**	C	**5**	A	**6**	D	**7**	B	**8**	C
9	D	**10**	D	**11**	D	**12**	B	**13**	D	**14**	B	**15**	D	**16**	D
17	A	**18**	B	**19**	B	**20**	B	**21**	A	**22**	B	**23**	C	**24**	D
25	A	**26**	A												

⊙ State True or False

1. Excess of Actual cost over Standards Cost is treated as unfavourable variance.
2. Variances are calculated for both material and labour.
3. While fixing standards, normal losses and wastages are taken into account.
4. Standard costing is an ideal name given to the estimate making.
5. Pre-determined standards provide a yardstick for the measurement of efficiency.
6. Material cost variance and labour cost variance are always equal.
7. Fixing standards is the work of industrial engineer or the production people and not of cost accountant.

8. Standards costing are more profitability employed in job order industries than in process type industries.

9. Budget is a means and budgetary control is the end result.

10. To achieve the anticipated targets, Planning, Co-ordination and Control are the important main tasks of management, achieved through budgeting and budgetary control.

11. A key factor or principal factor does not influence the preparation of all other budgets.

12. Budgetary control does not facilitate introduction of 'Management by Exception'.

13. Generally, budgets are prepared to coincide with the financial year so that comparison of the actual performance with budgeted estimates would facilitate better interpretation and understanding.

14. A flexible budget is one, which changes from year to year.

15. A flexible budget recognises the difference between fixed, semi-fixed and variable cost and is designed to change in relation to the change in level of activity.

16. Sales budget, normally, is the most important budget among all budgets.

17. The principal factor is the starting point for the preparation of various budgets.

18. A budget manual is the summary of all functional budgets.

Answer:

1	**T**	**2**	**T**	**3**	**T**	**4**	**F**	**5**	**T**	**6**	**F**	**7**	**F**	**8**	**F**
9	**T**	**10**	**T**	**11**	**F**	**12**	**F**	**13**	**T**	**14**	**F**	**15**	**T**	**16**	**T**
17	**T**	**18**	**F**												

⊙ **Fill in the Blanks**

1. _____ are not assigned to the product but are recognized as expenses in the period incurred. All nonmanufacturing costs are period costs

2. Only difference between variable costing and absorption costing is the classification of _____

3. Under marginal costing the difference in the magnitude of _____ does not affect the unit cost of production.

4. _____ compare favourably with the economist's definition of marginal cost, viz. that marginal cost is the amount which at any given volume of output is changed if output is increased or decreased by one unit.

5. Historical costing uses post period costs while standards costing uses _____ costs.

6. Three types of standards are _____, _____, _____.

7. The _____ is usually the co-ordinator of the standards committee.

8. Basically there are two types of standards viz; _____ and _____.
9. When actual cost is less than the standards cost, it is known as _____ variance.
10. A flexible budget is geared toward _____ rather than a single level of activity.
11. _____ is a system for reporting revenue and cost information to the individual responsible for the revenue-causing and/or cost-incurring function.
12. Budgets are useful for _____ the operating activities and _____ of a business enterprise.
13. The _____ is the starting point in preparing the master budget (given that sales are the principal budget factor.
14. Responsibility Accounting is a system of accounting that recognizes various _____ throughout the organisation.

Answer:

1	Period Cost	**2**	fixed factory overheads
3	opening stock and closing stock	**4**	Differential Costs
5	Predetermined	**6**	Basic Ideal and Current
7	Cost Accountants	**8**	ideal standard attainable standard
9	Favourable	**10**	A range of activity
11	Responsibility accounting	**12**	forecasting, financial position
13	Sales Budget	**14**	responsibility centres

⊙ Essay Type Questions

1. Define 'variable cost' and 'fixed cost' with help of diagrams.
2. Contrast the economist's view of costs and revenues with that taken in management accounting.
3. What happens to the breakeven point when the sales price per unit falls?
4. What happens to the breakeven point when the variable cost per unit falls?
5. What happens to the breakeven point when fixed overheads increase?
6. Give three examples of applications of CVP analysis.
7. Explain how CVP analysis helps in the following decisions:
   i. special orders;
   ii. abandonment decisions;
   iii. situations of limiting factors;
   iv. a decision on buying in services.

