Intermediate

Cost Accounting

Paper 8

The Institute of Cost Accountants of India

Statutory Body under an Act of Parliament

www.icmai.in

About the Institute

The Institute of Cost Accountants of India is a Statutory Body set up under an Act of Parliament in the year 1959. The Institute as a part of its obligation, regulates the profession of Cost and Management Accountancy, enrols students for its courses, provides coaching facilities to the students, organizes professional development programmes for the members and undertakes research programmes in the field of Cost and Management Accountancy. The Institute pursues the vision of cost competitiveness, cost management, efficient use of resources and structured approach to cost accounting as the key drivers of the profession.

With the current emphasis on management of resources, the specialized knowledge of evaluating operating efficiency and strategic management the professionals are known as ''Cost and Management Accountants (CMAs)''. The Institute is the 2nd largest Cost & Management Accounting body in the world and the largest in Asia, having more than 5,00,000 students and 90,000 members all over the globe. The Institute operates through four regional councils at Kolkata, Delhi, Mumbai and Chennai and 113 Chapters situated at important cities in the country as well as 11 Overseas Centres, headquartered at Kolkata. It is under the administrative control of the Ministry of Corporate Affairs, Government of India.

Vision Statement

"The Institute of Cost Accountants of India would be the preferred source of resources and professionals for the financial leadership of enterprises globally."

Mission Statement

"The Cost and Management Accountant professionals would ethically drive enterprises globally by creating value to stakeholders in the socio-economic context through competencies drawn from the integration of strategy, management and accounting."

Motto

असतोमा सद्गमय	From ignorance, lead me to truth
तमसोमा ज्योतिर् गमय	From darkness, lead me to light
मृत्योर्मामृत गमय	From death, lead me to immortality
ॐ शान्ति शान्ति शान्तिः	Peace, Peace, Peace

Cover Image: https://www.shutterstock.com/search/cost-accounting

Behind Every Successful Business Decision, there is always a CMA

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

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:

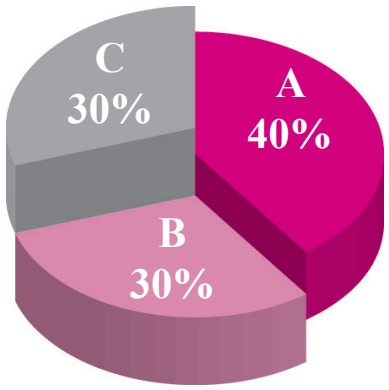
M/S. Infinity Advertising Services Pvt. Ltd.
Plot No. 171 & 172, Sector-58, Faridabad,
Haryana - 121004

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 organizations 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 overhead 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 overhead costs.
3	**Cost Accounting Standards**	https://icmai.in/CASB/casb-about.php (resources available in the website of the Institute of Cost Accountants of India) https://icmai.in/upload/CASB/2015/GACAP-Final.pdf (resources available in the website of the Institute of Cost Accountants of India).	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 (resources available in the website of the Institute of Cost Accountants of India).	
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

Contents as per Syllabus

SECTION-A

Introduction to Cost Accounting

Introduction to Cost Accounting 1

This Module Includes

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

The definition of Accounting put forward by American Accounting Association, which is one of the most used and relevant, 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:

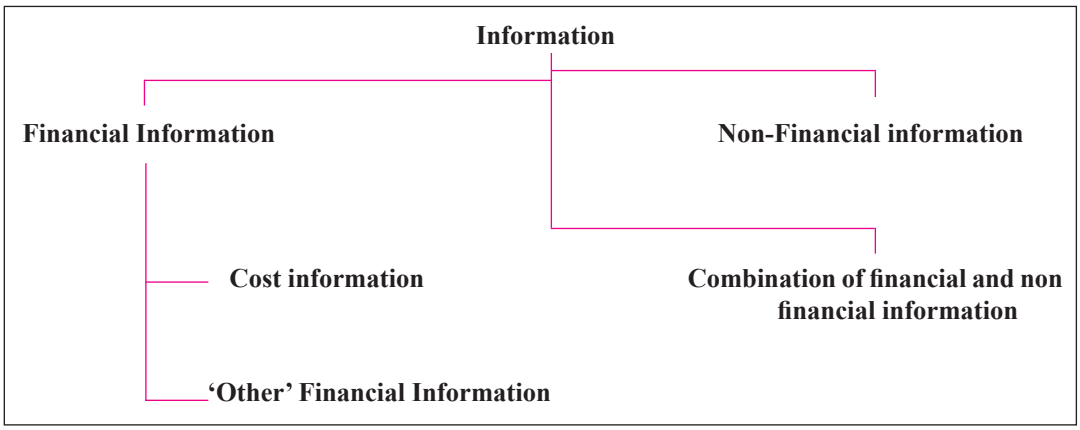


Figure 1.1: Types of Information

From the above it is clear that cost information or information related to the cost of the product or service is a financial information and 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.

There are two other important aspects to the discussion undertaken in the previous lines which are as follows:

- **Users of financial information** – Accounting is often referred as a language of the Business which helps the business to communicate with the stakeholders who are people having an interest in an organisation. Thus, the stakeholders of the business are the users of accounting information. These people are categorised as managers, shareholders and potential investors, employees, creditors, 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).

  Though the following aspect is taken up in details in subsequent section, it is important to note that the **management accounting** is concerned with the provision of information to people within the organisation (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 market 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 aspect 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 organisation 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 organisation.

  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 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.

1.1.1 Evolution of Cost Accounting

It is well known that the double entry system of accounting was initiated in 1494[5]. Since then, till the latter 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 of 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 organisations. But all these along with the adaptations were exclusively focussed on direct labour and direct material (prime costs).

The scientific management movement[6] provided a major impetus to the further 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[7].

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 and Works 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 233B 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 differences among these terms. As a professional, though we use interchangeably we must know the meaning of each term precisely.

1.1.2 Four 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 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 information need of the external users. Thus, it would not be an exaggeration to highlight that cost

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.

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 four basic conceptual issues which are discussed in the following lines.

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[9] 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[10] which are pertinent for decision making purpose.

   The Institute of Cost Accountants of India which was previously known as The Institute of Cost and Works Accountants of India was established in 1944 as a registered company under the Companies Act with the objects of promoting, regulating and developing the profession of Cost Accountancy.

   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[11]).

   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.

2. **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, 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.

9 CIMA Official Terminology, 2005, The Chartered Institute of Management Accountants (CIMA Publishing, an imprint of Elsevier).

10 This includes opportunity cost which is pertinent for decision making purpose. This is taken up in later part of this module

11 This are, thus, the guiding principles of cost accountancy. A comprehensive discussion is undertaken in Module III of this study note.

c. Cost accounting 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 one-time exercise.

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

3. **Cost accounting** - CIMA Official Terminology5 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 purpose 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[12].

   c. Computation of profitability[13] which pivots around fixation of selling price is an important aspect of cost accounting.

4. **Costing** - CIMA Official Terminology5 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 very basic objective are summarized in the following lines:

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/ 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.

12 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.

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

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**[14] **-** 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 ensure that 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. The most important statutory books are:

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**[15]

   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

14 This is covered in module 4 of this study note.

15 This is one of the frequently used cost accounting system and is used for external reporting purpose, as well.

manufacturing fixed overhead, the administrative overhead, selling and distribution overheads are treated as fixed cost and recorded only when they are incurred[16]. 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[16].

4. **Standard Costing[17]**

   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 Accounting, 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 organisations 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 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.

16 This is discussed in module 6.1 of this study note.

17 This is discussed in module 6.2 of this study note.

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 organisation 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 organisation. 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 organisation is guided by the management control requirements. The costing system should supply data to persons at different levels in the organisation 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. **Organisation Structure -** The structure of the organisation also plays a vital role in designing a costing system. The system should correspond to the hierarchy of the organisation.
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[18].

   (a) Classification of costs into its elements.

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

   (c) Apportionment of overhead 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 recording of the financial transactions of a business. The recordation process includes setting up a system of record keeping, tracking transactions within that system, 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.

- **Financial Reporting[19]**

  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 Management 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 as follows:

18 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.

19 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.

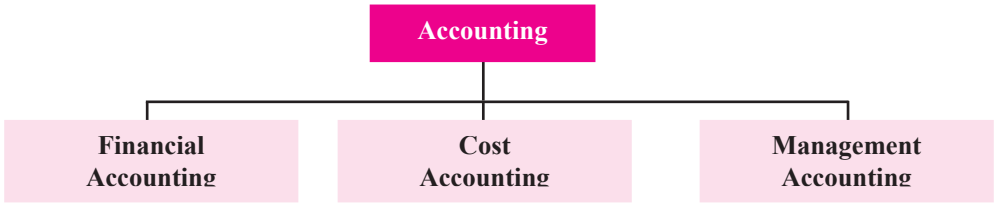


Figure 1.2: Classification of Accounting

Financial Accounting and Cost Accounting – A Comparison

Financial accounting and cost accounting are complementary to each other. They also supplement 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 is 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.
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

Basis of Comparison	Financial Accounting	Cost Accounting
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 a view to 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 known 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 organisation. Following table is a pictorial 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 both the 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.
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 line:

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 furnishes the statutory requirements)	Management accounting has no statutory requirement.
Format	Financial accounting has specific formats for presenting and recording information.	There is 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

The term 'cost' is discussed in previous section of this module. CIMA official termilogy[9] states that the term can be used either as a noun (referring to the cost of an item) or as a verb (cost of an activity). The documents furnish the two definition as follows:

As a noun: the amount of expenditure (actual or notional) incurred on, or attributable to, a specified thing or activity

As a verb: to ascertain the cost of a specified thing or activity.

As such, cost accounting transactions are recorded at historic cost[20] for measurement basis, but for decision making purpose costs are referred as economic cost.

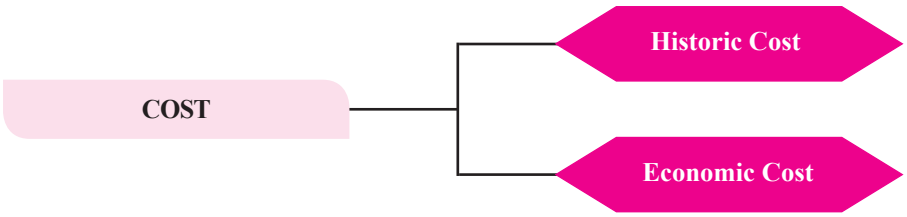


Figure 1.3: Types of Cost

Economic costs are only one type of cost used in the managerial decision making process.

In the next few lines economic costs along with the other costs pertinent to the managerial decision making process are discussed.

- **Out-of-Pocket Cost** – This is the portion of the cost associated with an activity that involve cash payment to other parties, as opposed to costs which do not require any cash outlay, such as depreciation and certain allocated costs. Out-of-Pocket Costs are very much relevant in the consideration of price fixation during trade recession or when a make-or-buy decision is to be made.
- **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

20 This is discussed in details in the next section of this study note: Elements of Cost

hour then the historical cost of the nap is zero as the person did not pay out any money in order to take the nap. However, the economic cost of the nap is ₹25. This is what he could have 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

If the users of accounting information want to know the cost of something, that something is called a cost object. Examples of cost objects include:

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

CIMA Official Terminology[9] states, A cost object is for example a product, service, centre, activity, customer or distribution channel in relation to which costs are ascertained.
GACAP[21] 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 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[9] defines a cost centre as a production or service location, function, activity or item of equipment for which costs are accumulated.

GACAP[21] 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.

21 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)

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[22] centres 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.

4. Responsibility Centre

Responsibility Center refers to a particular segment or unit of an organisation 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.

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.

5. 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

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)

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[21] 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

6. Composite Cost Unit[23]

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 are used. 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

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[21] 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[24], adjustment for Stock of work-in-Process, finished goods, recoveries for sales of scrap, wastage shall be made.

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

24 '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

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 overhead costs of converting raw material to the finished products or converting a material from one stage of production to another stage.

CIMA official terminology[9] defines conversion cost as cost of converting material into finished product, typically including direct labour, direct expense and production overhead.

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

9. Overhead Cost:

An item of expense/cost which is not directly traceable to the product. CIMA official terminology[9] defines overhead cost as expenditure on labour, materials or services that cannot be economically identified with a specific saleable cost unit.

GACAP[21] 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 overhead cost[25]:

1. Overhead 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[26] and indirect expenses.

The overhead 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[27] overheads are given as under:

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)

25 A synonymous term 'burden' is in common use in the US and in subsidiaries of American companies.

26 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'

27 In standard books only this is mentioned as factory (production) overhead, administrative overhead and selling and distribution overhead. Here the classification is as mentioned in CAS 1.

The above classification is pictorially represented as follows:

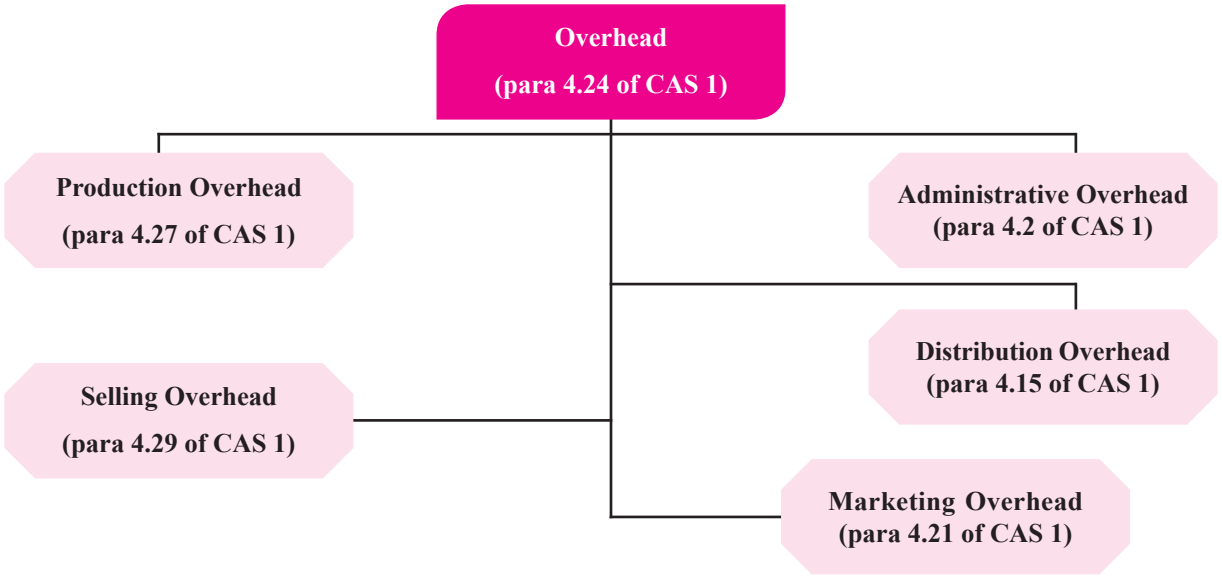


Figure 1.4: Types of Overhead

10. Cost Accounting Standards[28]

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 of organisations, 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[29].

11. Cost Allocation

When items of cost 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 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

28 This is discussed in details in Module 3 of this study note.

29 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).

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 overhead apportionment, allocation and absorption.

13. Cost Absorption[30]

Ultimately the indirect costs or overhead 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 observation to ensure 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 overhead absorption rate (OAR) as a means of attributing overhead to a product or service, based for example on direct labour hours, direct labour cost or machine hours.

14. Under/over absorption of overhead[31]

Costs, as such, are either direct costs (discussed in the next section) 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 (calculating the cost per unit of a product) the direct costs can be added specific 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 overhead cost to the products.

Overhead 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 overhead rate permanently available which they can use in product costing and fixation of sale price.

The actual overhead costs and activity levels are not known until the end of the period. Thus it would not be desirable for managers to have to wait until after the end of the period before they had a rate of overhead

30 This is fundamental aspect of the absorption costing system.

31 This is discussed in details under the section 'overheads' in Module 2.

that they could use on a day-to-day basis, but this gives rise to the problem of under/over absorption as the actual figures for overhead and for the absorption base are likely to be different from the estimates used in calculating the absorption rate.

When this happens, the overhead will be either under absorbed or over absorbed. If the actual overhead incurred is higher than the overhead absorbed, then overhead is 'under absorbed' and if the actual overhead incurred is lower than the overhead absorbed then the overhead 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 overhead (`)	3,40,000	1,20,000
Machine hours	1,70,000	4,200
Direct labour hours	16,500	40,000
Actual results		
Production overhead incurred (`)	3,60,000	1,29,400
Machine hours	1,50,000	3,900
Direct labour hours	18,290	44,100

If it is company policy to use machine hour rate to absorb production overhead in the machining department. The finishing department is more labour intensive and therefore labour hour rate is considered as more appropriate overhead absorption rate. Find out the Overhead Absorption Rates, Under and Over Absorbed Overheads.

Solution:

The overhead 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	₹300000 (₹ 2 × 150000 labour hour)	₹132300 (₹ 3 × 44100 machine hours)
Actual overhead (incurred)	₹ 360000	₹ 129400
Under/Over absorbed overhead	₹ 60000 (absorbed overhead is less than actual overhead, thus under absorbed)	₹ 2900 (absorbed overhead is greater than actual overhead, thus over absorbed)

Elements of Cost

1.3

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

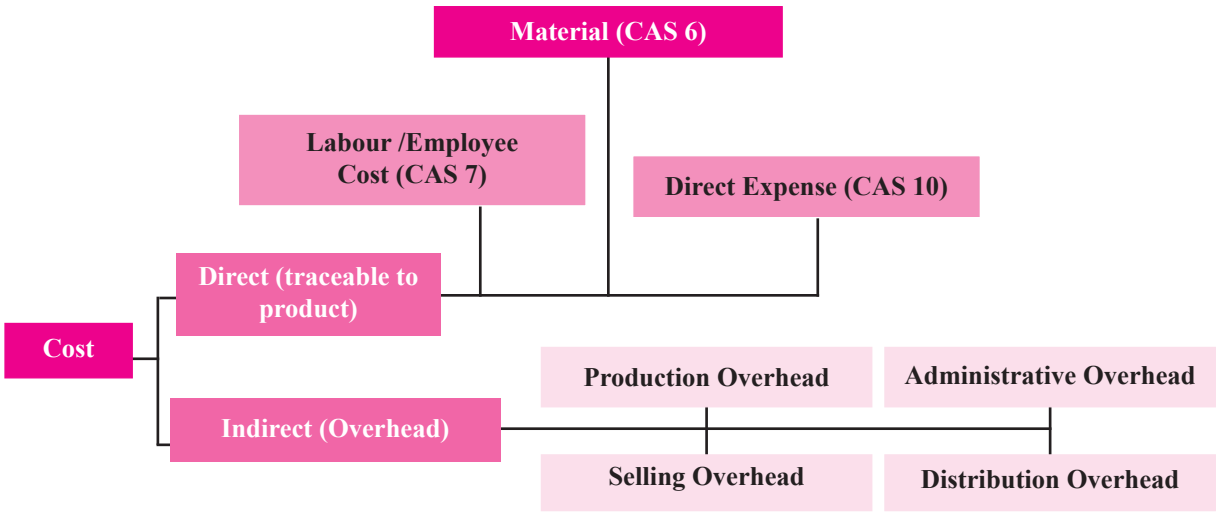


Figure 1.5: Elements of Cost

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

- Material
- Labour[32]
- Expenses

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

32 Labour cost is referred as employee cost as per CAS 7

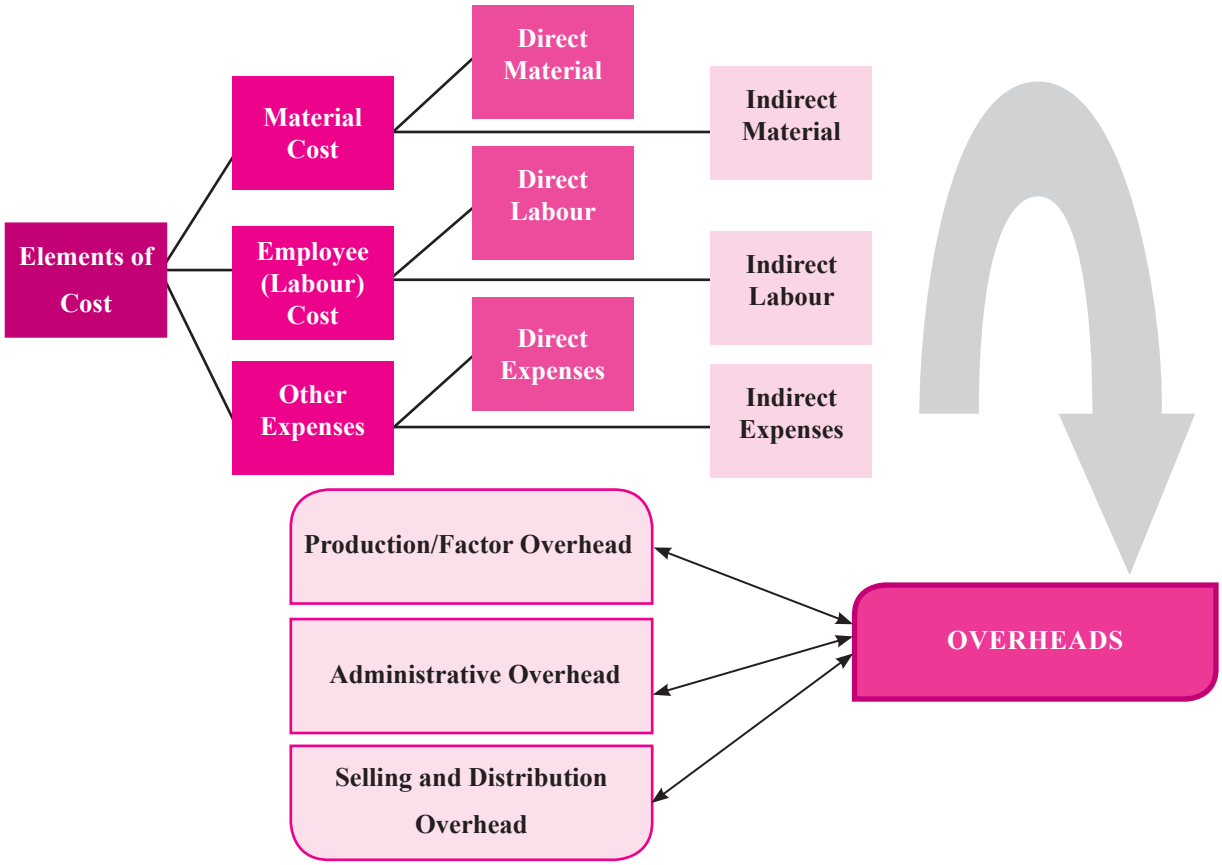


Figure 1.6: Classification of Elements of Cost into Direct and Indirect Costs

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 define Prime cost is the aggregate of direct material cost, direct employee cost and direct expenses.

Thus,

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

It is 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[33]. thus, absorption costing also referred as full costing or traditional costing is GAAP compliant.

The following is a pictorial representation of the elements of cost and how the same builds up into cost of production and cost of sales under absorption costing system:

33 https://corporatefinanceinstitute.com/resources/knowledge/accounting/absorption-costing-guide/

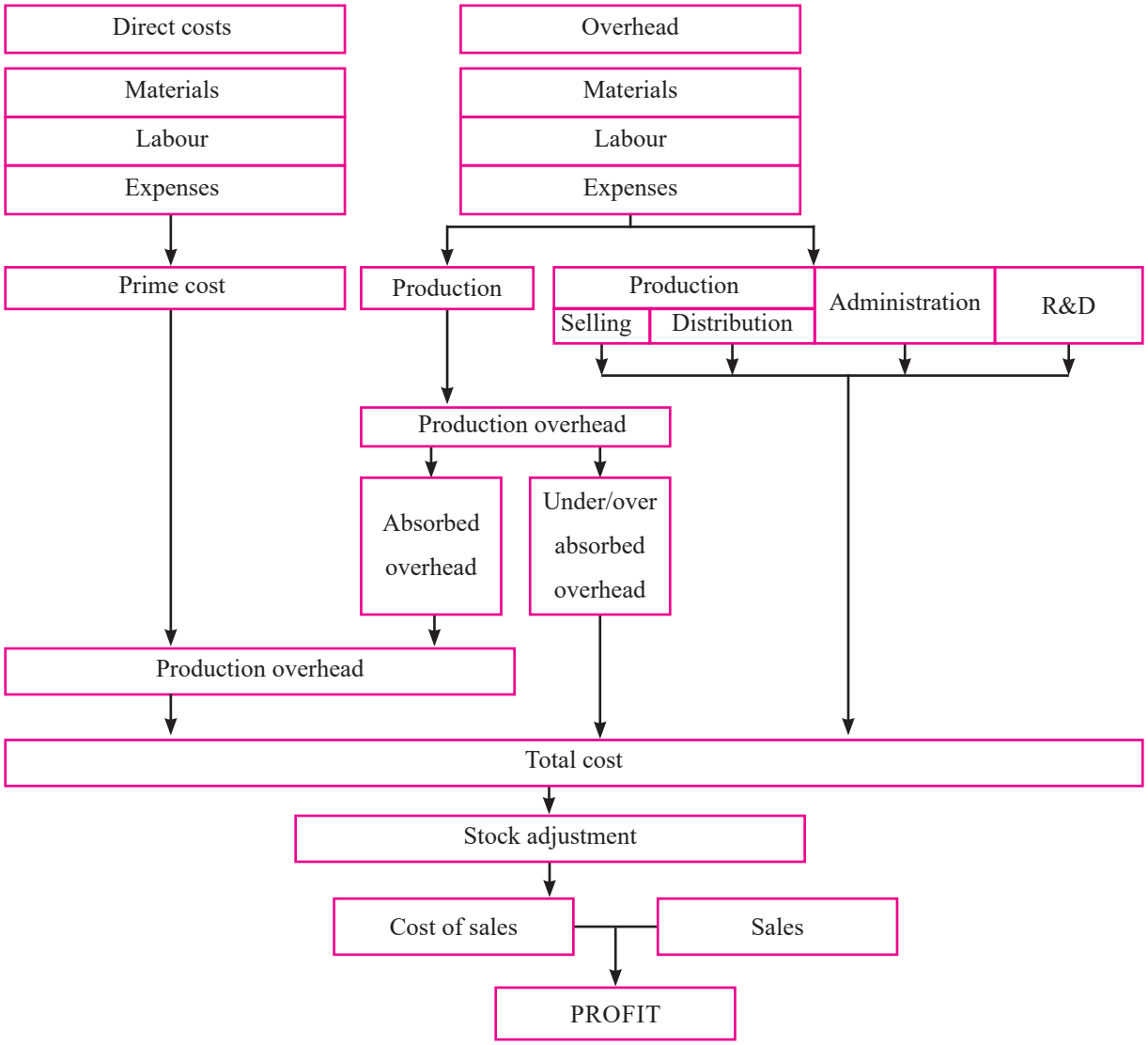


Figure 1.7: Elements of Cost under Absorption Costing System[34]

This representation is illustrated in the last section of this study note where statement of cost and profit is discussed in detail. This is also referred as Cost Sheet. Though this is recommended in the CIMA document, it is important to note that almost all authors, in their books on Cost Accounting, includes selling and distribution overhead to cost of goods sold (Total cost in the above figure) to arrive at Cost of sales[35].

34 The above chart is based on the absorption costing principle. The chart is adopted from CIMA Official Terminology, 2005, The Chartered Institute of Management Accountants (CIMA Publishing, an imprint of Elsevier

35 Discussion on cost sheets, as well as the illustrations on cost sheet, as given in the last part of the study note are presented on the basis of this classification of selling and distribution overhead.

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 is 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 are:

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/Semi fixed 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. Batch cost

b. Contract cost

c. Process cost

d. Joint costs

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

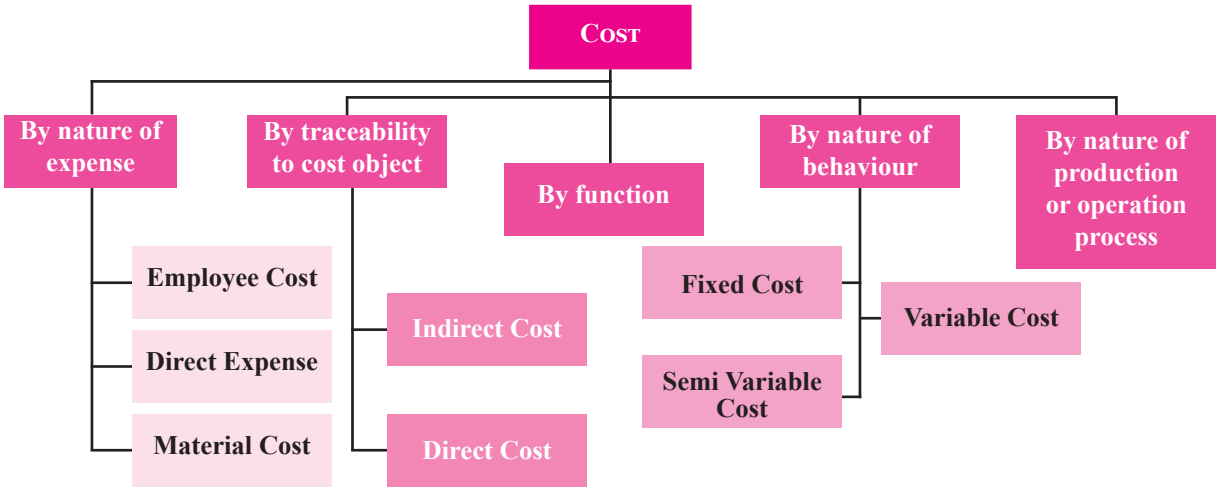


Figure 1.8: Types of Cost Classification

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 organisation's level of activity. These costs may include direct materials, direct labour, and overhead costs that are incurred in developing a product. Management typically performs cost behaviour analysis through mathematical cost functions.

Cost functions are descriptions of how a cost (e.g., material, labour, or overhead) 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[9] 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 cost' and refers to a cost which is incurred for a particular period. It remains fixed over a relevant range[36]. 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[9] defines a fixed cost as a cost incurred for an accounting period, that, within

36 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.

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[9] defines variable cost as a cost that varies with a measure of activity.
3. **Semi-variable cost –** This are dual natured. A part of these cost remain fixed while the other part behaves as a variable cost. CIMA official terminology[9] 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 [(i) -(v)] is a pictorial representation of the costs discussed above.

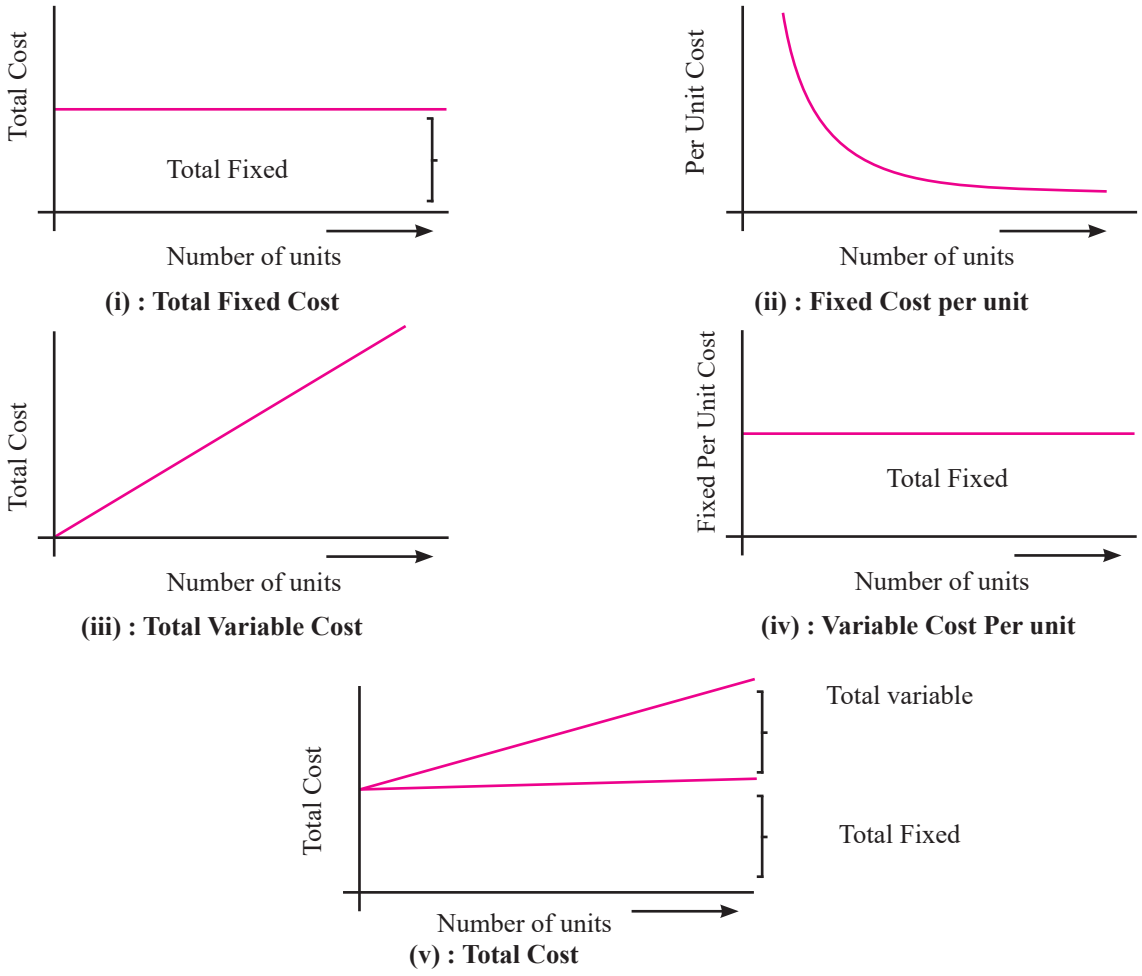


Figure 1.9: Graphical Representation of Different Total Costs and per unit costs under Cost Behaviour Analysis

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, they will 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.

Example 1

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 ₹ 1700

February 2022, 70 tables are produced with total cost of ₹ 1900

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 (₹ 1900 - ₹ 1700) during January –February is caused by an increase of 10 units (70 tables – 60 tables)

This is given as

₹ 1900 – ₹ 1700 = ₹ 200 change in costs (increase)

70 tables – 60 tables = 10 change 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 ₹ 1200 (60 × 20) and in February the total cost would be ₹ 1400 (70 ×20), which they are not. The TC in January is ₹ 1700 and in February it is ₹ 1900.

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

$\Rightarrow 1900 = 20 \times 70 + 500$

$\Rightarrow$ LHS = RHS

In other words, the cost function is given as

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

Y = m × 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[37] 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. 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[9] 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.

   CIMA official terminology[9] 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.

37 These are discussed in details in later part of the study note.

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.

Example 2

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	7000
2	1,15,000	8000
3	1,11,000	7700
4	97,000	6000

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	₹ 72,000	
6000 × ₹ 9		₹ 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 × x + C

Where

Y = TC,

m = slope of the cost function (variable cost per unit) and

C = y intercept (total fixed cost)

Where,

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

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

At 8000 units of production,

Variable cost = 8000 units × ₹ 9 per unit = ₹ 72000

Fixed cost (Balancing Figure) = ₹ 43000

Total Cost (given) = ₹ 115000

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 overhead are considered as composing the factory (works) cost. Administrative overhead added to works cost gives the cost of production. Selling and distribution overhead 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 overhead. Cost sheet shows the operating results.

Importance and objectives of cost sheet

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 overhead 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[38]

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

1. Prime Cost = Direct Materials + Direct Labour + Direct Expenses

38 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.

2. Works Cost (Factory) = Prime Cost + Factory Overhead Cost
3. Cost of Production = Works (Factory) Cost + Office and Administrative Overhead
4. Cost of Sales = Cost of Production + Selling and Distribution Overhead

In a manufacturing concern, inventory comprises of

1. Raw material – this is adjusted at the raw material consumed stage
2. Work in progress – this is generally adjusted at the works cost stage unless otherwise stated.
3. Finished goods – 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 Overhead		**
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 overhead		**
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 Overhead		**
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[39].

Illustration 2

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	275000
Inventories at the beginning of the year: Finished goods	7000
Work in Progress	4000
Purchase of the material for the year	110000
Material inventory: At the beginning of the year	3000
At the end of the year	4000
Direct Labour	65000
Factory overhead: 60% of direct labour cost	
Inventories at the end of the year: Finished goods	8000
Work in Progress	6000
Other expenses for year:	
Selling expenses - 10% of sales	
Administrative expense – 5% of sales	

39 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 overhead 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.

Solution

Details	(₹)	(₹)
Inventory (RM) at the beginning of the year	3000	
Add: Purchase of RM during the year	110000	
	113000	
Less: Inventory (RM) at the end of the year	(4000)	
Material consumed		109000
Add: Direct Labour		65000
Prime Cost		174000
Add: Factory Overhead @ 60% of direct labour		39000
Works Cost		213000
Adjustment for work in progress		
Opening WIP	4000	
Less: Closing WIP	(6000)	(2000)
		211000
Add: Administrative Overhead		
@ 5% of Sales (275000)		13750
Cost of Production		224750
Adjustment for Finished goods		
Opening Stock of Finished Goods	7000	
Less: Closing stock of Finished Goods	(8000)	(1000)
Cost of goods sold		223750
Add: Selling overhead		
@ 10% of sales (275000)		27500
Cost of Sales		251250
Profit (Balancing figure)		23750
Sales		275000

Illustration 3

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

Particulars	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	2,40,000
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

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	$\frac{₹\ 25,00,000}{₹\ 125} = 20,000$	$20,000 \times 120\% = 24,000$	
Direct Material	3,20,000	$3,20,000 \times 120\% \times 110\%$	4,22,400
Direct Wages	8,00,000	$8,00,000 \times 120\% \times 0105\% \times \frac{100}{112}$	9,00,000
Prime Cost	**11,20,000**		**13,22,400**
Add: Variable Production OH	$4,80,000 \times 25\% = 1,20,000$	$1,20,000 \times 120\% \times 105\%$	1,51,200
Fixed Production OH	$4,80,000 \times 75\% = 3,60,000$	$3,60,000 \times 133^{1}/_{3}\%$	4,80,000
Works Cost	**16,00,000**		**19,53,600**
Add: Variable Administrative OH	$1,60,000 \times 25\% = 40,000$	$40,000 \times 120\% \times 105\%$	50,400
Fixed Administrative OH	$1,60,000 \times 75\% = 1,20,000$		1,20,000
Cost of Production	**17,60,000**		**21,24,000**
Add: Variable Selling & Distribution OH	$^{1}/_{3} \times 2,40,000 = 80,000$	$80,000 \times 120\% \times 105\%$	1,00,800
Fixed Selling & Distribution 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) Profit for the year 2021-22 = Sales – Cost of Sales = 25,00,000 – 20,00,000 = ₹5,00,000

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

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

(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%:

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 4

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 February 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 per hour.

(5) Factory Overhead 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 $\left(= \frac{₹\ 2,100}{1,000 \text{ hours}}\right)$ 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 Overhead	2.10 × 200 =	420	2.10 × 400	840
Add: Opening WIP	420 + 450 + 400 =	1,270	80 + 150 + 200 =	430
Factory Cost		2,420		1,990
Add: S & D Overhead (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 Overhead = 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 Overhead = 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 Overhead = 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 Overhead	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 5

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 (1300 – 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 Overhead: 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 Overhead

   Actual cost is 20% excess than Estimated cost

   Let Estimated cost be x

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

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

   Similarly, Factory Overhead cost has been calculated

2. For Direct Labour

   Estimated Cost is 10% more than Actual Cost

   So, Estimated Cost = Actual Cost × $62,500 \times \frac{110}{100}$

Illustration 6

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 Overhead	40% × 53,200	21,280
Factory Cost		**74,480**
Add: Selling & Distribution Overhead	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 for Artist ₹ 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 for copy writer ₹ 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 for client servicing ₹ 9,000
   Working Hours per month (25 × 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 7

The following figures were extracted from the Trial Balance of a company as on 31st December, 2022.

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

Particulars	Debit Amount (₹)	Credit Amount (₹)
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 ⅔ rd to the factory and ⅓ rd 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:

Statement of Cost Sheet

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

Particulars	Amount (₹)	Amount (₹)
Prime Cost		4,59,200
Add: Factory Overhead		
Indirect Labour	18,000	
Add: Accrued indirect labour	1,200	
Factory supervision	10,000	
Factory Repairs & upkeep	14,000	
Heat, Light & Power	52,000	
Rates & Taxes	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 Overhead		
Heat, Light & Power ($^{1}/_{10}$ × 65,000)	6,500	
Rates & Taxes ($^{1}/_{3}$ × 6,300)	2,100	
Depreciation on Buildings ($^{1}/_{10}$ × 4% × 2,00,000)	800	
Depreciation on office appliances	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 Overhead		
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 31-12-2022

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

Illustration 8

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 2022, at 100% capacity in the remaining months of the year.

The selling price for the period from 1st January, 2022 to 31st July, 2022 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, 2022 to 31st December, 2022.

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

1. From 1st January to 31st July, 2022.
2. From 1st August to 31st December, 2022.

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

Capacity Utilisation Period	50% Capacity 1st January – 31st July		100% Capacity 1st August– 31st December	
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 Overhead	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 = $\frac{₹\ 30,50,000}{50,000}$ = ₹ 61

Illustration 9

The following are the costing records for the year 2022 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 overhead 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	$\frac{2,00,000}{10,000}$ = ₹ 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	$\frac{10,000}{10,000}$ = ₹ 12	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

Production Unit	15,000		
		Total (₹)	Cost per Unit (₹)
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)		**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

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 overhead
   d. a selling and distribution overhead

3. A company has to pay a ₹ 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 overhead
   c. Administrative overhead
   d. Selling overhead

4. _____ is a method of dealing with overheads which involves spreading common costs over cost centers on the basis of benefit received.
   a. overhead absorption
   b. overhead apportionment
   c. overhead allocation
   d. overhead 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 overhead
   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

Answer:

1	**b**	**2**	**d**	**3**	**a**	**4**	**b**	**5**	**b**
6	**c**	**7**	**d**	**8**	**d**	**9**	**c**	**10**	**d**

⊙ **Fill in the blanks**

1. Historical costs that cannot be recovered by any decision made now or in the future are called _____.
2. Factory overhead costs are all manufacturing costs incurred in the factory except for _____ and _____ and _____.
3. The sum of direct labour and factory overhead 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
   e. indirect expenses.
5. Explain the meaning of the terms:
   a. prime cost
   b. overheads
   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
   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[40]

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

40 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 overhead 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 discoursed 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. Paragraph 6.1 of Cost Accounting Standard (CAS) 1[2] recommends classification of cost by nature of expense. 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.
- 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). 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.

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 CAS 1 is on 'Classification of Cost' and was revised in 2015.