8. Explain the situations where full cost pricing may be appropriate.
9. What are the limitations of full cost pricing?
10. Explain the situations where marginal cost pricing may be appropriate.
11. Describe the difference between budgeted and standard costs.
12. Describe the different purposes of a standard costing system.
13. State practical application of standard costing system.
14. What are the possible causes of (a) material price and (b) material usage variances?
15. Explain why it is preferable for the material price variance to be computed at the point of purchase rather than the point of issue.
16. What are the possible causes of (a) wage rate and (b) labour efficiency variances?
17. Explain the reason for excluding idle time variance from labour efficiency variance.
18. 'Idle time variance is always adverse' – Explain.
19. What is generally meant by the term budget? What are the essentials of a budget?
20. State the main differences between budgets and forecasts?
21. Explain budgetary control? What are the objectives of Budgetary Control?
22. Distinguish between Standard Costing and Budgetary control?
23. Write short notes on:
    i. Budget Centre.
    ii. Budget Officer.
    iii. Budget Committee.
    iv. Budget Manual.
    v. Budget Period.
    vi. Key Factor.
    vii. Performance of Budgeting.
24. Briefly explain the different types of budgets with diagram for the classification.
25. What do you understand by Cash Budget? Discuss the procedure for preparing the cash budget.
26. What do you understand by Master Budget?
27. What do you understand by Fixed Budget and Flexible Budget? What are the advantages of Flexible Budget?

B. Numerical Questions:

⊙ Numericals Multiple Choice Questions

1. If sales are ₹ 90,000 and variable cost to sales is 75%, contribution is
   a. ₹ 21,500
   b. ₹ 22,500
   c. ₹ 23,500
   d. ₹ 67,500

2. If sales are ₹ 1,50,000 and variable cost are ₹ 50,000. Compute P/V ratio.
   a. 66.66%
   b. 100%
   c. 133.33%
   d. 65.66%

3. Contribution is ₹ 3,00,000 and sales is ₹ 15,00,000. Compute P/V ratio.
   a. 15%
   b. 20%
   c. 22%
   d. 17.5%

4. Variable cost to sales ratio is 40%. Compute P/V ratio.
   a. 60%
   b. 40%
   c. 100%
   d. None of the these

5. Fixed cost is ₹ 30,000 and P/V ratio is 20%. Compute breakeven point.
   a. ₹ 1,60,000
   b. ₹ 1,50,000
   c. ₹ 1,55,000
   d. ₹ 1,45,000

6. Standard price of material per kg ₹ 20, standards consumption per unit of production is 5 kg. Standard material cost for producing 100 units is

   a. ₹ 20,000

   b. ₹ 12,000

   c. ₹ 8,000

   d. ₹ 10,000

7. Standard cost of material for a given quantity of output is ₹ 15,000 while the actual cost of material used is ₹ 16,200. The material cost variance is:

   a. ₹ 1,200 (A)

   b. ₹ 16,200 (A)

   c. ₹ 15,000 (F)

   d. ₹ 31,200 (A)

8. Standard price of material per kg is ₹ 20, standard usage per unit of production is 5 kg. Actual usage of production 100 units is 520 kgs, all of which was purchase at the rate of ₹ 22 per kg. Material usage variance is

   a. ₹ 400 (F)

   b. ₹ 400 (A)

   c. ₹ 1,040 (F)

   d. ₹ 1,040 (A)

9. Standard price of material per kg is ₹ 20, standard usage per unit of production is 5 kg. Actual usage of production 100 units is 520 kgs, all of which was purchase at the rate of ₹ 22 per kg. Material cost variance is

   a. ₹ 2,440 (A)

   b. ₹ 1,440 (A)

   c. ₹ 1,440 (F)

   d. ₹ 2,300 (F)

10. Standard quantity of material for one unit of output is 10 kgs. @ ₹ 8 per kg. Actual output during a given period is 800 units. The standards quantity of raw material

    a. 8,000 kgs

    b. 6,400 kgs

    c. 64,000 kgs

    d. None of these

11. What is the labour rate variance if standard hours for 100 units of output are 400 @ ₹ 2 per hour and actual hours taken are 380 @ ₹ 2.25 per hour?

    a. ₹ 120 (adverse)

    b. ₹ 100 (adverse)

    c. ₹ 95 (adverse)

    d. ₹ 25 (favourable)

12. In a period, 11280 kilograms of material were used at a total standard cost of ₹ 46,248. The material usage variance was ₹ 492 adverse. What was the standard allowed weight of material for the period?

    a. 11600 kg

    b. 11160 kg

    c. 12190 kg

    d. 10590 kg

13. The operations to produce a unit of product L require 9 active hours. Budgeted idle time of 10% of total hours paid for is to be incorporated into the standard times for all products. The wage rate is ₹ 4 per hour. The standard labour cost of one unit of product L is:

    a. ₹ 10.00

    b. ₹ 36.00

    c. ₹ 39.60

    d. ₹ 40.00

Answer:

1	**B**	**2**	**A**	**3**	**B**	**4**	**A**	**5**	**B**	**6**	**D**	**7**	**A**	**8**	**B**
9	**B**	**10**	**A**	**11**	**C**	**12**	**B**	**13**	**D**						

Unsolved Case

1. Leisure Furniture Ltd produces furniture for hotels and public houses using specific designs prepared by firms of interior design consultants. Business is brisk and the market is highly competitive with a number of rival companies tendering for work. The company's pricing policy, based on marginal costing (variable costing) techniques, is generating high sales. The main activity of Home Furniture Ltd is the production of a limited range of standard lounge suites for household use. The company also offers a service constructing furniture to customers' designs. This work is undertaken to utilise any spare capacity. The main customers of the company are the major chains of furniture retailers. Due to recession, consumer spending on household durables has decreased recently and, as a result, the company is experiencing a significant reduction in orders for its standard lounge suites. The market is unlikely to improve within the next year. The company's pricing policy is to add a percentage mark-up to total cost.

Required

Explain why different pricing policies may be appropriate in different circumstances, illustrating your Solution: by reference to Leisure Furniture Ltd and Home Furniture Ltd.

2.[1] Decathlon LLP manufactures cricket bats using high quality wood and skilled labour using mainly traditional manual techniques. The manufacturing department is a cost centre within the business and operates a standard costing system based on marginal costs. At the beginning of April, the production director attempted to reduce the cost of the bats by sourcing wood from a new supplier and deskilling the process a little by using lower grade staff on parts of the production process. The standards were not adjusted to reflect these changes. The variance report for April is shown below (extract):

Variances	Adverse (₹)	Favourable (₹)
Material price		**5100**
Material usage	**7500**	
Labour rate		**43600**
Labour efficiency	**48800**	
Labour idle time	**5400**	

The production director pointed out in his April board report that the new grade of labour required significant training in April and this meant that productive time was lower than usual. He accepted that the workers were a little slow at the moment but expected that an improvement would be seen in May. He also mentioned that the new wood being used was proving difficult to cut cleanly resulting in increased waste levels.

Sales for April were down 10 per cent on budget and returns of faulty bats were up 20 per cent on the previous month. The sales director resigned after the board meeting stating that SW had always produced quality products but the new strategy was bound to upset customers and damage the brand of the business.

Required:

Assess the performance of the production director using all the information above taking into account both the decision to use a new supplier and the decision to deskill the process.

3.[2] Thorne Co. values, advertises and sells residential property on behalf of its customers. The company has been in business for only a short time and is preparing a cash budget for the first four months of 2022.

Year	**2021**	**2022**	**2022**	**2022**	**2022**
Month	**December**	**January**	**February**	**March**	**April**
Units Sold	**10**	**10**	**15**	**25**	**30**

The average price of each property is ₹ 1,80,000 and Thorne Co. charges a fee of 3 per cent of the value of each property sold. Thorne Co. receives 1 per cent in the month of sale and the remaining 2 per cent in the

1 Adopted from Management and Cost Accounting (10th edition) by Colin Drury.

2 Adopted from Management and Cost Accounting, eighth edition by Colin Drury

month after sale. The company has nine employees who are paid on a monthly basis. The average salary per employee is ₹ 35,000 per year. If more than 20 properties are sold in a given month, each employee is paid in that month a bonus of ₹ 140 for each additional property sold.

Variable expenses are incurred at the rate of 0.5 per cent of the value of each property sold and these expenses are paid in the month of sale. Fixed overheads of ₹ 4,300 per month are paid in the month in which they arise. Thorne Co. pays interest every three months on a loan of ₹ 200 000 at a rate of 6 per cent per year. The last interest payment in each year is paid in December. An outstanding tax liability of ₹ 95,800 is due to be paid in April. In the same month Thorne Co. intends to dispose of surplus vehicles, with a net book value of ₹ 15,000, for ₹ 20,000. The cash balance at the start of January 2022 is expected to be a deficit of ₹ 40,000.

Required :

Thorne company appoints you to

a. Prepare a monthly cash budget for the period from January to April. The budget must clearly indicate each item of income and expenditure, and the opening and closing monthly cash balances.

b. Discuss the factors to be considered by Thorne Co. when planning ways to invest any cash surplus forecast by its cash budgets.

c. Discuss the advantages and disadvantages to Thorne Co. of using over draft finance to fund any cash shortages forecast by its cash budgets.