3 The definitions mentioned, are adopted from CAS 1.

- 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 Overhead. Under absorption costing system[4], Overhead costs are absorbed to the product on a pre-determined rate[5]. Over /Under absorption arises when the overhead absorbed is more/less than the actual overhead 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 overhead 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 Overhead	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 overhead 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 basic 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 easily traced to the product.
  2. They represent a major material of the finished product.
  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 (i.e., nails in furniture manufacturing) and are considered to be a factory overhead 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. Materials control may be defined as a system which ensures availability of the required quantity of material of proper quality at the proper time and at the same time avoidance of 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. 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, acquired, handled and utilized. It is a process that requires planning, organisation an auditing of all the elements employed in certain productive activity. Simply put, Materials control may be defined as the systematic control over the procurement, storage and usage of materials so as to maintain an even flow of materials and at the same time avoiding excessive investment in inventories.

Therefore, two important aspects:

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. For every product or job there is a particular quality of materials which is needed and that quality alone should be purchased. For printing text books, for example, neither art paper nor newsprint is to be used rather simple white printing paper of reasonable weightage will be needed. But a book containing art pictures and priced quite high must be printed on good quality art paper; newspapers have to use newsprint as otherwise the cost will be too high. Prices also must be unnecessarily high although in certain cases it may be the company's policy to encourage certain supplies by paying them a price higher than prevailing in the market; but this can be only for a short period and in special cases.
- **Minimum wastage:** While various materials are being stored in the godowns, the loss of or damage to the 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'.

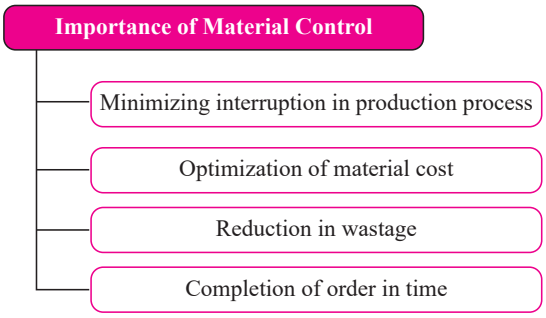


Figure 2.1: Importance of Material Control

In order to have a good material control system, an organisation should have the following issues at place. This is also referred as 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:

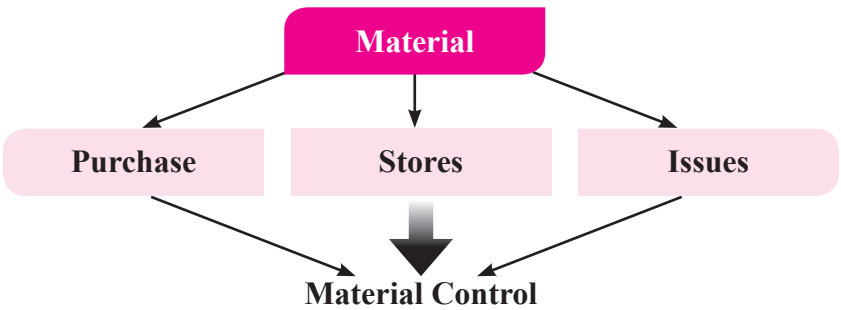


Figure 2.2: Implementation Areas of Material Control

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

The function of purchase

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.

Merits of a Centralized and Demerits of Decentralized Purchase Organisation:

1. When materials are purchased favourable terms (Trade discount, economies of transport etc) can be obtained because the quantity will be large. In case of decentralized system these benefits cannot be realized.
2. Specialized purchasing officer can be appointed with the specific purpose of highly efficient purchases functions of the concern. In case of decentralized purchase system, the business entity cannot afford a specialized purchasing officer in every location.
3. Effective control can be exercised over the stock of materials because duplication of purchase of the same materials may easily be avoided in centralized purchase system, where as in decentralized purchase system, duplication of purchase of same material cannot be avoided.
4. Under centralized purchase system effective control can be exercised on the purchases of all the materials as the purchase function is channelized through one track which would make the system of receiving, checking and inspection efficient. Where as in decentralized purchase system it is very difficult to exercise controls.
5. Under centralized system of purchase materials, components and capital equipments can be suitably standardized so that the maximum purchasing benefits be availed of storage facilities can be improved and available production facilities can be greatly utilized to the maximum possible extent. Under decentralized purchase system standardization of materials, storage facilities etc is very difficult to achieve.
6. Under centralized system of purchase closer cooperation between the financial and purchasing departments can be achieved which may not be easy under decentralized purchase system.

Demerits of a Centralized and Merits of Decentralized Purchase Organisation:

1. It may take unnecessary long time to place a purchase order under centralized purchase system because to

collect the relevant data from various departments / branches / locations may take more time. These delays can be avoided under decentralized purchase system.

2. In case of centralized purchasing system, branches at different places cannot take advantage of localized purchasing, whereas under decentralized purchase system localization savings can be realized.
3. Due to chances of misunderstanding / miscommunication between the branch and the centralized purchasing office may result in wrong purchase of material also. Whereas under decentralized purchase system, the chances of miscommunication / misunderstanding are very limited.
4. Centralized system will lead to high initial costs because a separate purchasing department for purchase of materials is to be set up. No such costs are required to be incurred in the decentralized system.
5. Replacement of a defective item may take long time resulting in strain on smooth production flow under centralized system of purchase. No such delay in decentralized system.

Below listed is a set of documents (along with a specimen of the respective document) 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="12">Modern Ltd</td></tr>
<tr><td colspan="12">Bill of Materials</td></tr>
<tr><td colspan="6">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="6">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 colspan="2">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 colspan="2"></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="6">Purchase order given by:</td></tr>
</table>

2. Material Requisition Note

Material Requisition 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 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 department 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 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 of a given material or materials 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 (e.g., iron nails).

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.

Procedure to be followed to transfer the material

a. Transferring supervisor will prepare a Material Transfer Note giving all the details of the materials transferred and will send this note to the supervisor of the job to which materials being transferred.

b. Transferee supervisor will sign the note in token of receipt of the materials and send it back to the transferring supervisor.

c. This note will then be send to cost office where necessary entries will be passed and respective job accounts debited and credited.

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).

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 both ordering and carrying cost are 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 **assumptions** underlying the Economic Order Quantity (EOQ): 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 used for determining the size of order for each purchase at minimum ordering and carrying costs, which is as below:

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

where, A = Annual demand / consumption

O = Ordering Cost per Order

C = Carrying Cost per unit per annum

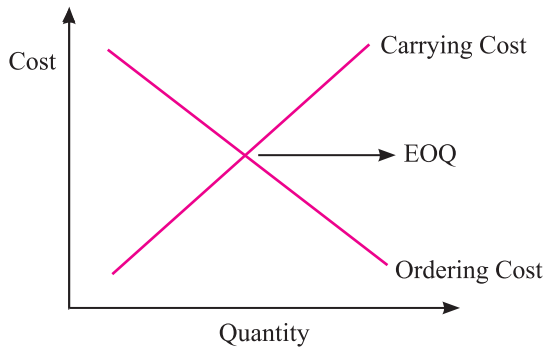


Figure 2.3: Graphical representation of EOQ

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.

Duties of Store Keeper

The duties of store keeper are as follows:

i. To exercise general control over all activities in stores department.

ii. To ensure safe storage of the materials.

iii. To maintain proper records.

iv. To initiate purchase requisitions for the replacement of stock of all regular materials, whenever the stock level of any item in the store reaches the minimum level.

v. To initiate the action for stoppage of further purchasing when the stock level approaches the maximum level.

vi. To issue materials only in required quantities against authorised requisition documents.

vii. To check and receive purchased materials forwarded by the receiving department and to arrange for storage in appropriate places.

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. All materials are kept at one central store.

   Advantages of centralized stores

   i. Better control can be exercised over stores because all stores are housed in one department. The risk of obsolescence of stores can be minimized.

   ii. The economy of staff-experts, or clerical, floor space, records and stationery are available.

   iii. Better supervision is certainly possible.

   iv. Obsolescence of the store items can be kept under strict vigil and control.

   v. Centralized material handling system can be put into operation thus further economizing on space, personnel and equipments.

   vi. Investment in stocks can be minimized.

   Disadvantages of centralized stores

   i. The transportation costs of the materials may increase because the movements of the stores may be for a greater distance since the storing is centralized.

   ii. If the user departments are far away from the stores there may be delay in receipt of the stores by those departments.

   iii. Breakdown of inter departmental transport system may hold up the entire process, and similarly labour problem in the centralized stores may bring the entire concern to standstill.

   iv. There is greater chance of losses through fire, burglary or some other unhappy incidents.

   v. It may not be safe to have some hazardous elements bunched together in the centralized stores.

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 should be 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.

   Advantages

   i. It ensures the prompt issue of stores.

   ii. It confines the advantages of centralized stores with sub-stores and at the same time it does not sacrifice the centralized control.

   iii. It reduces handling cost of materials.

   iv. It avoids the maintenance of elaborate inventory records.

Control of the Stores

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.

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 3112.

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 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 by coded as MS and the sheets, bars, strips, rounds of mild steel may be coded as MS01, MS02, MS04 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 of materials

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.

v. 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 to be fixed. It is the storekeeper's responsibility to ensure 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 to stock-piling for keeping large stock in reserve for long term future uses and in such a case, the level is pushed up.

viii. 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 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 quantitative balance 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 (normal re-order period) required replenishing supply. This is known as the lead time and are defined as the anticipated time lad 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

When the stock in hand reaches the ordering or re-ordering level, 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 presupposed 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, of action for purchase of an item was taken when the stock reached 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.

The operation of the perpetual inventory system may be as follows:

i. The stock records are maintained and up to date posting of transactions are made there in so that current balance may be known at any time.

ii. Different sections of the stores are taken up by rotation for physical checking. Every day some items are checked so that every item may be checked for a number of times during the year.

iii. Stores received but awaiting quality inspection are not mixed up with the regular stores at the time of physical verification, because entries relating to such stores have not yet been made in the stock records.

iv. The physical stock available in the store, after counting, weighing, measuring or listing as the case may be, is properly recorded in the bin cards / inventory tags and stock verification sheets.

Perpetual Inventory System and Continuous Stock Taking

Perpetual inventory system should not be confused with continuous stock taking. Continuous Stock Taking is an essential feature of perpetual inventory system. Perpetual inventory means the system of stock records and continuous stock taking, whereas continuous stock taking means 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.

Advantages of Perpetual Inventory System

i. The system obviates the need for the physical checking of all items of stock and stores at the end of the year.

ii. It avoids the dislocation of the routine activities of the organisation including production and despatch.

iii. A reliable and detailed check on the stores is maintained.

iv. Errors, irregularities and loss of stock through other methods are quickly detached and through necessary action recurrence of such things in future is minimized.

v. As the work is carried out systematically and without undue haste the figures are readily available.

vi. Actual stock can be compared with the authorised maximum and minimum levels, thus keeping the stocks within the prescribed limits. The disadvantages of excess stocks are avoided and capitalized up in stores materials cannot exceed the budget.

vii. The recorder level of various items of stores are readily available thus facilitating the work of procurement of stores.

viii. For monthly or quarterly financial statements like Profit and Loss Account and Balance Sheet the stock figures are readily available and it is not necessary to have physical verification of the balances.

ABC Analysis

The "ABC Analysis" is an analytical method of stock control which aims at concentrating efforts on those items where attention is needed most. It is based on the concept that a small number of the items in inventory may typically represent the bulk money value of the total materials used in production process, while a relatively large number of items may present a small portion of the money value of stores used resulting in a small number of items be subjected to greater degree of continuous control.

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 stands for Vital, Essential and Desirable – analysis is used primarily for control of spare parts. The spare parts can be classified in to three categories i.e., Vital, Essential and Desirable – keeping in view the criticality to 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 pay attention if the organisation adopts ABC analysis.

FSN Analysis

FSN analysis is the process of classifying the materials based on their movement from inventory for a specified period. All the items are classified in to F – Fast moving, S – Slow moving and N – Non moving items based on consumption and average stay in the inventory. Higher the stay of item in the inventory, the slower would be the movement of the material. This analysis helps the store keeper / purchase department to keep the fast moving items always available and take necessary steps to dispose off the non-moving inventory.

Just-in-Time (JIT)

JIT is a production strategy that strives to improves a business return on investment by reducing in process inventory and associated carrying costs. Inventory is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting. In short, 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 cost 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 may happen the entire inventory 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.

Advantages

i. It is simple and easy to operate.

ii. In case of falling price, this method gives better results.

iii. Closing stocks represents the market prices.

Disadvantages

i. If the prices fluctuate frequently, this method may lead to clerical errors.

ii. In case of rising prices this method is not advisable.

iii. The material costs charged to same job are likely to show different rates.

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.

Advantages

i. The cost of materials issued will be either nearer to and / or will reflect the current market price.

ii. In case of falling prices profit tends to rise due to lower material cost.

Disadvantages

i. The computations become complicated if too many receipts are there.

ii. Companies having JIT system will face this problem more.

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 used 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 issued are valued at average price, which is computed by dividing the total of the unit prices of each purchase by the total number of units.

$$\text{Material Issue Price} = \frac{\text{Total of unit prices of each purchase}}{\text{Total Number of Units}}$$

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 market price, 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. As a result of the exclusion of overheads. The cost of the subsequent period is understated and the cost of production for the current period is inflated to that extent.

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

This system envisages physical stock verification at a fixed date/period during the year. Generally, under this system the activity takes place at the end of the accounting period or a date close to such date. Usually, the system is opened in the following manner:

i. A period of 5/7 days, depending on the magnitude of the work is chosen during which all the items under stock are verified physically and such period is known as 'cut-off' period. During this period there are no movements of stock items and neither 'receipts' nor are 'issues permitted'.

ii. The items are physically counted / measured depending on their nature and are noted down in records which are signed by the auditors if they are present in stock verification.

iii. The bin cards balances are also checked and initiated. Generally, the physical balances and bin card balances of various items should be same unless shortages / excesses are there or the recording / balancing in the cards are incorrect.

iv. After the physical verification is completed work sheets are countersigned by the godown supervisors and the stock verified.

v. Thereafter reconciliation statement is prepared item wise where the physical balances and bin card balances are different.

vi. Then the balance as per bin cards and as per stores ledger is also compared and necessary adjustments are made to show the correct position of stock at the year end.

vii. Finally, the shortages / excess statement is prepared by the concerned departments and are placed before the higher management for their approval for adjustments.

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

b. **Credit to overhead**

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 overhead. The effect of this credit is to reduce the overhead recovery rate. When predetermined overhead 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 overhead 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 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 overhead and included in production cost. On the other hand, the cost of secondary containers should charge as a selling and distribution overhead. 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.

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 overhead. In case where the carriage and cartage are abnormal due to any reason the same is charged off to costing profit and loss account.

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, cost of tools issued during a period is accumulated and distributed to various departments on some suitable basis, e.g., hours worked.

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.

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 overhead 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.

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

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

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

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

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)	$2,700 - (300 \times \frac{4+6}{2})$ = 1,200 units	$1,800 - (300 \times \frac{2+4}{2})$ = 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

	Particulars	Component A	Component B
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

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

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

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

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

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

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

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

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

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

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

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹*	Amount ₹
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

* Balance Rate = $\frac{\text{Balance Amount}}{\text{Balance Quantity}}$

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

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
15/06	300	80	24,000				100	50	5,000
							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

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
							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
							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

Date	Receipts			Issue			Balance		
	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹	Qty	Rate ₹	Amount ₹
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
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

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

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

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

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

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

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

Ordering quantities (tonnes)	Price per tonne Amount (₹)
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 overhead 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 $\left(\text{No. of Drums} = \frac{200}{25} = 48\right)$	$\frac{₹\ 10}{25\ \text{kg}}$	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	$\frac{₹\ 240}{1,200\ \text{kg}}$	0.20		240.00
		18.9985		22,798.20
Less: Credit for drums returned	$\frac{₹\ 8}{25\ \text{kg}}$	0.32	48 × 8	384.00
Total Cost of Material Purchased		18.6785		22,414.20
Add: Stores Overhead	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

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

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

(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	20% 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	6 – 8 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 × 20% = ₹ 100

(i) $EOQ = \sqrt{\frac{2 \times 5,200 \times 100}{100}} \approx 102$ 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 (₹)	$\frac{1}{2} \times 102 \times 500 \times 20\%$	5,100	$\frac{1}{2} \times 1500 \times 500 \times 20\% \times 95\%$	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 × 8 =1,600 tubes

iii. Minimum Level of Stock

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

= 1,600 – (100 × 7) = 900 tubes

iv. Maximum Level of Stock

= Re-order Level + Re-order Quantity – (Minimum Usage × Minimum Re-order period)

= 1,600 + 102 – (50 × 6) = 1,402 tubes

Employee Costs

2.2

Labour cost[10] occupies a significant portion of the total cost of a product manufactured or services rendered. Allowing labour cost to go out reasonable limits may lead an organisation to serious difficulties. Thus, labour cost control which is the focus area of labour cost management is referred 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. Labour cost proportion of product cost or service cost may be, sometimes, key consideration for pricing decisions and profitability analysis. 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 focussed on the control aspect of the cost of labour such that the cost of production remains within control limits.

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, Employee cost includes the following:

Salaries, wages, allowances and bonus / incentives, Contribution to provident and other funds, Employee welfare, and other benefits

The following steps will be useful in controlling and reducing the labour cost:

1. Classification of labour cost: The first step in the direction of controlling and reducing the labour cost is proper classification of the same. The labour cost is classified into direct cost and indirect cost. There are three characteristics of direct labour:
    a. It is easily traced to the product.
    b. It is a major cost of producing the product.
    c. It can be identified directly with production of the product.

10 In this study note the terms 'labour' and 'employee' are synonymously used as CAS 7 issued by the Council of the Institute of Cost Accountants of India deals with 'Employee' cost while 'labour cost' is dealt in various books on cost accounting.

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 overhead cost[11].

Paragraph 4.10 of CAS 7 defines indirect employee cost as employee cost, which cannot be directly attributed to a particular cost object.

Labour cost management, as such, is an arena where specifically three departments have to put in their efforts. The whole gamut of labour cost management is pictorially represented in the following diagram:

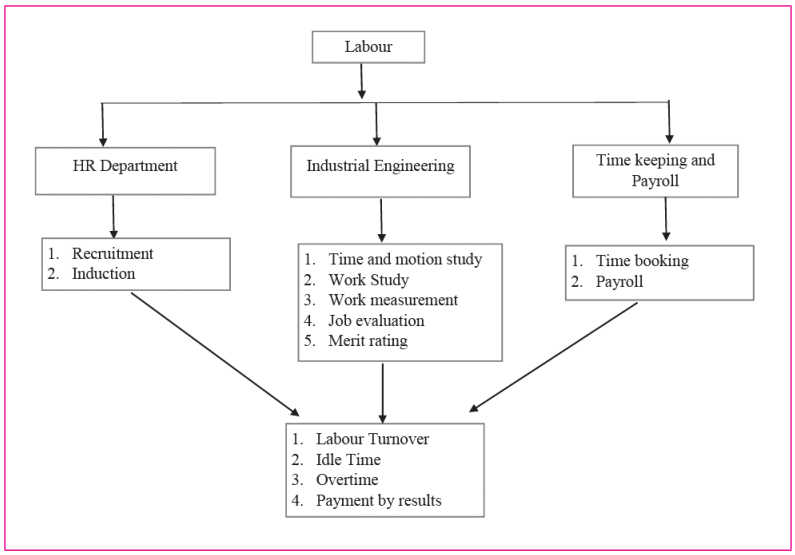


Figure 2.4: Various Departments in Labour Cost Management

Various aspects of Labour Cost Control

In the modern competitive environment, it is essential to make efforts for controlling and reducing the labour cost. Systematic efforts are required in order to achieve this target. The following steps will be useful in controlling and reducing the labour cost:

a. **Classification of Labour Cost**

The first step in the direction of controlling and reducing the labour cost is proper classification of the same. The labour cost is classified into direct cost and indirect cost. Direct labour cost is the cost that can be identified with a product unit. It can also be described as cost of all labour incurred for altering the construction, composition or condition of the product. Indirect labour cost is the cost, which cannot be identified with a product unit. It represents the amount of wages which is paid to the workers who are not directly engaged on the production but it includes wages paid to the workers and assistants working in departments like purchasing, store keeping, time office, maintenance, and other service and production departments. In other words, indirect wages are the wages paid to the workers who facilitate the production rather than actually engaged in production. The direct labour cost can be charged directly to the job or product units and is included in the prime cost. Indirect labour cost is included in the overhead cost. Direct labour cost is variable in nature and can be controlled by

11 Since this is treated as overhead for the purpose of this study note it is considered in section 2.4 of this module

strictly adhering to the norms and standards set by the management. Indirect labour cost can be controlled by establishing labour budgets and comparing the actual indirect labour cost with the budgeted labour cost. Any difference between the two is analysed carefully and suitable corrective action is taken.

b. **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. With the help of work study, time and motion study can be conducted which will help in fixation of standard time for a particular job. A comparison between the standard time and actual time is constantly made to find out the difference between the two. Suitable corrective action can be taken if it is noted that the actual time taken is constantly more than the standard time allowed for the job.

c. **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 comparison between the budgeted labour cost and the actual labour cost.

d. **Labour Standards**

Standards can be set for labour cost against which the actual labour cost can be compared. Standard labour costs is the cost, which should have been incurred for producing a particular quantity of production. While fixing the standard labour cost, use of time and motion study is made to fix up the standard time that should be taken for the actual production.

e. **Labour Performance Report**

There should be a system of periodic labour efficiency and utilisation reports. These reports will give an idea about the efficiency and productivity of the labour.

f. **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 non-monetary incentives can help to improve the productivity substantially. However, there should be a periodic review of the incentive schemes and therefore incentive schemes report should be prepared at periodic intervals.

g. **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.

Thus, from the above mentioned points, it will be clear that there is a need to control the labour cost and it can be done by the combined efforts of various departments.

Principles of measurement of Employee Costs (CAS – 7)

The guidelines for ascertaining the labour cost / employee cost are as follows:

1. Employees cost shall be ascertained taking into account the gross pay including all allowances payable along with the cost to the employer of all the benefits.

2. Bonus whether payable as a statutory minimum or on a sharing of surplus shall be treated as part of employee cost. Ex-gratia payable in lieu of or in addition to bonus shall also be treated as part of the employee cost.
3. Remuneration payable to managerial personnel including executive directors on the board and other officers of a corporate body under a statute will be considered as part of the employee cost of the year under reference, whether the whole or part of the remuneration is considered as a percentage of profits.
4. Explanation: Remuneration paid to non-executive directors shall not form part of employee cost but shall form part of administrative overheads.
5. Separation costs related to voluntary retirement, retrenchment, termination etc shall be amortised over the period of benefitting from such costs.
6. Employee cost shall not be included any imputed costs.
7. 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.
8. Where employee cost is accounted at standard cost, variances due to normal reasons related to employee cost shall be treated as part of employee cost. Variances due to abnormal reasons shall be treated as part of abnormal cost.
9. Any subsidy, grant, incentive or any such payment received or receivable with respect to any employee cost shall be reduced from ascertainment of cost of the cost object to which such amounts are related.
10. Any abnormal cost where it is material and quantifiable shall not form part of the employee cost.
11. Penalties, damages paid to statutory authorities or other third parties shall not form part of the employee cost.
12. The cost of free housing, free conveyance and any other similar benefits provided to an employee shall be determined at the total cost of all resources consumed in providing such benefits.
13. Any recovery from the employee towards any benefit provided e.g., housing shall be reduced from the employee cost.
14. Any change in the cost accounting principles applied for the determination of the employee cost should be made only if it is required by law or for compliance with the requirements of a cost accounting standard or a change would result in a more appropriate preparation or presentation of cost statements of an enterprise.

Control of Labour Cost

Labour cost consists of the total amount of wages paid to the workers and other expenses related thereto. It includes hourly or piece rates payable to the workers. It may be excessive due to inefficiency of labour force, high idle time and overtime payments, increase in spoilage, waste and defective production due to lack of supervision and inspection, high labour turnover and other matters. Therefore, it is clearly seen that the control of labour cost is essential in every organisation to cut down the cost of production and to improve the labour productivity / efficiency. The following departments play a vital role in labour cost control:

a. **Human Resource Department**

This department is responsible for the execution of policies regarding appointment, discharge, transfer, promotion, classification of labour, wage and incentive systems, etc, which have been formulated by the board of directors or executive committee. It normally maintains detailed records of attendance, leave records, overtime and shift records from which various calculations of wages, allowances, overtime, incentives are made. Reports concerning labour turnover, recruitment, productivity, utilization, absenteeism as well as reports on labour cost, idle time, various cost ratios etc., are prepared here for submission to hgher authorities for necessary action.

b. **Engineering, Industrial Engineering Department**

This department helps to maintain control over working conditions, production methods, job performances by preparing plans and specification for each job scheduled for production, maintaining safety and efficient working conditions, initiating and supervising research and development activities, making method study, motion study, and time study, setting piece rates, making job evaluation, merit rating and job analysis, measuring labour productivity and in general suggesting ways and means to improve labour efficiency / productivity thereby cutting down the effective labour cost.

c. **Time Keeping Department**

The function of this department is mainly to keep, maintain the time for which each and every worker has worked including the check-in and check-out time. The records are kept separately for different shift and irregular working periods like overtime period. The records are such kept that the departments wise / product wise / process wise / batch wise / job wise / operation wise allocation of labour cost is possible. The entire correctness of calculation of payroll, overtime payments, incentive payments, overhead allocation depend on the records maintained by this department and as such the importance of the functions rendered by this department cannot be over emphasized.

d. **Payroll Department**

This department is responsible for preparation of payroll and also basically to maintain records of job classification, department wage rates to prepare each man's earnings, to allocate those earnings to various cost centres to summarise various deductions and employers' share of provident fund, state insurance and other items, and also to summarise overtime payments and incentive payments wherever applicable.

e. **Cost Accounting Department**

The cost accounting department is responsible for analysing the labour cost for the purpose of computation and control of the same. It is responsible for the accumulation and classification of all cost data of which labour cost is one of the important component. The cost accounting department classifies the labour cost into direct and indirect, compares the actual labour cost with the budgeted cost, compute unit labour cost and compiles the data for further analysis of the labour cost. It also analyses the employee cost to render routine and special labour cost reports thereby disclosing the amount of normal, and abnormal idle time, direct labour, indirect labour, overtime and departmental labour costs and variances between actual and standard labour costs. These reports are used by the top management to effectively control the labour cost and also to improve the labour productivity / efficiency.

Important factors for the control of Employee Cost

The factors which need consideration for the purpose of controlling employee cost effectively are as follows:

i. Assessment of manpower requirements
ii. Control over time-keeping and time-booking
iii. Time and Motion Study
iv. Control over idle time and overtime
v. Control over employee turnover
vi. Wage and incentive systems
vii. Job evaluation and Merit Rating
viii. Employee productivity

Collection of Employee Cost

It is the responsibility of the cost accounting department to ascertain the effective wages per hour in each department and analyse the total payment of wages of each department into:

a. The amount included in the direct cost of goods produced or jobs completed

b. The amount treated as indirect employee and thus included in overheads

c. The amount treated as the cost of idle time

d. The amount treated as abnormal loss / gain and to be transferred to profit and loss account

In this process the costs of various jobs are ascertained and the proper recording of time spent by the employees can be ensured.

2.2.1 Time Keeping, Time Booking and Payroll

Like Personnel Department, this department also plays an important role in labour cost control through maintaining record of each worker's time-in and time-out during regular working period and reporting the time of each worker for each department, operation or production order. Thus, this department is responsible for recording the attendance time of each worker accurately. This will ensure punctuality and discipline in the company and will have a positive impact on the morale of each worker. time keeping is a statutory requirement also and therefore accurate recording of time should be ensured. The important role of time keeping from the point of view of labour costing and control can be summarised as given below:

a. It shows the total number of hours worked by each workman and so the calculation of his wage becomes possible. This is applicable where the workers are paid wages as per the time rate.

b. Time keeping promotes punctuality and discipline amongst the workers. In the absence of the time keeping system, there will be not only indiscipline amongst them but the workers who are otherwise punctual and disciplined will be frustrated.

c. Certain benefits like pension, gratuity and leave with pay, provident fund, promotion and salary scale are linked with the continuity of service. Attendance records in this regard, can be helpful in computation of these benefits.

d. Computation of labour hours becomes possible through time keeping records. This will be useful in overhead apportionment and absorption, which may be made on the basis of labour hours.

e. Time keeping is a statutory requirement under labour laws.

f. The time keeping records can be used for further analysis like for fixation of standard time and finding out idle time as well as the efficiency of labour. It can be used by researchers as well as by government authorities for various purposes.

Methods of Time Keeping

The methods of time keeping are as follows:

1. **Attendance Records:** This is the simplest and the oldest 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 large number of workers, there may be large queues for signing the Master Register. Similarly, there is little control over marking the attendance time and hence there may be irregularities in time recording.

2. **Disc Method:** This is one of the older methods of recording time. A disc, which bears the identification number of each worker, is given to each one. When the worker comes in, he picks up his disc from the tray near the gate of the factory and drops in the box or hooks it on a board against his number. Same procedure is followed at the time of leaving the factory. The box is removed at starting time, and the time keeper becomes aware of late arrivals by requiring the workers concerned to report him before starting. The time keeper will record in an Attendance Register any later arrivals and workers leaving early. He will also enter about the absentees in the register on daily basis. The main limitation of this method is that there is a possibility of marking the attendance of a worker by his friend i.e., 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 mechanized method of time recording. Each worker punches the card given to him when he comes in and goes out. The time and date is automatically recorded in the card. Each week a new card is prepared and given to the worker so that weekly calculation of wages will be possible. If wages are paid on monthly basis, a new card may be given in each month. Due to advancement of technology, given a new card each month is also not required as the same card continued till the worker either leaves the service or retires from the service. The only limitation of this method, (in fact it is the limitation of all the methods of time keeping) is that though the time in and time out are recorded, the records do not show the productive time of the worker, i.e., how he has spent the time in the factory. Thus, if a worker comes in at 8 am and leaves at 5 pm, he has spent 9 hours in the company, which can be ascertained from the time keeping records. However, how he has spent time, is not shown by these records. For showing the productive time, separate records showing time booking are to be prepared. The time booking records can also be combined with time keeping records so that there is no need to keep dual records.

4. **Bio-metric Attendance System:** According to Bio-metric attendance system, attendance of the employees is marked by recognising an employee based on physical and behavioural traits. An employee's unique identity like finger print, face and retina image etc., are kept in a database which is matched at the time of marking of attendance before the attendance device for this purpose. Bio-metric attendance system includes 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.

Essentials of a Good Time Keeping System

A good time keeping system is supposed to have the following requirements:

i. System of time-keeping should be such as not to allow proxy for another employee under any circumstances.

ii. There should be a provision of recording of time of piece employees so that regular attendance and discipline can be maintained.

iii. Time of arrival as well as time of departure of employees should be recorded so that total time of employees can be recorded and wages can be calculated accordingly.

iv. Method of recording of time should be mechanical as far as possible so that chances of disputes regarding time may not arise between employees and the time-keeper.

v. Late comers should record late arrivals. The time-keeper should adhere to this discipline strictly.

vi. The system should be simple, smooth and quick. Unnecessary queuing for marking attendance should be avoided.

vii. The system should be reviewed periodically to prevent any error or loophole.

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 are 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.

Time Booking Methods

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.

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.

Work Study

In order to motivate workers, it is necessary to design a proper incentive system of payment of wages. Money is the strongest motivating factor and hence monetary incentive system become essential. In any incentive system, the bonus is paid by comparing the standard performance / production with the actual performance i.e., actual production. Bonus is paid if the actual performance is higher than the standard one. However, for deciding the standard performance, standard time, i.e., time that is allowed doing a particular job should be fixed against which the actual time taken should be compared. The work study which includes, the job study, and the method study ensures the fixation of standard time to do a particular job and thus has become extremely important in the designing of the incentive system. Work study components are discussed below.

Method Study

Method study is done to improve the methods of production and to achieve the most efficient use of the resource like, manpower, machines and materials. Method study has the following stages:

i. Method study is generally conducted for the jobs, which involve complex operations as well as costly operations. Hence, the first step is to select jobs, which are having complexity of operations.

ii. There should be a detailed study of related aspect of the specified job. Information about the job like, purpose, location, sequence, relationship with other work, methods of working, operators, requirement of skilled workers, facilities required etc. should be collected.

iii. The crucial step is that after studying the relevant aspects of the job, there should be development of the improved method of doing the job. An improved method of job might change the location and sequence of the work, methods of production and the layout for the job. The improved method will result in more efficiency, more simplicity and effectiveness and job will be done in a better manner.

iv. The developed method should be applied in doing the job.

v. For any new method, a follow up is always required. For method study also a constant follow up is necessary to ensure that the method selected in implemented properly. Thus, method study ensures efficient use of resources by reducing unnecessary work and helps to achieve highest production.

Work Measurement

The work measurement aims at determining the effective time required to perform a job. The ineffective, wasteful or avoidable time is separated from required time to complete the work. The effective time so established in work measurement can be used for the following purposes:

i. Incentive wage schemes which require data about the time allowed and time taken for a particular job.

ii. Improving utilization of men, machines and materials.

iii. Assisting in production control.

iv. Assisting in setting labour standards.

v. Cost control and reduction.

The following stages are involved in work measurement:

i. Selection of work

ii. Measuring the actual time taken in the work done

iii. Making comparison between the standard time and the actual time

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. Job evaluation is a technique of analysis and assessment of jobs to determine their relative value within the firm. It aims at providing a rational and equitable basis for differential salaries and wages for different classes of workers. Job evaluation has the following objectives:

i. It helps in developing a systematic and rational wage structure as well as job structure.

ii. Job evaluation aims at removing the controversies and disputes relating to salary between the employers and employees. Thus, the employees and also the employer remain satisfied.

iii. Another important objective of job evaluation is to bring fairness and stability in the wage and salary structure so as to ensure full cooperation of workers in implementing various policies of the employers.

iv. Job evaluation discloses characteristics and conditions relating to different jobs. This is very useful at the time of recruiting of workers as only suitable workers can be recruited. This avoids square pegs in round holes.

Methods of Job Evaluation

Methods of job evaluation are as follows:

1. **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.

2. **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.

3. **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:

i. To evaluate the merit of an employee for the purpose of promotion, increment, reward and other benefits.

ii. To establish and develop a wage system and incentive scheme.

iii. To determine the suitability of an employee for a particular job.

iv. To analyze the merits or limitations of a worker and help him to develop his capability and competence for a job.

v. 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.

Difference between Merit Rating and Job Evaluation

The difference between the merit rating and job evaluation are as follows:

i. Job evaluation is the assessment of the relative worth of jobs within a business enterprise and merit rating is the assessment of the employees with respect to a job.

ii. Job evaluation helps in establishing a rational wage and salary structure. On the other hand, merit rating helps in fixing fair wages for each worker in terms of his competence and performance.

iii. Job evaluation brings uniformity in wages and salaries while merit rating aims at providing a fair rate of pay for different workers on the basis of their performance.

Time and Motion Study

The study of time and motion is essential for designing an incentive system. Time study determines the time to be spent on the job. Standard time is the time that should be taken for completing a particular job under standard or normal working conditions. For fixation of standard time, motion study is necessary. Thus, the motion study precedes the time study. Motion study means dividing the job into fundamental elements or basic operations of the job or process and studying them in detail to eliminate the unnecessary elements or motions. After investigation all movements in a job, process or operation, the motion study aims at finding out the most scientific and systematic way of performing the job. After eliminating unnecessary motions, the time that should be taken to perform these motions is decided with the help of a stop watch. In the time so fixed, some allowance is added in the same for normal idle time, which is due to fatigue, change of job, change of tools, and preventive maintenance of machines and so on. Thus, standard time for a job or process is arrived at. The time and motion study **aims** at:

i. Eliminating unnecessary motions, thereby reducing inefficiency.

ii. Improving methods, procedures, techniques, and processes relating to a job.

iii. Effective utilization of men, material, machines and time.

iv. Improving working environment, layout and design of plant and equipment.

The following are the **benefits** of Time and Motion Study:

i. Effective utilization of resources like men, material, machine and time

ii. Helps in assessment of labour

iii. Helps in designing incentive system as many of the incentive systems are based on standard time

iv. Preparation of labour budget

v. Proper planning of production for preparation of production budget

vi. Helps in improving labour productivity by designing best method for performing a job or process

vii. Improvement of work methods.

Payroll Department

Roll of payroll department is of crucial importance in overall labour cost computation and control. The main responsibilities of this department are preparation of payroll from clock cards, job or time tickets, or time sheet. The payroll shows the amount of wages payable to each worker showing the gross wages payable, the deductions and the net wages payable. For doing this calculation, they have to work in collaboration with time office, personnel department, cost accounting department and with the concerned department in which the worker is working. The functions of this department are given below:

i. To compute the wages of the employees

ii. To prepare a detailed wages sheet showing the gross wages payable, various deductions and other payroll liabilities.

iii. To maintain individual employee payroll records.

iv. To prepare department wise summaries of wages.

v. Compilation of labour statistics of management.

vi. To install and implement an effective internal check system for preventing frauds and irregularities in payment of wages.

vii. To deduct and prevent ghost workers.

Activitis and their respective Responsibilities

Following activities and the responsibility to discharge such activities are mentioned here under:

Activities		Responsibilities	
i.	Attendance and time details.	i.	Time-keeping department.
ii.	Preparation of list of employees and other details.	ii.	Personnel / HR department
iii.	Computation of wages and other incentives.	iii.	Payroll department.
iv.	Payment to employees.	iv.	Payroll Department
v.	Discharge of statutory liabilities	v.	Cost Accounting Department

2.2.2 Principles and Methods of Remuneration and Incentive Schemes

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 is 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 causes due to 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 are the various methods of payment of wages:

A. **Time Rate System**
   - i. At ordinary levels
   - ii. At high wage levels and
   - iii. Graduated Time Rate

B. **Piece Rate**
   - i. Straight Piece Rate
   - ii. Differential Piece Rates
   - iii. Piece Rate with Guaranteed Day Rates and

C. **Bonus System**
   - i. Individual Bonus for Direct Workers
   - ii. Group Bonus for Direct Workers and
   - iii. Bonus for Indirect Workers

D. **Indirect Monetary Incentives**

i. Profit Sharing and

ii. Co-partnerships

iii. Non-monetary incentives like job security, social and general welfare, sports, medical facilities etc.

These methods are discussed in the following paragraphs:

A. Time Rate Method

i. 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 methos is used in the following situation:

1. Where the work requires high skill and quality is more important than the quantity.
2. Where the output / service is not quantifiable. i.e., where output / service cannot be measured.
3. 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.
4. Where the speed of production is governed by time in process or speed of a machine.
5. Where the workers are leaners or inexperienced.
6. 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.

ii. 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.

iii. 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

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.

Advantages

i. As the workers are paid on the basis of the results, i.e., for each unit produced, job performed or number of operations completed, there is a tendency on their part to increase their production so that they may earn more wages.

ii. The increased production thus achieved results in the reduction of overhead expenses per unit of production even though total overheads may increase. The increase in overheads will be relatively small as compared to the increase in turnover.

iii. The wages being paid on the basis of production; the management know the labour cost per unit or per job.

iv. The workers are rewarded for their efficiency because the inefficient workers will not get as much as the efficient workers.

v. The workers are very careful in handling their tools and machinery, etc., because on the proper maintenance of these machinery depends upon higher efficiency of workers and in turn, wages of the workers will increase.

vi. This method is very simple to operate.

Disadvantages

i. It is not easy to determine the piece work rate on an equitable basis. When a rate has been fixed and later on it is found to be too high, it is very difficult to reduce it as its reduction will cause dissatisfaction and friction among the workers.

ii. As the labour cost per unit remains the same, the employees do not gain as a result of increase in productivity except to some extent in the form of reduction in overheads. As such if the overhead expenses per unit are relatively small, the advantage to the employer will not be significant.

iii. Sometimes quantity may increase at the cost of quality. For this reason, a strict inspection has to be maintained in the form of quality control. This will result into additional expenditure.

iv. Materials may be used in excessive quantities and may be handed carelessly on account of the workers' efforts to achieve high output.

v. This method may cause discontentment amongst those who are slow and those who are paid on time basis.

vi. The workers may in an attempt to increase production, handle the machines carelessly causing major damage or breakdown.

I. 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.

II. Differential Piece Rate

Under these methods, the rate per standard hour of production is increased as the output level rises. The increase in rates may be proportionate to the increase in output or proportionately more or less than that as may be decided. In other words, a worker is paid higher wages for higher productivity as an incentive. The rate per unit will be higher in this case as compared to the rate paid to a worker with lower productivity. For deciding the efficiency, comparison is made between the standard production and actual production of the worker. If the actual production is more, the worker qualifies for higher rate of wages. The differential piece rate methods will be useful when the production is of repetitive type, methods of production are standardized and the output can be identified with individual workers. The following are the major systems of differential piece rate system:

1. Taylor's Differential Piece Rate System

Taylor is regarded as father of scientific management and he has recommended a system of Differential Piece Rate. According to him, there are only two classes of workers, efficient and inefficient. He suggested that while 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 21

From the following particulars, calculate the earnings of workers A and B 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, A produces 140 units while B 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.

2. 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

3. 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 22

Amar, Akbar and Anthony 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 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:

(i) Earnings under Taylor Plan

Particulars	Amar	Akbar	Anthony
Standard Production in 40 hours	100 units	100 units	100 units
Actual Production	96 units	111 units	126 units
Efficiency	Below Standard = 80% of Normal Piece Rate	Above Standard = 120% of Normal Piece Rate	Above Standard = 120% of Normal Piece Rate
Total Earnings	= 96 × 6 × 80% = ₹ 460.80	= 111 × 6 × 120% = ₹ 799.20	= 126 × 6 × 120% = ₹ 907.20
Labour Cost per unit	$\frac{₹\ 460.80}{96\ units} = ₹\ 4.80$	$\frac{₹\ 799.20}{111\ units} = ₹\ 7.20$	$\frac{₹\ 907.20}{126\ units} = ₹\ 7.20$

(ii) Earnings under Merrick Plan

Particulars	Amar	Akbar	Anthony
Standard Production in 40 hours	100 units	100 units	100 units
Actual Production	96 units	111 units	126 units
Efficiency	$\frac{96}{100} \times 100 = 96\%$	$\frac{111}{100} \times 100 = 111\%$	$\frac{126}{100} \times 100 = 126\%$
Rate to be applied (PR = Piece Rate)	110% of Ordinary PR = ₹ 6 × 110% = ₹ 6.6	120% of Ordinary PR = ₹ 6 × 120% = ₹ 7.20	120% of Ordinary PR = ₹ 6 × 120% = ₹ 7.20
Total Earnings	₹ 6.6 × 96 = ₹ 633.60	₹ 7.20 × 111 = ₹ 799.20	₹ 7.20 × 126 = ₹ 907.20
Labour Cost per unit	$\frac{₹\ 633.60}{96\ units} = ₹\ 6.60$	$\frac{₹\ 799.20}{111\ units} = ₹\ 7.20$	$\frac{₹\ 907.20}{126\ units} = ₹\ 7.20$

(iii) Earnings under Gantt Task Bonus Plan

Particulars	Amar	Akbar	Anthony
Standard Production in 40 hours	100 units	100 units	100 units
Actual Production	96 units	111 units	126 units

Particulars	Amar	Akbar	Anthony
Efficiency	Below Standard = Guaranteed Time Rate	Above Standard = High Piece Rate	Above Standard = High Piece Rate
Total Earnings	= 40 × 10 = ₹ 400	= 111 × 6 = ₹ 666	= 126 × 6 = ₹ 756
Labour Cost per unit	$\frac{₹\ 400}{96\ \text{units}} = ₹\ 4.17$	$\frac{₹\ 666}{111\ \text{units}} = ₹\ 6$	$\frac{₹\ 756}{126\ \text{units}} = ₹\ 6$

III. Piece Rate with Guaranteed Day Rates

1. 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 $\frac{2}{3}^{rd}$ to of this standard efficiency or above, 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 is 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 pre – suppose a high degree of average performance. The wages are guaranteed on time basis.

2. 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

I. 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:

i. 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.

$$\text{Total Earnings} = T \times R + \frac{50}{100} \times TS \times R$$

ii. 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 33⅓ % of the time saved. Accordingly, the formula for this method is modified as follows:

Total Earnings = Total Earnings = T × R + 33⅓ % × TS × R

iii. 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:

$$\text{Total Earnings} = T \times R + \frac{TS}{TA} \times T \times R$$

iv. Barth Variable Sharing Plan

In this system, the total earnings are calculated as follows:

$$\text{Total Earnings} = R \times \sqrt{TA \times T}$$

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

Different Group Bonus Schemes in use are as follows:

1. **Budgeted Expenses Bonus:** Under this system, bonus is based on the savings in actual total expenditure compared with the budgeted expenditure.

2. **Cost Efficiency Bonus:** In this method, standards are set for expenses like material, labour and overheads. The actual expenditure against these standards is measured and if there is a savings in actual expenditure as compared to the standards, a portion of such savings is distributed as bonus amongst the workers.

3. **Pristman System:** In this method, production standards are set in units or points and actual production is compared with the standards. If the actual production exceeds the standard, the workers are paid additional wages equal to the percentage of output over standard. Obviously, no bonus is payable if actual production does not exceed the standard production. This method is mainly used in foundries.

4. **Towne Profit Sharing Plan:** In this method standards are set for costs (mainly labour cost) and the actual cost is compared with the standards. If there is a saving in the costs, the saving is shared by workers and supervisory staff in agreed proportion. The principle behind this method is that if there is a saving in the cost, not only the workers but the supervisory staff should also get the reward because the cost reduction is the joint efforts of both the types of staff. Hence, both workers and supervisors share it.

5. **Waste Reduction Bonus:** This system of bonus on savings in the material cost. If there is a saving in the material cost, the workers share the same in the agreed proportion. This system is generally used in industries where cost of material is very high.

6. **Rucker Plan:** The amount of bonus is linked with 'value added' in this system. The 'value added' is obtained by deducting the cost of material and services from sales value. In other words, value added is the total of labour, overheads and profits. Under this plan, employees receive a constant proportion of value added. For example, if the target ratio of labour cost to value added is 70%, and the actual ratio comes to 68%, 2% of the actual value added is distributed as group bonus, so that the ratio of direct labour cost to value added is maintained at 70%. Normally, instead of distributing the entire bonus, some proportion is distributed and the remaining is transferred to reserve fund.

7. **Scanlon Plan:** This method is similar to the Rucker plan as discussed above except that the ratio of labour cost to the sales is taken instead of direct labour cost to added value. Normally, bonus is paid based on average of last three years ratios. A part of the bonus may be transferred to bonus equalization fund for future use when the workers do not get bonus under this scheme.

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.

c. 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.

Some of the non-monetary incentives are as follows:

i. Free education and training
ii. Medical benefits
iii. Subsidized canteens
iv. Superannuation benefits like pensions, gratuity, life assurance schemes etc
v. Sports and recreation facilities, housing facilities, long service awards
vi. Job security, promotion schemes
vii. Benevolent funds and welfare fund.

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 overhead. 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 @ 8⅓ % 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 overhead. 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 Overhead, 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 whether the assistance is payable to direct labour, indirect labour or staff the expenditure should be treated as Direct Labour Cost, Production Overhead Cost or Administrative Overhead 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 overhead 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 overhead 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 overhead 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 overhead.

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 overhead 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.

Illustration 23

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 the following Bonus schemes:

a. Halsey Plan

b. Hasley – Weir Plan

c. Rowan Plan

d. Barth Variable Sharing Plan

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

$$\text{Earnings} = T \times R + 33\frac{1}{3}\% \times TS \times R$$

$$= 40 \times 15 + \frac{1}{3} \times 8 \times 15$$

$$= 600 + 40 = ₹\ 640$$

c. Rowan Plan

$$\text{Earnings} = T \times R + \frac{TS}{TA} \times T \times R$$

$$= 40 \times 15 + \frac{8}{48} \times 40 \times 15$$

$$= 600 + 100 = ₹\ 700$$

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 24

During October 2021, 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

$$= \frac{\text{Number of Seperations}}{\text{Average Number of Workers during the period}} \times 100 = \frac{(25 + 40)}{2,000} \times 100 = \frac{65}{2,000} \times 100 = 3.25\%$$

c. Replacement Method

$$= \frac{\text{Number of Additions}}{\text{Average Number of Workers during the period}} \times 100 = \frac{30}{2,000} \times 100 = 1.5\%$$

d. Flux Method

$$= \frac{\frac{1}{2} \times (\text{Number of Additions} + \text{Number of Separations})}{\text{Average Number of workers during the period}} \times 100$$

$$= \frac{\frac{1}{2} \times (280 + 65)}{2,000} \times 100$$

$= 8.63\%$

Average Number of Workers during the period

$$= \frac{\text{Opening number of workers + Closing number of workers}}{2}$$

$$= \frac{1,900 + 2,100}{2}$$

$$= 2,000$$

Illustration 25

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, 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

∴ 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% × ₹ 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**

Illustration 26

Calculate the total earnings and effective rate of earnings per hour of three operators: A, B and C 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 27

Suresh 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	Time Rate System	Halsey Plan	Rowan Plan
	(₹)	(₹)	(₹)
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	Time Rate System	Halsey Plan	Rowan Plan
Earning	**T × 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 28

Ramesh 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	$= \mathbf{T \times R + \frac{TS}{TA} \times T \times R}$	
	$= 6 \times 0.25 + \frac{2}{8} \times 6 \times 0.25 = 1.50 + 0.375$	≈ ₹ 1.88
Add: Cost of Living Bonus (6 hours × 10 paise per hour)		= ₹ 0.60
Gross Earnings under Rowan Plan		= ₹ 2.48

Illustration 29

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	$= \frac{60}{25}$

$$\text{Piece Rate} = \frac{\text{Rate per hour}}{\text{Number of Pieces to manufacture per hour}}$$

$$= \frac{₹\ 1.80 \text{ per hour}}{\frac{60}{25} \text{ pieces per hour}}$$

$$= ₹\ 0.75 \text{ per piece}$$

Earnings under Piece Rate = 180 units × ₹ 0.75 per piece = ₹ 135

c. Earnings under Halsey Premium Bonus Plan:

Time Allowed (TA) for 180 units = $180 \text{ units} \times \frac{25}{60} = 75$ hours

Time Saved (TS = TA – T) = 75 – 48 = 27 hours

Earnings under Halsey Plan = T × R + 50% × TS × R

= 48 × 1.80 + 50% × 27 × 1.80

= 86.40 + 24.30 = ₹ 110.70

d. Earnings under Rowan Premium Bonus Plan $= \mathbf{T \times R + \frac{TS}{TA} \times T \times R}$

$$= 48 \times 1.80 + \frac{27}{75} \times 48 \times 1.80$$

$$= 86.40 + 31.104 \approx ₹\ 117.50$$

Illustration 30

Calculate the earnings of workers X and Y 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.

X produced 1,300 units per day of 8 hours and Y 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

$$\therefore \text{Rate per piece} = \frac{\text{Rate per hour}}{\text{Number of units to manufacture per hour}}$$

$$= \frac{₹\ 1.80 \text{ per hour}}{180 \text{ pieces per hour}}$$

$$= ₹\ 0.01$$

Standard Production in 8 hours = 180 × 8 = 1,440 units

Earnings under Straight Piece Rate:

Earnings of X = 1,300 × 0.01 = ₹ 13.00

Earnings of Y = 1,500 × 0.01 = ₹ 15.00

Earnings under Taylor's Differentials Piece Rate

Particulars	X	Y
Standard Production	1,440 units	1,440 units
Actual Production	1,300 units	1,500 units
Efficiency	$= \left(\frac{1,330}{1,440} \times 100\right) = 90.28\ \%$	$= \left(\frac{1,500}{1,440} \times 100\right) = 104.17\ \%$
	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 31

The following particulars apply to a particular job:

Standard production per hour	6 units
Normal rate per hour	₹ 1.20
Ajay produced	32 units
Vijay produced	42 units
Sujoy 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	Ajay	Vijay	Sujay
Normal Piece Rate*	₹ 0.20	₹ 0.20	₹ 0.20

Particulars	Ajay	Vijay	Sujay
Standard Production per day 6 units × 8 hours	48 units	48 units	48 units
Actual Production	32 units	42 units	50 units
Efficiency#	$\frac{32}{48} \times 100 = 66\frac{2}{3}\%$	$\frac{42}{48} \times 100 = 87\frac{1}{2}\%$	$\frac{50}{48} \times 100 = 104\frac{1}{6}\%$
	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 32

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 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 P produced 180 units; Q 164 units; R 200 units; S 208 units and T 130 units.

Calculate the earnings of these workers.

Solution:

Particulars	P	Q	R	S	T
Standard Output (units)	200	200	200	200	200
Actual Output (units)	180	164	200	208	130
Efficiency	$\frac{180}{200} \times 100$ = 90 %	$\frac{164}{200} \times 100$ = 82 %	$\frac{200}{200} \times 100$ = 100 %	$\frac{208}{200} \times 100$ = 104 %	$\frac{130}{200} \times 100$ = 65 %
Bonus %	9%	5%	20%	24%	Nil

Particulars	P	Q	R	S	T
Normal daily wage (6 days × ₹ 2.50)	₹ 15	₹ 15	₹ 15	₹ 15	₹ 15
Add: Bonus	15 × 9% = ₹ 1.35	15 × 5% = ₹ 0.75	15 × 20% = ₹ 3	15 × 24% = ₹ 3.60	Nil
Total Wages	₹ 16.35	₹ 15.75	₹ 18	₹ 18.60	₹ 15

Illustration 33

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 exceed. Four workmen M, N, O and P 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.

$$\therefore \text{Standard Production / output per day} = \frac{360 \text{ minutes}}{6 \text{ minutes p.u.}} = 60 \text{ units}$$

$$\text{Hourly wages rate} = \frac{₹ 32}{8 \text{ hours}} = ₹ 4 \text{ per hour}$$

Statement Showing computation of performance achieved and total earnings per day of four workers

Particulars	M	N	O	P
Standard output	60 units	60 units	60 units	60 units
Actual output	48 units	60 units	75 units	90 units
a. Performance Level (efficiency)	$\frac{48}{60} \times 100$ = 80%	$\frac{60}{60} \times 100$ = 100%	$\frac{75}{60} \times 100$ = 125%	$\frac{90}{60} \times 100$ = 150%
Wages of Measured Work	6 hours @ ₹ 4 = ₹ 24	6 hours @ ₹ 4 = ₹ 24	6 hours @ ₹ 4 = ₹ 24	6 hours @ ₹ 4 = ₹ 24

Particulars	M	N	O	P
Bonus	Nil	Nil	25% × ₹ 24 = ₹ 6	50% × ₹ 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 34

The following particulars for the first week of September, 2022 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 (1. – 2.)	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	$\frac{3 \text{ hours}}{200 \text{ units}} \times 4{,}200 \text{ units}$ = 63 hours

Sl. No.	Particulars	X (₹)	Y (₹)
6.	Actual Time worked	45 hours	50 hours
7.	Overtime worked (Actual Time Worked – Normal Working Hours)	45 – 42 = 3 hours	50 – 42 = 8 hours
8.	Bonus Hours (5. – 6.)	60 – 45 = 15 hours	63 – 50 = 13 hours
9.	Amount Bonus	15 hours × ₹ 5 × $\frac{2}{3}$ = ₹ 50	13 hours × ₹ 6 × $\frac{2}{3}$ = ₹ 52
10.	Overtime Wage	3 hours × ₹ 5 × $\frac{4}{3}$ = ₹ 20	4 hours × ₹ 6 × $\frac{4}{3}$ + 4 hours × ₹ 6 × $\frac{3}{2}$ = ₹ 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	$\frac{₹\ 280}{3{,}060\ \text{units}}$ × 100 units = ₹ 9.15	$\frac{₹\ 372}{3{,}780\ \text{units}}$ × 100 units = ₹ 9.84

Illustration 35

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 minutes
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 = $\frac{24\ \text{minutes}}{60\ \text{minutes}}$ × ₹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 pieces × $\frac{24}{60}$ minutes = 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 $= T \times R + \frac{TS}{TA} \times T \times R$

$= 48 \times 3.75 + \frac{12}{60} \times 48 \times 3.75$

$= 180 + 36$

$= ₹ 216$

Illustration 36

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 Ram who worked 41 ½ hours and was paid ₹ 2 per hour basic and of Shyam who worked 44 ½ hours and was paid ₹ 2.50 per hour basic.

Solution:

a. Standard Production in Actual Time = 480 × 200 = 96,000 units

b. Actual Production = 1,19,600 units

c. Excess of Actual Production over standard = 1,19,600 – 96,000 = 23,600 units

d. Percentage of excess over standard = $\frac{23,600}{96,000} \times 100 = 24.58\%$

e. Percentage of Bonus = $\frac{1}{2} \times 24.58\% = 12.29\%$

f. Bonus Rate per hour = ₹ 3.20 × 12.29% = ₹ 0.393

g. Total Bonus for week = 480 × 0.393 = ₹ 188.64

Computation of Total Earnings of Ram & Shyam:

Particulars		Ram (₹)		Shyam (₹)
Basic Wages	41.50 × 2	83.00	44.50 × 2.50	111.25
Bonus	41.50 × 0.393	16.31	44.50 × 0.393	17.49
Total Earnings		**99.31**		**128.74**

Illustration 37

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% increase 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 8⅓ %. Show the net 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 = $\frac{16}{96} \times 100 = 16\frac{2}{3}\%$

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 $\left(16\frac{2}{3}\% \times \frac{1}{2} = 8\frac{1}{3}\%\right)$	=	**$24,000 \times 8\frac{1}{3}\% = ₹\ 2,000$**
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 required net savings in production costs must be ₹ 7,250

Illustration 38

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 × 60)	=	600 minutes
Less: Idle Time (15% × 600)	=	90 minutes
Actual Time	=	510 minutes
Normal Time	=	510 × 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 39

The extracts from the payroll of M/s. Bahubali Bros. are as follows:

Number of employees at the beginning of 2021	150
Number of employees at the end of 2021	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 40

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 overhead 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 $= T \times 1.25 + \frac{40 - T}{40} \times T \times 1.25$

$= \frac{50T + 50T - 1.25T^2}{40}$

$= \frac{100T - 1.25T^2}{40}$

Factory Cost = Material Cost + Wages + Factory Overhead

$$\text{or, } 161.875 = 100 + \frac{100T - 1.25T^2}{40} + 0.5T$$

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, $T \neq 66$ [Since, Time taken should not be more than Time Allotted]

So, T = 30. Hence, Time taken by the worker = 30 hours

Illustration 41

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 overhead at 20% of prime cost; selling overhead 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 × 1.5 = 330	220 × 1.5 = 330	220 × 1 = 220	220 × 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 Overhead @ 20% × 3,300	660
Factory Cost	3,960
Add: Selling and Distribution Overhead @ 10% × 3,960	396
Cost of Sales or Total Cost	4,356
Add: Profit @ 25% × 4,356	1,089
Selling Price	5,445

Illustration 42

Two workmen, Jay and Viru, produce the same product using the same material. Their normal wage rate is also the same. Jay is paid bonus according to the Rowan System, while Viru is paid bonus according to Halsey System. The time allowed to make the product is 100 hours. Jay takes 60 hours while Viru takes 80 hours to complete the product. The factory overhead rate is ₹ 10 per man-hour actually worked. The factory cost for the product for Jay is ₹ 7,280 and for Viru 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	Jay (Rowan Plan)	Viru (Halsey Plan)
Material	M	M
Labour (Working Note)	$60 \times R + \frac{40}{100} \times 60 \times R$	$80 \times R + \frac{50}{100} \times 20 \times R$
	= 84 R	= 90 R
Prime Cost	M + 84 R	M + 90 R
Add: Overhead	60 × 10 = 600	80 × 10 = 800
Factory Cost	7,280	7,600

Particulars	Jay (Rowan Plan)	Viru (Halsey Plan)
Equation	M + 84R + 600 = 7,280 or, M + 84R = 6,680	M + 90R + 800 = 7,600 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 × 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	Jay (₹)	Viru (₹)
Material	5,000	5,000
Wages	$\left(60\times20+\frac{40}{100}\times60\times20\right)$ 1,680	$\left(80\times20+\frac{50}{100}\times20\times20\right)$ 1,800
Overhead	600	800
Factory Cost	7,280	7,600

Working Note:

Computation of Wages

Jay	Viru
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

Cost Accounting Standard – 7: Employee Cost (CAS 7)

Employee Cost: The aggregate of all kinds of consideration paid, payable and provisions made for future payments for the services rendered by employees of an enterprise (including temporary, part time and contract employees). Consideration includes wages, salary, contractual payments and benefits, as applicable or any payment made on behalf of employee. This is also known as labour cost.

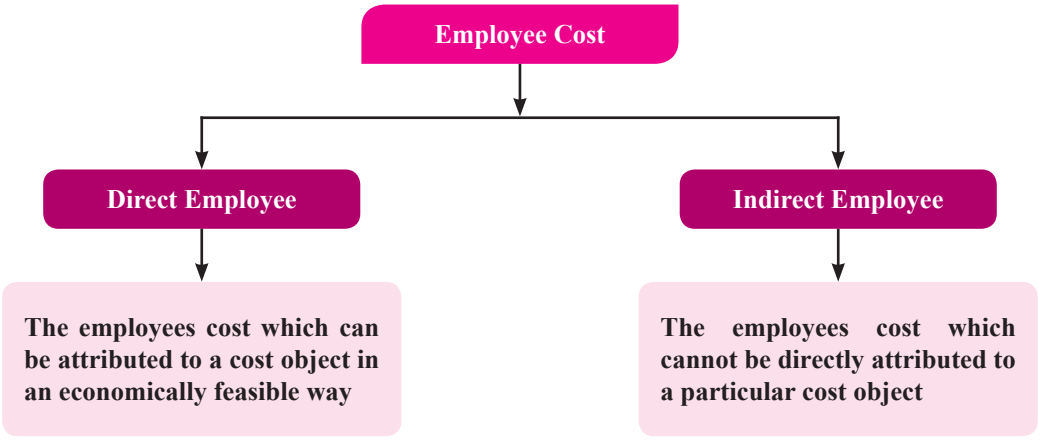


Figure 2.5: Classification of Labour Cost

Principles of Measurement of Employee Cost: The principles to be followed for measurement of employee costs are:

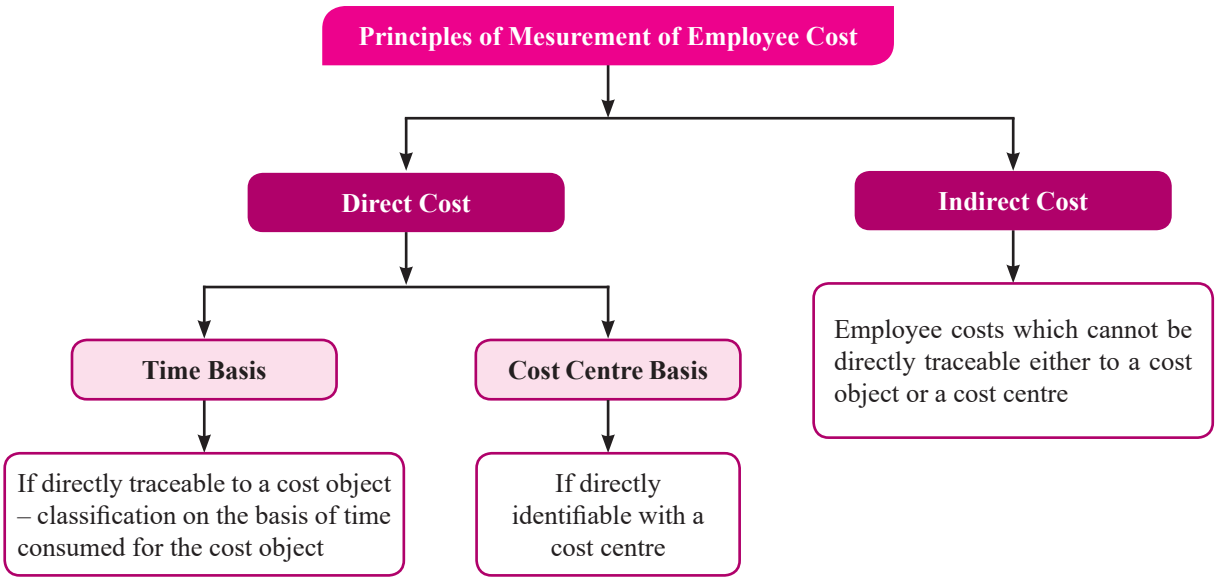


Figure 2.6: Principles of Measurement of Employee Cost

Measurement of Employee Cost: Inclusions and Exclusions

The following items are to be **'included'** for the purpose of measuring employee cost:

i. Any payment made to an employee either in cash or kind.

ii. Gross payments including all allowances payable and includes all benefits.

iii. Bonus, ex-gratia, sharing of surplus, remuneration payable to managerial personnel including executive directors and other officers.

iv. Any amount of amortization arising out of voluntary retirement, retrenchment, termination, etc.

v. Variance in employee payments / costs, due to normal reasons (if standard costing system is followed).

vi. Any perquisites provided to an employee by the employer.

The following items are to be **'excluded'** for the purpose of measuring employee cost:

i. Remuneration paid to non-executive director.

ii. Cost of idle time [Hours spent as idle time × hourly rate]

iii. Variance in employee payments / costs, due to abnormal reasons (if standard costing system is followed).

iv. Any abnormal payment to an employee – which are material and quantifiable.

v. Penalties, damages paid to statutory authorities or third parties.

vi. Recoveries from employees towards benefits provided – this should be adjusted / reduced from the employee cost.

vii. Cost related to labour turnover – recruitment cost, training cost and etc.

viii. Unamortized amount related to discontinued operations.

Illustration 43

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 44

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 45

Measurement of Employee Cost (with special items)

Dr. **Trial Balance as on 31.3.2022 (relevant extracts only)** **Cr.**

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		

Particulars	Amount (₹)	Particulars	Amount (₹)
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 overhead, hence not included.
3. Special subsidy received is to be excluded, as it reduces the cost of the employer.
4. Unamortised amount of employee cost related to a discontinued operation is not an includible item of cost.

2.2.3 Overtime and Idle Time

Overtime Wages / Overtime Premium

The Factories Act provides for payment of overtime wages at double usual rates of wages. Even where the Act is not applicable, the practice is to pay for overtime work at higher rates usually in accordance with a standing agreement between the employer and the workers. Hence, payment of overtime consists of two elements, viz., the normal (i.e., usual) amount and the extra payment, i.e., the premium. As per CAS – 7, the overtime and overtime premium is defined as "Overtime is the time spent beyond the normal working hours which is usually paid at a higher rate than the normal time rate. The extra amount payable beyond the normal wages and salaries for beyond the normal working hours is called Overtime Premium".

Treatment of Overtime in Cost Records

As per CAS – 7, overtime premium shall be assigned directly to the cost object or treated as overheads depending on the economic feasibility and specific circumstances requiring such overtime.

When overtime is worked due to exigencies or urgencies of the work, the basic / normal payment is treated as

Direct Labour Cost and charged to production or cost unit on which the worker is employed. Whereas the amount of premium (extra amount) is treated as overhead.

If overtime is spent at the request of the customer, then the entire amount (including overtime premium) is treated as direct wages and should be charged to the job.

When the overtime is worked due to lack of capacity as general policy of the company, then the total amount paid is treated as direct wages which is computed at the estimated rate based on the figures of the previous years.

Overtime worked on account of the abnormal conditions such as flood, earthquake, etc., should not be charged to cost, but to costing profit and loss account if integrated accounts are maintained.

It will thus be seen that overtime involves payment of increased wages and should be resorted to only when extremely essential. The disadvantages attached to overtime working are as follows:

a. It involves excess labour cost.

b. There is decrease in productivity. Output is usually proportionate to the excess time worked as efficiency during late hours is diminished.

c. Work in the evenings increases lighting cost.

d. Continuous work for long periods leads to fatigue and defective work.

e. It fells upon the health of the workers.

f. Overtime work if not properly distributed among the workers may lead to discontentment.

g. There is an unusual strain on plant and machinery.

h. Once overtime is resorted to for some time, the workers take the overtime wages as part of their normal earnings and resist future attempts to discontinue overtime work.

i. There is a tendency to keep the work pending to be done during overtime period or to intentionally slow down in order to compel the management to sanction overtime.

   It may however, be said in favour of overtime work that it increases the productive capacity of the concern as more work is done with the existing resources. Overtime work is particularly useful in pulling up backlog in production arising due to shutdown, breakdown, power failure and such other contingencies.

   Though overtime work cannot be completely eliminated, it is essential that proper control should be exercised to keep it to the minimum. The following steps should be taken to control the overtime:

   a. All overtime work should be duly authorised after investigating the necessity thereof.

   b. Overtime cost should be recorded separately and shown against the department incurring it. This will enable proper investigation and planning of production in future.

   c. If overtime tends to be a permanent feature, the necessity of recruiting more men and working in different shifts should be considered.

   d. If overtime is due to lack of plant or machinery or other resources, steps may be taken to install more machines, or to give subcontracts alternatively, to restrict production so as to complete it within the normal time.

Idle Time

Idle time cost represents the wages paid for the time lost during which the worker does not work, i.e., time for which wages are paid, but no work is done. As per CAS – 7, idle time is defined as "the difference between the time

for which the employees are paid / payable to employees and the employees time booked against the cost object". This happens because due to various causes for which he is not responsible, the worker remains idle but full wages are paid to him. Even for workers who are paid on the basis of output, idle time payment may be required to be made.

The causes leading to idle time may be broadly classified into four categories, viz:

i. **Normal, inherent or unavoidable idle time:** Time lost between the gate and place of work, break for tea, time interval between one job and another, time for tool setting, adjustment of machine, etc.

ii. **Normal idle time** such as waiting for jobs, tools, materials or instructions, small power failures, small breakdown of machines and tools, and atmospheric conditions.

iii. **Abnormal idle time** such as those arising due to breakdown for considerable period, non-availability of raw materials, slack supervision, strikes or lock-outs, fire flood, storm, etc.

iv. **Concerned idle time** such as manipulation of job breaking, wastage of time due to under employment, i.e., unnecessary work like cleaning, grass cutting and gardening to employ idle men, and employment of skilled workers on unskilled jobs.

Idle time should not be booked directly to jobs or production orders because such a practice not only increases the cost of direct labour, but also vitiates comparison of idle time costs from time to time. In booking of time, idle or waiting time should not normally record in the job card but on separate idle time cards. Separate cards or registers may be provided for recording idle time according to the causes which give rise to it.

Treatment of Idle Time

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 are as follows:

a. 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.

b. Normal idle time is booked to factory or works overhead. 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.

c. 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.

d. Tendency to conceal idle time should be discouraged. It is a non-effective time and the resultant loss of profit due to reduced production activity but also increases the cost per unit of production as the fixed costs continue to be incurred, irrespective of the reduced quantum of production due to loss of labour time. Idle time should, therefore, be highlighted prominently so that action can be taken to remove the causes thereof. Although for obvious reasons, it is not possible to record minor details, vigilance is necessary for finding out long term idleness among the workers.

Idle Time Preventive Measures

Idle Time may be eliminated or reduced to a large extent by taking suitable preventive measures such as:

a. Proper planning of production in advance, thus reducing imbalances in production facilities,

b. Timely provisioning of materials,

c. Regular maintenance of machines so as to avoid breakdown, and

d. Careful watch over the labour utilization statement.

The remedial measure to be taken will, no doubt, depend upon the particular factor or situation which caused the idle time.

2.2.4 Employee Cost Reporting

Employee cost reporting

1. Direct Employee costs shall be presented as a separate cost head in the cost statement: Direct employees are those who work on a product directly, either manually or by using machines. They are directly involved in the production of a finished product, that can be easily traced to the product. Examples are assembly line workers in an automobile factory or employee working on spindle / loom in textile industry. Direct employee cost is to be presented as a separate item in the cost statement.

2. Indirect employee costs shall be presented in cost statements as a part of overheads relating to respective functions e.g., manufacturing, administration, marketing etc: Indirect employee cost is not directly traceable to a cost object / product and forms part of overheads. The word 'overheads' is used for a type of cost that cannot be directly allocated to a cost object or product, but can be assigned to cost objects.

   Employees whose services are indirectly related to production include product designers, job supervisors, foreman, product inspector, and the like. Employee cost of such employees is considered part of production overheads. Salaries of employees working on administrative activities such as administration, personnel, accounts and the like are classified as part of administrative overheads. Similarly, salaries of employees engaged in marketing / selling activities and distribution activities are part of selling and distribution overheads.

3. The cost statement shall furnish the resources consumed on account of employee cost, category wise such as wages salaries to permanent, temporary, part time and contract employees piece rate payments, overtime payments, employee benefits (category wise) etc wherever such items form a material part of the total employee cost: Direct employee cost is to be exhibited as a separate item in the cost statement as per CAS – 7.

Measuring Productivity

Productivity is simply the amount of units of a product or service that an employee handles in a defined time frame. An employee who makes mechanical device make 20 mechanical devices per hour, or an employee at a coffee shop might service 15 customers per hour. Simply productivity is neither good nor bad, and in service industries, it might vary according to factors beyond the employee's control, like the number of customers who present for service. Productivity is the basic measure of employee work output.

Determining Unit of Service (UOS)

Productivity and efficiency require a defined unit of service. UOS analysis is usually job-specific, and is most relevant to employees who have jobs that are repetitive. For example, a spot welder might have "welds completed" or "parts completed" as his UOS, whereas a housekeeper in a hotel might have "rooms cleaned per shift" as her UOS. Some jobs, particularly professional jobs that have variable output, defy reasonable UOS measurements.

Measuring Efficiency

For many businesses, including most small businesses, the most significant cost is labour. Salaries and wages comprise the major line item expense for most retail and small scale manufacturing companies, but labour also

tends to be responsive to productivity improvements. To reduce labour costs, entrepreneurs should consider measuring employee efficiency and setting aggressive performance targets to get most of their employee costs.

Efficiency is a ratio of an employee's actual time to perform each UOS against the theoretical time needed to complete it. For example, an employee who packages DVDs might put together 80 DVDs in one hour. If the best practice target is 100 DVDs in an hour – measured by a time study – then the employee is 80 percent effective and has the capacity to package 20 more units per hour. It is usually helpful to report separately the percentage of an employee's paid time that is actually spent performing direct work. For example, an employee who is paid for working 8 hours but because of meetings and lunch breaks, works for 6 hours only i.e., the employee's 75 percent time being "productive" in terms of UOS analysis. Only the six hours working should be factored into efficiency scoring.

Benchmarks and Targets

Some industries have basic benchmarks already established. For example, telephone call centres have service levels that identify the ideal amount of time that common transactions should take, that are consistent across industries. However, most companies will have to establish for themselves, how long basic tasks should take, and set performance targets accordingly. The task of baseline measuring should be done with a time study, which averages the amount of time that multiple transactions take or assess the amount of time an average employee performs the task. It may not be ideal to require employees to be 100 percent efficient, particularly when the employees lack control over their own productivity – like in customer – service jobs when employees wait for customers to call or stop by. If an employee can never hit 100 percent, then morale may suffer.

Longitudinal Reporting

The real benefit to measuring employee is in longitudinal reporting. Calculating efficiency over a period of time can identify opportunities to reorganize staffing, or add or remove employees based on the company's volume of business, and an individual employee's long – term productivity can factor into merit increases and bonuses. Efficiency scoring can also help with predictive modelling. If it takes 90 seconds to produce a mechanical device, and employees are operating at 75 percent efficiency, then instead of producing 40 widgets per hour, only 30 will be produced.

2.2.5 Labour Turnover

Labour turnover is the rate of change in the labour force of a concern during a specific period. In every organisation some employees leave every year while new employees are recruited in their place. This is a natural phenomenon in industrial sector and it gives rise to the problem of labour turnover. The rate at which the employees depart from the organisation is normally measured as the ratio of number of persons leaving in a period to the average number of employees on the pay roll. A controlled level of labour turnover is considered as desirable because it helps the firm to adjust the size of its labour force in response to needs such as for seasonal changes or changes in technology.

The rate of labour turnover is high if the number of employees leaving the organisation occurs frequently. This leads to (i) decrease in the productivity and efficiency in the concern, (ii) destabilize normal flow of work, (iii) increases the labour cost.

Causes of Labour Turnover

The causes giving rise to high labour turnover may be broadly classified under the following heads:

i. **Personal Causes:** Workers may leave employment purely on personal grounds, e.g.,
   a. Dislike for the job, locality or environments.
   b. Domestic troubles and family responsibilities.

c. Change of line for betterment.

d. Retirement due to old age and ill health.

e. Death.

In all such cases, personal factors count the most and employer can practically do nothing to help the situation.

ii. Unavoidable Causes: In certain circumstances it becomes obligatory on the part of the management to ask some of the workers to leave. These circumstances are:

a. Retrenchment due to seasonal trade, shortage of any material and other resources, slack market for the product, etc.

b. Discharge on disciplinary grounds.

c. Discharge due to continued or long absence.

iii. Avoidable Causes: Under this head, may be grouped the causes which need the attention of the management most so that the turnover may be kept low by taking remedial measures. The main reasons for which workers leave are:

a. Unsuitability of job

b. Low pay and allowance

c. Unsatisfactory working conditions

d. Unhappy relations with co-workers and unsatisfactory behaviour of superiors.

e. Dispute between rival trade unions.

f. Lack of transport, accommodation, medical and other factors.

g. Lack of amenities like recreational centres, schools, etc.

The above causes may also be classified in a different manner under three heads, viz., Financial Causes, Social and Economic Causes and Psychological Causes relating to human relationship.

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:

a. 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:

$$\text{Labour Turnover} = \frac{\text{Number of Additions}}{\text{Average Number of Workers during the period}} \times 100$$

c. 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:

$$\text{Labour Turnover} = \frac{\text{Number of Separation}}{\text{Average Number of Workers during the period}} \times 100$$

e. **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.

$$\text{Labour Turnover} = \frac{\text{Number of Replacements}}{\text{Average Number of Workers during the period}} \times 100$$

f. **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

Increasing Labour Turnover is a double edged sword. It reduces the productivity of labour and resulting in high costs. The cost of labour turnover may be analysed under two broad headings, Preventive Costs and Replacement Costs. Preventive Costs refer to all those items of expenditure which are incurred in order to keep the workers satisfied and thus to act as discouragement against leaving employment. Replacement Costs are those costs which are incurred for the recruitment and training of new hands and the resulting losses, wastages and lowering of productivity due to the inexperience and inefficiency of the new labour force.

Preventive Costs may be further grouped under the following heads:

1. **Personnel Administration**

   Most concerns would have a personnel department which is entrusted with recruitment, training and other problems arising out of the employment of the labour force. Obviously, the entire expenditure of the department cannot be treated as labour turnover costs but a portion of the costs which related to the efforts of the personnel manager in maintaining good relationship between the management and the staff should be treated as preventive labour turnover cost. The labour force remains satisfied if properly looked after and if grievances are sympathetically considered.

2. **Medical Service (Preventive and Curative)**

   Care for own health and that of family members gets prior consideration with the workers who prefer those concerns where medical services are available. Further, a healthy worker is an asset of the firm as he is able to make substantial contribution towards higher efficiency and productivity.

3. **Welfare activities and schemes**

   These includes like subsidized canteen, co-operative store, laundry and washing services, sports, housing schemes, transport and educational facilities. These facilities are as good as higher wages offering incentive to the worker to stay with the firm.

4. **Miscellaneous schemes such as pension or provident fund schemes, bonus, high wage and other incentive schemes**

   Greater the advantage these prerequisites offer, the lower will be the rate of labour turnover.

Replacement Costs consist of the following:

1. **Loss of output due to delay in recruiting new workers**

   As suitable workers may not be available readily, there is a time gap before a new worker can replace the old one. During this period, some output may be maintained by retaining surplus labour force to meet such contingencies or by working overtime. All such extra cost should be taken as labour turnover cost.

2. **Employment department expenses**

   With the increase in the tempo of recruitment, additional work in thrown on the employment or personnel department. Administrative expenditure is incurred for the selection, test and medical examination of the new hands for writing initial document like service records, fund accounts, etc.

3. **Induction training for new workers**

   Unless skilled workers are recruited (more likely on higher rates of pay) who can be at right way put on jobs, the average worker has to be given some induction training before he is fit to be put on his assigned work. For certain categories of skilled and highly skilled jobs, intensive training for some period may be essential.

4. **Inefficiency of new workers**

   The efficiency of new hands is generally low, productivity is reduced and cost increases.

5. **Cost of tool and machine breakage**

   While on training and the initial stages of work after completion of training, the worker is likely to break tools more frequently on account of his inexperience.

6. **Cost of scrap and defective work**

   A new worker is likely to spoil work and although in most cases responsibility can be fixed on him and no wages paid for the scrapped work, the expenditure incurred on material and wages for the earlier operations done on the job becomes waste.

7. **Cost of accidents**

   On account of his inexperience, the new worker is apt to disregard safety rules and he is thus more prone to accidents. It may be noted that the increases in labour costs due to high labour turnover contribute to create an inflationary trend in the industry.

Measures to reduce Labour Turnover

Labour turnover may be reduced by removing its avoidable causes and taking preventive remedial measures. The various measures may be summarised as follows:

i. Efficient, sympathetic and impartial personal administration.

ii. Effective communication system to keep the workers informed on matters that affect them.

iii. Improving working conditions and placing the right man on the right jobs.

iv. Job enrichment to reduce boredom and monotony and to provide job satisfaction.

v. Introducing fair rates of pay and allowance and incentives, pensions, gratuity, etc.

vi. Strengthening welfare measures.

vii. Augmenting recreational activities and schemes.

Direct Expenses

2.3

2.3.1 Definitions and Examples

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. 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 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, 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.

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 forms part of the prime cost.

Principles of Measurement as per CAS – 10 (Para 5)

1. Direct expenses incurred for the use of bought out resources shall be determined at invoice or agreed price including duties and taxes, and other expenditure directly attributable thereto net of trade discounts, rebates, taxes and duties refundable or to be credited.
2. In the case of research and development cost, the amount traceable to the cost object for development and improvement of the process for the existing product shall be included in direct expenses.
3. Direct expenses paid or incurred in lump-sum or which are in the nature of 'one – time' payment, shall be amortized on the basis of the estimated output or benefit to be derived from such direct expenses.

4. Examples: royalty or technical know-how fees, or drawing designing fees, are paid for which the benefit is ensured in the future period. In such case, the production / service volumes shall be estimated for the effective period and based on volume achieved during the cost accounting period, the charge for amortization be determined.
5. If an item of direct expenses does not meet the test of materiality, it can be treated as part of overheads.
6. Finance costs incurred in connection with the self - generated or procured resources shall not form part of direct expenses.
7. Direct expenses shall not include imputed costs. In case of goods produced for captive consumption, treatment of imputed cost shall be in accordance with CAS – 4.
8. Where direct expenses are accounted at standard cost, variances due to normal reasons shall be treated as part of the direct expenses. Variances due to abnormal reasons shall not form part of the direct expenses.
9. Any subsidy / grant / incentive or any such payment received / receivable with respect to any direct expenses shall be reduced for ascertainment of the cost of the cost object to which such amounts are related.
10. Any abnormal portion of the direct expenses where it is material and quantifiable shall not form part of the direct expenses.
11. Penalties, damages paid to statutory authorities or other third parties shall not form part of the direct expenses.
12. Credit / recoveries relating to the direct expenses, material and quantifiable, shall be deducted to arrive at the net direct expenses.
13. Any change in the cost accounting principles applied for the measurement of the direct expenses should be made only if, it is required by law or for compliance with the requirements of a cost accounting standard, or a change would result in a more appropriate preparation or presentation of cost statements of an organisation.

Disclosures

Paragraph 8 of CAS -10 states that disclosures shall be made only where material, significant and quantifiable and such disclosures shall be made in the body of the cost statement or as a foot note or

as a separate schedule. The following points are stated as important aspects of the disclosure of direct expenses in cost statements.

1. The basis of distribution of Direct Expenses to the cost objects/ cost units.
2. Quantity and rates of items of Direct Expenses, as applicable.
3. Where Direct Expenses are accounted at standard cost, the price and usage variances.
4. Direct expenses representing procurement of resources and expenses incurred in connection with resources generated.
5. Direct Expenses paid/ payable to related parties (Related party as per the applicable legal requirements relating to the cost statement as on the date of the statement).
6. Direct Expenses incurred in foreign exchange.
7. Any Subsidy/Grant/Incentive and any such payment reduced from Direct Expenses.
8. Credits/recoveries relating to the Direct Expenses.

9. Any abnormal portion of the Direct Expenses.
10. Penalties and damages excluded from the Direct Expenses

2.3.3 Diect vs. Indirect Expense

Direct Expenses	Indirect Expenses
1. Direct expenses or direct costs incurred while manufacturing the main 'product' or 'service' of the company/organisation.	1. Indirect expenses or indirect costs which are not directly related to the core 'product' or 'service' of the company/organisation.
2. It is shown on the debit side of a Trading Account.	2. It is shown on the debit side of Profit and Loss Account.
3. Direct expenses can be allocated to a specific product, department or segment.	3. Indirect expenses are usually shared among different products, departments and segments.
4. They become a part of the total cost of goods/ services sold.	4. Indirect expenses are not included in the total cost of goods/services sold.
5. Examples – Direct labour (wages), cost of raw material, power, rent of factory, etc.	5. Examples – Printing cost, utility bills, legal & consultancy, office and administration expense, bad-debts, etc.

Illustration 46

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 47

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 × 2 = 30,000	12,000 × 2 = 24,000
Add: Royalty paid on units produced	20,000 × 1 = 20,000	15,000 × 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

Any cost which is not directly identifiable to any product, job, operation or process is referred as overhead. As such it is sum total of indirect material cost, indirect labour cost and indirect expenses. 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.

With the advent of time service sector organisations have become more and more prominent and this have contributed to overhead costs becoming more and more significant. Also with the modern trend towards the mechanization, automation, and mass production, overhead costs have grown considerably, magnitude wise. In other organisations the proportion of overhead costs to the total costs of products is appreciably high. High overheads do not indicate inefficiency if the increase in overheads is due to the following likely causes:

a. Improved methods of managerial control like Accountancy, Production Control, Work Study, Cost and Management Accountancy etc. In the process of reducing costs of other elements viz direct material and direct labour, overhead costs are likely to increase.

b. Large scale production or mass production.

c. Use of costly machines and equipments leads to increase in the amount of depreciation, maintenance expenditure and similar other items of overhead costs.

d. Less human efforts are necessary with automatic machines. A major portion of the cost is attributed to use of machines, thus increasing the machine overhead costs.

e. Increased efficiency and productivity of labour has the effect of pushing up the overhead to direct labour ratio.

Paragraph 6 of Cost Accounting Standard 3 (CAS – 3) issued by The Institute of Cost Accountants of India states that while assigning Production or Operation Overheads, traceability to a cost object in an economically feasible manner shall be the guiding principle. The cost which can be traced directly to a cost object shall be the guiding principle. The cost which can be traced directly to a cost object shall be directly assigned.

Assignment of Production or Operation 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.

Overhead Accounting

The ultimate aim of overhead accounting is to absorb them in the units produced by the firm. Absorption of overhead 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 overhead accounting are as follows:

i. Collection, Classification and Codification of Overheads

ii. Allocation, Apportionment and Reapportionment of Overheads

iii. Absorption of Overheads.

As mentioned above, the ultimate concept of overhead accounting is 'absorption' in the units produced by the firm. This is extremely 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.

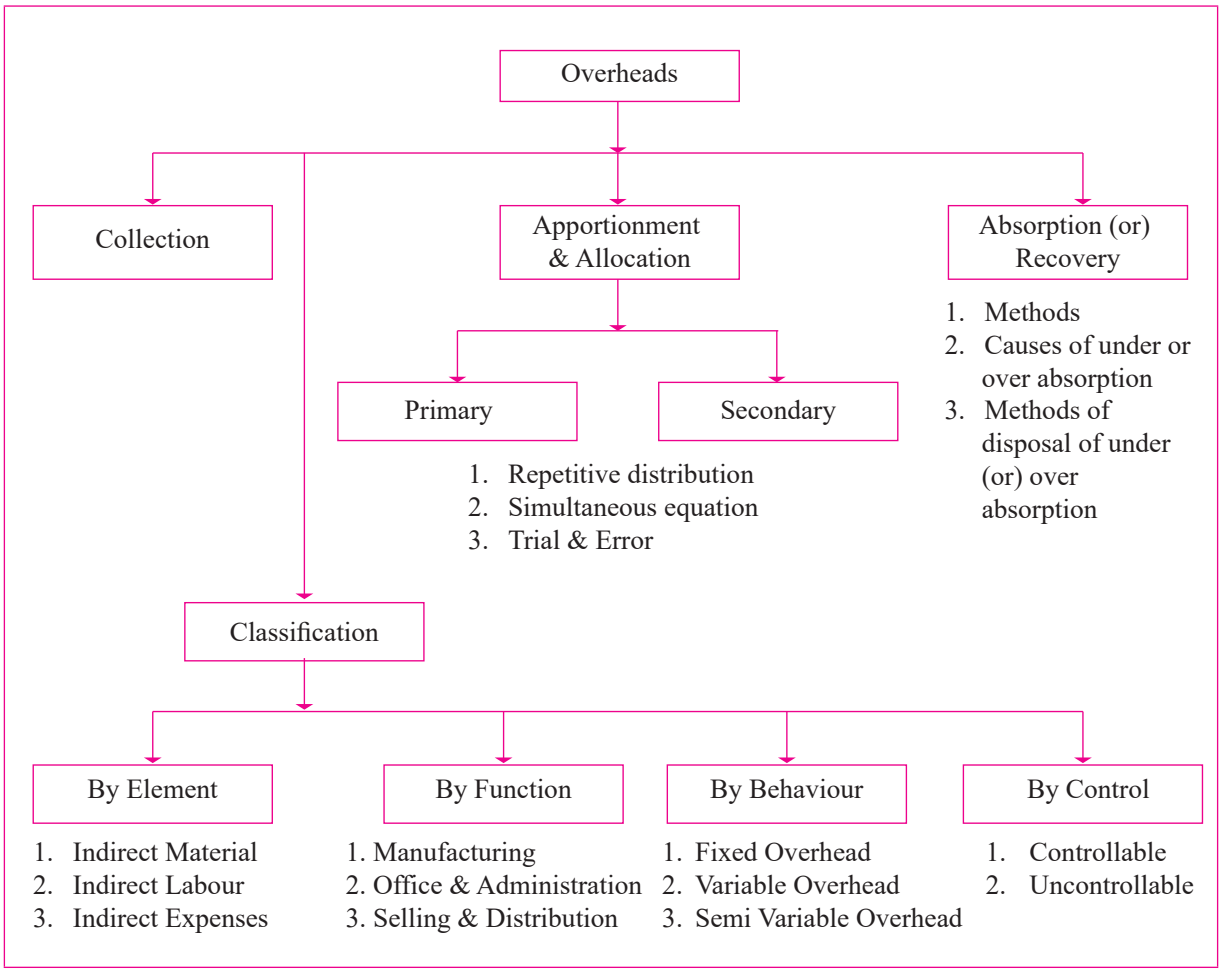


Figure 2.7: Various aspects of Overhead Accounting

2.4.1 Collection, Classification and Apportionment and Allocation of Overheads

1. **Collection and Codification of Overheads**

Overheads collection is the process of recording each item of cost in the records maintained for the purpose of ascertainment of cost of each cost centre or unit.

Documents	Overhead Costs	Nature
Stores Issue note, purchase voucher	Indirect Material	Consumables, Lubricants etc
Payroll sheets, time sheets	Indirect Labour	Wages, Salaries, Contribution to statutory benefits, Bonus, Incentives, Idle time
Cash Book	Indirect Material, Indirect Labour, Indirect Expenses	All types of costs
Subsidiary records – Journal	Indirect Material, Indirect Labour, Indirect Expenses	For provisions of costs that are not actually paid for
Other reports	Indirect Expenses	Depreciation, Scrap, Wastage, etc

For the purpose of overhead accounting, collection of overheads is very important. It is necessary to identify the indirect expenses and the above mentioned source documents are used for this. Proper collection of overhead expenses will help to understand accurately the total overhead expenses.

Codification of Overhead

It is always advisable to codify the overhead expenses. Codification helps in easy identification of different items of overheads. There are numerous items of overheads and a code number to each one will facilitate identification of these items easily. Codification can be done by allotting numerical codes or alphabetical codes or a combination of both. Whatever, system is followed, it should be remembered that the system is simple for understanding and easy to implement without any unnecessary complications.

Cost Centre Code	Name of the Department
1100	Turning Department
1200	Grinding Department
1300	Components manufacturing
1400	Assembly
2100	Maintenance
2200	Quality control
2300	Stores
3100	HR and Administration
3200	Accounts

All codes starting with '1' are production departments, all codes starting with '2' are factory related services and all codes starting with '3' are general services. This codes helps in collection of costs on functional basis and also to identify an item of expense directly to a department or cost centre.

2. **Classification**[12]

Classification is defined by CIMA as, 'arrangement of items in logical groups having regard to their nature (subjective classification) or the purpose to be fulfilled (objective classification). In other words, classification is the process of arranging items into groups according to their degree of similarity. Accurate classification of all items is actually a prerequisite to any form of cost analysis and control system. Classification is made according to the following basis

Elementwise classification –

According to this classification, overheads are divided according to their elements. The classification is done as per the following details:

a. Indirect Material – Materials which cannot be identified with the given cost objective is called indirect materials. 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, similarly thread used to stitch clothes is also indirect material. Small nuts and bolts are also examples of indirect materials.

b. Indirect Labour – 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 are examples of indirect wages.

c. Indirect Expenses – As per CAS – 3, indirect expenses are expenses, which cannot be directly attributed to a particular cost object. Expenses such as rent and taxes, printing and stationery, power, insurance, electricity, marketing and selling expenses etc are the examples of indirect expenses.

3. **Functional Classification**

a. **Factory (or Manufacturing or Production) Overhead**

As per CAS – 3, Indirect Cost involved in the production process or in rendering service. These overheads are the aggregate of indirect materials cost, indirect wages and indirect expenses associated with manufacturing activities. For example, factory power, works manager's salary, factory insurance, depreciation of factory machinery and other fixed assets, etc. The expenses incurred for manufacturing cannot be directly identified with the units produced.

Manufacturing is a separate function like administration, selling and distribution. The term manufacturing stands for activities, which begin with receipt of order and end with completion of finished product. Manufacturing overheads represents all manufacturing costs other than direct materials and direct labour. These costs cannot be identified specifically with or traced to cost object in an economically feasible way. Manufacturing overhead are indirect manufacturing costs. The term overhead is peculiar and therefore, there is a growing tendency to prefer the term indirect manufacturing cost to overhead.

b. **Office and Administration Overhead**

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. On the other, production overheads include administration cost relating to production, factory, works or manufacturing.

As per the functional classification, administration overheads comprise of those indirect costs which

12 Classification of cost as per CAS 1 is discoursed in details in Module 1 of this study note.

are related to the general administrative function in the company. Such functions are related to policy formulation, directing the organisation and controlling the operations of the company. Administration overheads are incurred for the benefit of organisation as a whole. Controlling them is difficult for they do not vary with most of the variables viz production or sales. Examples of such overheads are, office salaries, printing and stationery, office telephone, office rent, electricity used in the office, salaries of administrative staff etc. The size as well as control over these overheads depends largely on decisions of management. Organisations at the development stage face the problem of controlling administrative overheads. Multiple location set up leads to duplication of many administrative overheads.

Controlling Administrative Overheads

Given the nature of these expenses, they cannot be controlled at the lower level of management. They can be better controlled by top management as they pertain to formulating policy and directing the organisation. The first step in the control mechanism is proper classification of expenses and departmentalization. The actual expenses are collected for each department and then compared with a bench mark. Deviations are analysed and causes for increase are mitigated by fixing responsibility on the departmental head.

The control benchmarking can be done with respect to:

i. Figures of the previous year: Expenses could be compared with the figures of previous year and increase or decrease are analysed. However, comparison with previous year may not help as the condition may have totally changed from one year to the other.

ii. Use of budgets: Budgets are estimates for the current year, and they take into account the changed conditions. They also built in the year's complete plan which would factor all changes in the cost structure. It is advisable to compare budgeted overheads with actual for control purpose.

iii. Use of standard: Although very scientific, this method is difficult to operate. Administrative activities (being very subjective) cannot be standardized. On a certain level it can be applied e.g., the time taken to process a voucher by accountant can be standardized, or time taken for processing a payment could be standardized.

c. Selling and Distribution Overhead

Selling overheads are all the costs associated with creating or stimulating demand or of securing orders. Examples of such overheads are sales office expenses, advertisements, the sales manager's salary, and travel expenses.

While distribution overheads are all the expenses incurred from the time the product is finished in the factory until it is delivered to end consumers. Examples include warehouse rent, warehouse utility bills, maintenance for delivery vans, carriage on sales, and packing charges.

Paragraph 4.9 of CAS 15 defines selling overheads as overheads are the expenses related to sale of products or services and include all indirect expenses incurred in selling the products or services. The para provides the following as example of selling overheads:

a. Salaries of sales personnel

b. Travelling expenses of sales personnel

c. Commission to sales agents

d. Sales and brand promotion expenses including advertisement, publicity,

e. sponsorships, endorsements and similar other expenses.

f. Receivable Collection costs

g. After sales service costs

h. Warranty costs

Paragraph 4.4 of CAS 15 defines distribution overheads as overheads, 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. The para provides the following as example of distribution overheads.

The cost of packing, repacking, labelling, etc. at an intermediate storage location will be part of distribution cost.

For Example:

a. Packing, repacking / labelling at an intermediate storage location

b. Transportation cost

c. Cost of warehousing (cover depots, godowns, storage yards, stock yards etc,)

Collection and Absorption of Selling and Distribution Overheads

While classifying the selling and distribution costs are properly bifurcated and coded accordingly. This could be done by having separate account codes for selling overheads such as: advertising, sale commission, travelling expense, communication, exhibition, market survey, free samples, credit and collection costs, bad debts, and distribution expenses such as: transportation vehicle related expenses, warehousing and storage at different places, depreciation. Depending upon the size of the organisation, there may be proper departmentalization of selling and distribution activities. The departments could be:

1. Sales head office
2. Sales regional office
3. Depots
4. Direct selling department
5. Dealer's management
6. Credit and collection (commercial)

The costs are collected through various source documents under the above heads and for the above departments. For absorption, the basis to be used will have practical difficulties, as one will have to look for a relationship between the expenses and the cost unit. Some expenses like sales commission, shipping costs, and direct selling expenses can be absorbed directly. The other expenses can be absorbed on the basis of either sales value, cost of goods sold, gross profit or number of units sold. Out of these the sales value method is the most commonly used.

Control over Selling and Distribution Expense

The selling and distribution expenses are related to sales and distribution activity which is externally focused. The extent of these expenses depends mainly on external factors like consumer profile, changing habits, technology improvements etc. Controlling these expenses does not mean capping them. It aims at increasing the effectiveness of these expenses e.g., getting maximum sales per rupee of selling and distribution expenses. For control purpose, a great care should be taken to ensure correct classification

and collection of selling and distribution overheads. The collected expenses must be analysed to assess the effect of them on sales. Such analysis could be done as follows:

a. Analysis of sales and selling and distribution expenses by geographical location – This could be regions, zones, domestic and international etc.

b. Analysis by type of customers – This could be done as institutional, government, retail etc.

c. Analysis by products or service – This may be done as range of products, the application of products, brands etc.

d. Analysis by salesmen.

e. Analysis by channel of distribution – The analysis pertains to wholesalers, retailers, commission agents etc.

The analysis of sales, profits and selling and distribution expenses on the basis of above factors will be a good insight into the performance as well as control over expenses. All these three parameters may be compared with:

a. Previous year

b. Budget for the current year or

c. Standards for the current year

a. **Research and Development Cost**

Research Cost is defined as 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:

i. Pure or basic research to gain general know how regarding the production or market, not directed towards any particular product.

ii. 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.

Special features of Research and Development Costs

The features are as follows:

a. Expenditure is incurred ahead of the actual production and may not be charged to current production.

b. The amount of expenditure may often be substantial.

c. The expenditure may at times be entirely infructuous, yielding no tangible results.

d. Benefits of the expenditure may be realised over a number of years.

e. Difficulty in fixation of standards for control

Collection of Research and Development Overheads

Accumulation of Research and Development Overheads is essential for the following reasons:

a. For review cost to date.

b. For planning the activities subsequent to research.

c. For evaluation of performance with relation to past performance or for inter-firm comparison.

The collection of research and development overheads is made though the following documents. Material requisitions, labour time cards, invoices, vouchers (royalty, patent, license etc). Research and development expenditure may be identified by its nature i.e., basic or applied research or development by the elements of cost, by business sector, by project. Each research and development project is allotted a project work order number. Separate series of work orders or codes should be used to distinguish from regular work orders.

Research and Development Costs can be accumulated as follows:

a. All expenditure under the direct elements (direct material, labour and expenses) must be charged to the work orders.

b. Expenses like supervisor salary, material handling charges, maintenance of equipments can be directly allocated to particular research work order.

c. Items of general overheads like depreciation of building, depreciation of maintenance equipment, share of purchase department expenses may be suitably apportioned to the research work order.

Accounting of Research and Development Overheads

Accounting of Research and Development Cost arise due to the following causes:

a. 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.

b. There is no immediate production, or the production is so small that it becomes difficult to charge such cost to products.

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:

i. Charging off to the current year profit and loss account.

ii. Capitalization so that cost may be amortized on a long term basis.

iii. Deferment and charge off to costs of the next two or three years – a short / medium term amortization.

Research and Development may be regarded as a function of production and the research and development costs may be charged to costs to be recovered through the general overhead rates. There are many arguments for and against charging the research and development costs in current revenue. The arguments in support of this method are as follows:

a. All research and development expenses may not result in new processes or saleable products.

b. Some of the research and development projects may result in failures.

c. These expenses may be incurred simply to maintain the present competitive position of the concern.

d. It is difficult to assess the period over which the know how or knowledge acquired may be spread over.

e. It may be more advantageous to recover a substantial portion of the cost immediately, as the life of the new products are uncertain.

f. In certain case, the effect of these research costs on future revenues may be doubtful.

The classification used for cost collection is mostly combination of elemental and functional. The behavioural classification cannot be used for booking of costs; it is used only for analysis and decision making

Table 2.1: Elements of Cost

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

iii. **Classification based on behaviour**

Overheads may be classified on the basis of relation with the volume of production. Behaviour wise overheads may be classified as Fixed, Variable and Semi-Variable.

a. **Fixed Overheads / Period Costs**

The amount of overhead tends to remain fixed for all volumes of production within a certain range. Examples of fixed overheads are depreciation of plant and machinery, insurance, rent of buildings etc. A fixed overhead represents constant expenditure incurred during a period without regarding to the volume of production during that period. Even when production completely ceases in a particular period, this constant amount of expenditure will continue to be incurred partially, if not wholly. Therefore, the fixed overheads are also known as period costs. Sometimes these costs are also termed as shutdown or stand by costs.

Features of Fixed Costs

Fixed costs are stated to be by and large uncontrollable, in the sense they are not influenced by the action of a specified member of an undertaking. For example, the supervisor has practically no control over

the fixed costs like depreciation of plant and machinery. The production supervisor can only see that the maximum possible utilization of the assets is made.

The fixed overhead amount is constant per period, the cost per unit of production varies with the volume. This variation is inverse since with increase in production, fixed cost per unit decreases as the same amount of fixed overheads is spread over larger units of production.

Factors affecting the Fixed Overheads

When a plant or a department is completely idle and there is no production, several items of fixed overheads disappear. Fixed overheads are thus, of two types, viz. a lower standing fixed cost when production is nil and a higher running fixed cost when the plant is running. For instance, maintenance expenditure incurred at plant shutdown has to be increased to a higher level when production starts.

Any long term change in the productive capacity of an undertaking also affects the basic characteristic of fixed overhead. Fixed costs are constant for short term period only, within a limited range of capacity. Another factor that affects the fixed nature of fixed overhead is the change in basic price level.

Graphical representation of fixed costs is depicted as below:

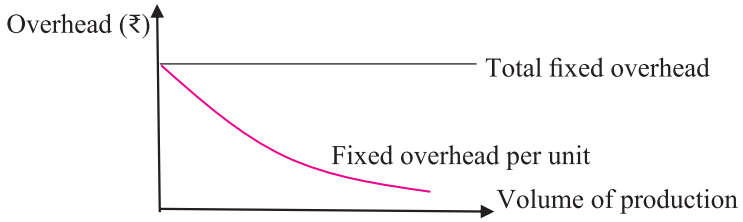


Figure 2.8: Graphical Representation of Fixed Costs

Fixed costs may be broadly classified into three basic types:

i. Fixed costs that have no causal relationship with the volume of output and are incurred mainly as results of policy decisions of the management. Research, development, design, employee training, advertisement and marketing expenses are examples of this expenditure. Accountants term such costs as discretionary fixed costs (also known as programmed costs or managed costs).

ii. Fixed costs that do not change significantly in the short term such as depreciation, rent etc.

iii. Fixed costs that are fixed for short period for a particular capacity, but change considerably when there is a long term change in the volume or capacity.

b. **Variable Overheads**

Variable Costs are those which vary totally in direct proportion to the volume of output. These costs remain relatively constant with changes in production. Thus, variable costs fluctuate in total amount but tend to remain constant per unit as production activity changes. Examples are material, labour, lubricants, cost of utilities, fuel cost, commission to salesman etc.

The variable overhead costs seldom reveal the characteristics of perfect variability i.e., an expenditure which varies directly with variation in the volume of output. They simply tend to vary rather than vary directly in direct proportion of output. We come across three types of variable overhead expenses in actual practice as explained below:

i. 100% variable expenses. For all production the variable expenditure per unit remains constant.

ii. The expense per unit of production is low at lower ranges of output but gradually increases as production goes up.

iii. The expenses per unit of production are more at lower ranges of output but gradually decrease with the decrease with the increase in production.

Graphical representation of variable cost is depicted as below:

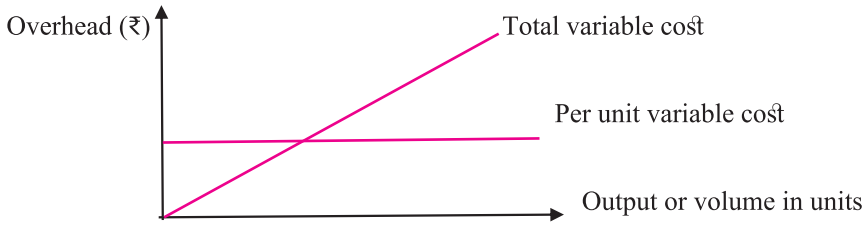


Figure 2.9: Graphical Representation of Variable Cost

c. **Semi – Variable Overheads**

These are a sort of mixed or hybrid costs, partly fixed and partly variable costs. For example, telephone expenses, include a fixed portion of annual charge plus variable charge according to the calls. Thus, total telephone expenses are semi – variable.

Semi – variable overheads are of two types:

i. These expenses which change with the change in volume of output, but the variation cost is less than proportionate to change in output. Examples are power and fuel, lighting, repairs and maintenance of buildings etc.

ii. The costs tend to remain constant with certain range of output, then jump up and remain constant for another range and so on.

Semi-variable cost needs to be classified into fixed and variable due to the following reasons:

a. **Effective Cost Control:** Fixed costs are in the nature of policy costs or discretionary costs and as such can be controlled by the management. However, variable costs can be controlled at lower levels. Separation of two elements facilitates the fixation of responsibility, preparation of overhead budget and exercise effective control.

b. **Decision Making:** The classification is very useful in management decisions relating to utilization of capacity. If cost information is to be of use in such problems, it is essential that fixed and variable costs which behave differently with changes in volume should be segregated.

c. **Preparation of Break Even Charts:** Separation of fixed and variable cost is essential for the study of cost volume profit relationship and for the preparation of breakeven charts and profit charts.

d. **Marginal Costing:** The basic requirement of the technique of marginal costing is the separation of fixed and variable costs. While the latter are taken into consideration for the determination of marginal cost and contribution, the fixed costs are treated separately.

e. **Method of Absorption Costing:** Separate method may be adopted for determination of rates for fixed and variable costs for absorption in production. Further a separate fixed overhead rate also serves as a measure of utilization of the facilities of the undertaking; any under recovery or under absorption denotes the idle or surplus capacity or production efficiency.

f. **Flexible Budget:** In a flexible budget, the budgeted amounts vary with the levels of activity and fixed cost remains constant. It is the variable cost that varies. Breakup of overhead cost into fixed and variable is therefore necessary for establishment of budget and for the purpose of variance analysis.

Methods of classification of semi-variable cost into fixed and variable

a. Graphical Method – The costs at number of levels are plotted on a graph, x – axis represents the volume and y – axis represents the amount of expenditure. A straight line known as regression line or line of best fit is drawn between the points, plotted in such a manner that there are equal number of points on both the sides of a line and as far as practicable, pairs of points on either side are in equal distance from the line. Points falling far beyond the line are erratic and are not considered. If the regression line is drawn carefully so that most of the plotted points are on the line or not far from it, the scatter chart provides a fairly accurate method for the separation of fixed and variable.

b. Simultaneous Equations – This uses the straight line equation of $y = mx + c$ where y represents total cost, m is variable cost per unit, x is the level of output and c is fixed cost. The total costs at two different volumes are put into these equations which are solved for the values of m and c.

c. 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.

d. 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.

iv. **Control-wise Classification**

Overhead costs which can be controlled by the exercise of proper wisdom and expertise of management are controllable and overhead costs that cannot be controlled in spite of the best exercise of managerial prudence are uncontrollable costs.

This distinction may not be absolute or unconditional. A cost which is uncontrollable to one management may be controllable by the other. Some cost may be uncontrollable in short run become controllable in long run.

3. **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.

A. **Departmentalization**

Before the allocation and apportionment process starts, the first step in this direction is 'Departmentalization' of overhead expenses. Departmentalization means creating departments in the firm so that the overhead expenses can be conveniently allocated or apportioned to these departments. For efficient working and to facilitate the process of allocation, apportionment and reapportionment process, an organisation is divided into number of departments like, machining, personnel, fabrication, assembling, maintenance, power, tool room, stores, accounts, costing etc and the overheads are collected, allocated or apportioned to these departments. This process is known as 'departmentalization' of overheads which will help in ascertainment of cost of each department and control of expenses.

B. **Allocation and Apportionment**

Allocation of overhead means charging of overhead to a particular cost centre when such overhead has been incurred directly for that cost centre. If the overhead is directly related to a particular cost centre or department, it is charged to that. Allocation involves identifying overheads to particular cost centre. Allocation is allotment of whole items of indirect costs to cost centre without any division. For example, electricity charges can be allocated to various departments if separate meters are installed. Depreciation of machinery can be allocated to various departments as the machines can be identified, salary of stores clerk can be allocated to stores department, cost of coal used in boiler can be directly allocated to boiler house division. Thus, allocation is a direct process of identifying overheads to cost units or cost centres.

Apportionment of overhead means those overheads which are not directly identifiable with any particular production or cost centre, are distributed over the departments / cost centres on some equitable basis. These are joint costs whose benefits are commonly shared. For example, the benefits of rent or electricity cannot be identified with any particular department. So, these overheads have to be apportioned. The basis for apportionment is normally predetermined and is decided after a careful study of relationships between the base and the other variables within the organisation. The Cost Accountant must ensure that the selected basis is the most logical. A lot of quantitative information has to be collected and constantly updated for the purpose of apportionment. The basis selected should be applied consistently to avoid vitiations. However, there should be a periodical review of the same to revise the basis if needed.

In simple words, distribution of various items of overheads in proportions to the departments or products on logical or equitable basis is called apportionment.

A general example of various bases that may be used for the purpose of apportionment is as follows:

Overhead 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.

This allocation and / or apportionment is called as **primary distribution of overheads.**

Distinction between Allocation and Apportionment

Although the purpose of both allocation and apportionment is identical, i.e., to identify or allot the costs to the cost centres or cost unit, both are not the same.

Allocation deals with the whole items of cost and apportionment deals with proportion of items of cost.

Allocation is direct process of departmentalization of overheads, where as apportionment needs a suitable basis for sub-division of the cost.

Whether a particular item of expense can be allocated or apportioned does not depends on the nature of expense, but depends on the relation with the cost centre or cost unit to which it is to be charged.

Principles of Apportionment of Overhead Cost

a. **Services Rendered**

A production department which receives maximum services from service departments should be charged with the largest share of the overheads. Accordingly, the overheads of service departments are charged to the production departments.

b. **Ability to Pay**

This method suggests that a large share of service department's overhead costs should be assigned to those production departments whose product contributes the most to the income of the business firm. However, the practical difficulty in this method is that, it is difficult to decide the most paying department and hence difficult to operate.

c. **Survey or Analysis Method**

This method is used where a suitable base is difficult to find or it would be too costly to select a method which is considered suitable. For example, the postage cost could be apportioned on a survey of postage used during the year.

d. **Efficiency Method**

The apportionment of overhead is made on the basis of production targets. If the target is exceeded, the unit cost reduces indicating a more than average efficiency. If the target is not achieved, the unit cost goes up, disclosing thereby, the inefficiency of the department.

Illustration 48

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	-	-

Particulars	P1	P2	P3	S1	S2
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

After the primary distribution 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 overhead.

The basis of secondary distribution is dependent on:

i. The nature of service given e.g., it may be maintenance department or stores.

ii. Measurement of service based on surveys or analysis.

iii. General use indices

In the Illustration 48, the cost of S1 is ₹ 2,910 and that of S2 is ₹ 1,610 which will be apportioned on to the totals of P1, P2 and P3.

Some examples of basis of apportionment that can be used to distribute cost of different service departments:

Service department	Basis
Quality	No. of inspection done
Maintenance	No. of maintenance calls Material usage for maintenance Time spent on maintenance
Stores	Indirect material cost No. of issue slips 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 Value of material purchased

This is not an exhaustive 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 basis of apportionment.

Methods of Secondary Distribution

a. **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 48: 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

Department	Total ₹	Basis of Apportionment	P1 ₹	P2 ₹	P3 ₹
Distribution of S2	1,610	5:3:2	805	483	322
Total	**31,200**		**13,319**	**9,861**	**8,020**

b. **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 48, 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 49

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, overhead of the time office department is allocated first. No. of stores requisition slips is used by three departments, hence overhead of the stores department is allocated next and machine hours is used by only production department. So, overhead 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.

c. **Reciprocal Service Method**

This method takes cognizance of the fact that service departments may actually give as well as receive services from and to the other service departments on reciprocal basis. such inter-departmental exchange of service is given due weight in the distribution of the overheads. There are two methods used for distribution under this logic. One is reciprocal distribution method and the other simultaneous equation method.

i. Repeated Distribution Method

This is a continuous distribution of overhead costs over all departments. The decided ratios are used to distribute the costs of service departments to the production and other service departments. This is continued till the figures of service departments become 'nil' or 'negligible'.

Illustration 50

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	2,400	2,100	1,500	700	900
Service department X (2:4:3:1)	140	280	210	(700)	70
Service department Y (4:2:2:2)	388	194	194	194	(970)
Service department X (2:4:3:1)	38.8	77.6	58.2	(194)	19.4
Service department Y (4:2:2:2)	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.

ii. **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 3, 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)

$\Rightarrow x = 700 + 0.20 (900 + 0.10x)$

$\Rightarrow x = 700 + 180 + 0.02x$

$\Rightarrow 0.98\ x = 880$

$\Rightarrow x = \frac{880}{0.98} = 898$

Now putting $x = 898$ in equation (2)

$\Rightarrow y = 900 + 0.10 \times 898 = 900 + 90 = 990$

$\therefore$ total cost of S1 = ₹ 898 and of S2 = ₹ 990

Redistribution Statement

	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)
Total	**2976**	**2657**	**1967**	**-**	**-**

iii. **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

Whichever method we may use, it still depends on a suitable basis used. The basis will always lead to approximations. If an approximate data is used for analysis, control and decision making, it may cause erroneous results. Thus, one has to be careful in relating the cost data to cost centre or cost unit. The natural relation of most of the indirect costs i.e., overheads is to a time period. In other words, as almost all overheads are period costs and hence an attempt to link it to cost unit will always be arbitrary. As such, the traditional methods of allocation and apportionment are often challenged by many in the industry. The techniques like marginal costing owe their origin to such limitations of Traditional Costing.

Capacity and Overhead Rate

Influence of activity level on overhead rate

In determination of overhead rate, a good deal depends upon the activity level, which is assumed. In other words, capacity consideration influence overhead rate. Overhead rate will be different at different capacity levels. Efficient utilization of capacity is desirable both for society and management. Following capacity concepts merit consideration for overhead rate determination: -

a. Theoretical or Maximum Plant Capacity

Maximum Capacity or the Ideal Capacity is the capacity for which plant is designed to operate. It is only 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. Ideal capacity is never used to determine overhead rates for its disregard to even necessary interruptions in production process.

b. Practical Capacity

When this capacity is determined, allowance is given for unavoidable interruptions like time lost for repairs, inefficiencies, breakdown, delay in delivery of raw material and supplies, labour shortages and absence, sunday, holidays, vacation, inventory taking etc. Thus, practical capacity is the maximum theoretical capacity with minor unavoidable interruptions. These unavoidable interruptions are based mostly on internal influences and do not consider main external causes like lack of customers orders. The practical capacity is determined with reference to nature of industry and circumstances in which a particular factory is situated. Normal unavoidable interruptions account for 15% to 25% of the maximum capacity. The practical capacity, thus ranges between 75% and 85% of maximum capacity after giving allowance for normal unavoidable interruptions.

c. Normal Capacity

Idle capacity due to long term sales trend only is reduced from practical capacity to get normal capacity. Calculation of normal capacity of a plant presents considerable problems. Normal capacity is determined for the business as a whole. Then, it is broken down by plants and departments. For normal capacity determination, prime considerations are physical capacity and average capacity and average sales expectancy. It should be noted that average sales expectancy to be considered for this purpose takes into account a period enough to level out cyclical fluctuations. The determination of normal capacity helps in:

i. The preparation of flexible budgets and computation of predetermined factory overhead rates.

ii. The use of standard costing.

iii. Estimating sales price etc.

iv. Scheduling production.

v. Inventory valuation.

vi. Determination of breakdown point.

vii. Controlling costs.

Importance of determining normal capacity

The normal capacity considerations are important for:

i. Budget preparation.

ii. Determination of overhead rate.

iii. Determination of standard cost, and

iv. Preparation of operation of operational plans.

For determining the normal capacity, machinery purchased for future use and outmoded machinery should be excluded for consideration.

d. Capacity based on Sales Expectancy

Capacity may be based on sales expectancy for the year. The distinction between normal capacity and capacity based on sales expectancy should be properly understood. While normal capacity considers the long term trend analysis of sales, which is based on sales of a cycle of years, the capacity based on sales expectancy is based on sales for the year only. When long term sales trends are determined, cycle of years long enough to even out cyclical fluctuations are considered. Capacity based on sales expectancy is influenced more by general economic conditions and forecast of industry than long term sales trends.

The main advantages of determining overhead rate based on sales expectancy are:

i. Overhead rate is linked with actual sales expectancy.

ii. Overheads costs are adequately spread over the production and

iii. Overhead rate determined for this purpose is very useful for making decisions like price fixation, etc.

e. Idle Capacity and Excess Capacity

Practical capacity is determined after allowance to unavoidable interruptions like time lost for repairs, inefficiencies,

breakdown and labour shortages, etc. Even this practical capacity is not normally fully achieved. Same losses due to idleness of workers and plant facilities to occur even in most carefully administered companies. These losses are not taken into account for determining the practical capacity, because for the purpose of determining practical capacity only unavoidable interruptions are considered. Thus, the difference between practical capacity and normal capacity, i.e., the capacity based on long term sales expectancy is the idle capacity. However, if actual capacity happens to be different from capacity based on sales expectancy, the idle capacity will represent difference between practical capacity and actual capacity. Idle capacity is that part of practical capacity which is not utilized due to factors like temporary lack of orders, bottlenecks and machine breakdown etc. Idle capacity represents unused productive potential, which fails to be realized due to interruptions that are not unavoidable. Idle capacity is that part of practical capacity which is not utilized due to irregular interruptions.

Idle capacity is different from excess capacity. Idle capacity refers to temporary idleness of available resources due to irregular interruptions. Excess capacity results either from managerial decision to retain larger production capacity or from unbalanced equipment or machinery within departments. Excess capacity refers to that portion of practical capacity which is available, but no attempt is made for its utilization for strategic or other reasons. If the excess capacity results from purchase of assets not required, it will be a prudent policy for company to dispose of the assets which cause excess capacity. Alternatively, action should be taken for utilization of resources in the form of excess capacity. Excess capacity also results from imbalance or bottlenecks in certain departments. This situation can be remedied by attempting synchronization in the working departments, working overtime, running double shift and temporary off-loading to departments having spare capacity. While overhead rate includes cost of idle capacity, excess capacity is excluded from overhead rate consideration.

Idle time is distinguished from idle capacity and its cost is separated in the accounts. Idle time represents lost time of men and machines arising from lack of business or of material, a breakdown of equipment, faulty supervision or other similar causes whether avoidable or not. Idle capacity is the difference between practical capacity and actual capacity and represents the unused production potential.

Idle capacity costs are represented mostly by the fixed charges of owing and maintaining plant and equipment and of employing services, which are not used to their maximum potential.

The principal causes of idle capacity are:

A. **Production Cause**

These causes primarily result from poor organisation of operational plan. Following production causes often lead to idle capacity:

a. Repetitive machine adjustment

   i. Setup and change over

   ii. Repairs and adjustment

b. Lack of materials and tools

   i. Internal

   ii. external

c. Lack of supervision, inspection and instruction

d. Lack of power

   i. Internally produced

   ii. Externally produced

B. **Administrative Causes**

Sometimes various administrative decisions taken at various level of management result in idle capacity. Major administrative causes that lead to idle capacity are:

a. Excess plant for anticipated expansion

b. Special machines prepared for particular jobs

c. Strike / Lockouts.

C. **Economic Causes**

Sometimes demand for the goods is seasonal as in wool, ice cream and furs and production cannot be evenly distributed. This is especially true, when there exists danger of deterioration of the product or where carrying charges for stock are too large. Thus, seasonal, cyclical and industrial causes also lead to idle capacity.

Various practices are followed in different companies for disposing of idle capacity cost. It is often agreed in principle that normal production losses should be absorbed in product costs. Abnormal losses should be treated as non-operating expenses in product costs. Abnormal losses should be treated as non-operating expenses by direct debit to Profit and Loss Account. Certain companies follow the practice of computing idle time costs on their leading products by use of statistical techniques. Cost Accountants should particularly analyse the reasons for idle plant and equipment not used during the period for non controllable causes. The review of practices of different companies reveals that idle capacity is a somewhat flexible concept. It is an individual problem which should be considered after taking into account the special situations. For the growth and survival of the organisation, the management is keenly interested to know the idleness, its causes, its cost and its available remedies. Normally different companies follow a bit varying restricted accounting concept of idle capacity. In many cases unabsorbed fixed overhead represents losses due to managerial decisions and it becomes a subjective matter to refer it as idle capacity cost. Overhead rates of different capacity levels will be different due to influence of fixed overhead.

2.4.2 Absorption and Treatment of Over or Under Absorption of Overhead

Absorption of Overheads

Total cost of production department is calculated once the steps of primary and secondary distribution are carried out. The next step is to assign these totals to the individual units produced. A job or a product pass through all or many production departments before it is formed into a finished saleable product. It is necessary to know the cost of each department the product passes through. The absorption of overhead enables a Cost Accountant to recover the overhead cost spent on each unit of the product. Overhead absorption is also known as levy or recovery of overheads. How is this done? If a total of 1,200 tubes are turned and the overhead cost of turning department is ₹ 72,000 then the overhead absorption rate is ₹ 6 per tube.

Absorption means 'recording of overheads in Cost Accounts on an estimated basis with the help of a predetermined overhead rate, which is computed at normal or average or maximum capacity'

In general, the formula for overhead absorption rate is = $\frac{\text{Amount of Overhead}}{\text{Number of units of the base}}$

Overhead 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 Pre-determined Overhead Rate, Blanket or Multiple Rates.

A. **Actual Overhead Rate**

Actual overhead rate is obtained by dividing the overhead expenses incurred during the accounting period by actual quantum on the base selected. Assuming that the rates are worked out on a monthly basis the formula is –

$$\text{Overhead Rate} = \frac{\text{Actual overhead during the month}}{\text{Value or Quantity of the base during the month}}$$

Absorption of overheads based on actual rates may not be adopted due to the following reasons:

a. Actual overhead rate can be computed only after the accounting period is over.

b. The incidence of some of the items of expenses like repairs, overhauling, etc is not uniformly spread over all the accounting periods.

c. Actual overhead rates do not provide any basis for cost control.

B. **Pre-determined Overhead Rate**

Predetermined rate is computed by dividing the budgeted overhead expenses for the accounting period by the budgeted base (quantity, hours etc)

$$\text{Overhead Rate} = \frac{\text{Budgeted overhead expenses for the period}}{\text{Budgeted Base for the period}}$$

Advantages of Pre-determined Overhead Rate

i. Enables prompt preparation of cost estimates, quotations and fixation of selling prices.

ii. Cost data is available to management along with financial data.

iii. In case of cost plus contracts prompt billing is possible through pre-determined recovery rates.

iv. In concerns having budgetary control system, no extra clerical efforts are required in computing the pre-determined overhead rate.

C. **Blanket (single) Overhead Rate**

A single overhead rate for the entire factory may be computed for the entire factory. So, this is known as factory wide or blanket overhead rate method.

$$\text{Blanket Rate} = \frac{\text{Overhead Cost for the factory}}{\text{Total Quantum of the base}}$$

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 overhead, satisfactory level of managerial control is not possible.

D. **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:

$$\text{Overhead Rate} = \frac{\text{Overhead Cost allocated and apportioned to each product, department}}{\text{Corresponding Base}}$$

The number of overhead rates a firm may compute would be fixed taking into consideration of two opposing factors viz clerical costs involved and the degree of accuracy level desired.

Methods of Overhead Absorption:

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 overhead 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 (2,500 × 6) ₹ 15,000.

B. Percentage of Direct Wages

Under this method, overhead for a job is recovered on the basis of a pre-determined percentage of direct wages. This method is used when the component of direct wages is higher. If the overhead to be absorbed is ₹ 1,20,000 and the direct wages are estimated at ₹ 8,00,000, the predetermined rate will be calculated as $\left(\frac{₹1,20,000}{₹8,00,000}\times 100\right)$ 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 overhead to be absorbed is ₹ 2,000 and the material cost is expected to be ₹ 4,000, then the absorption rate will be $\left(\frac{₹2,000}{₹4,000}\times 100\right)$ 50%. Thus, for a job requiring direct material of ₹ 200, the production overheads to be absorbed will be ₹ 100 (i.e., 50% × ₹ 200). However, many overhead 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 $\left(\frac{₹2,250}{₹50,000}\times 100\right)$ 4.5% of prime cost. If a job has a prime cost of ₹ 800, then overhead absorbed on that job will be (4.5% of ₹ 800) ₹ 36.

E. Direct Labour Hour

Under this method, the absorption rate is calculated by dividing the overhead 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 $\left(\frac{₹5,000}{10,000 \text{ hrs}}\right)$ ₹ 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 × ₹ 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 overhead 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 $\left(\frac{₹15,000}{2,000}\right)$ ₹ 7.50 per machine hour. If a job takes 75 hours on that machine, then (75 × ₹ 7.50) ₹ 562.50 will be the 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 Overhead 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 overhead recovery rates depends on the following factors:

i. Nature of the product and process of manufacture

ii. Nature of overhead expenses

iii. Organisational 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 overhead absorption.

The main features of a satisfactory overhead 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 Overhead

The amount of overhead absorbed in costs is the sum total of the overhead costs allotted to individual cost units by application of the overhead rate. When a predetermined rate worked out on the basis of anticipated or budgeted overhead 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 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 overhead 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. Overhead 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 is carried forward to the next year).

Illustration 51

Overhead incurred	₹ 1,50,000
Overhead 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 overhead will be treated?

Solution:

Overhead Incurred	₹ 1,50,000
Overhead Recovered	₹ 1,00,000
∴ Under-absorption	₹ 50,000

Supplementary Overhead 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 (10,00,000 + 8,00,000 + 7,00,000)

$$\text{Supplementary Overhead rate} = \frac{₹\ 50,000}{₹\ 25,00,000}$$

$$= ₹\ 0.02$$

∴ Under absorbed overhead amount will be distributed as follows:

Cost of Sales = (₹ 10,00,000 × 0.02) = ₹ 20,000

Finished Goods = (₹ 8,00,000 × 0.02) = ₹ 16,000

Work in Progress = (₹ 7,00,000 × 0.02) = ₹ 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 52

In an Engineering Factory, the following particulars have been extracted for the quarter ended 31st December, 2022. Compute the departmental overhead 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

Particulars	Basis of Apportionment	Total ₹	A ₹	B ₹	C ₹	X ₹	Y ₹
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 Overhead	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 Overhead Recovery Rate

Production Overhead	Overhead Amount ₹	Wages ₹	Overhead Recovery Rate
A	51,247	30,000	$\frac{51,247}{30,000} \times 100 = 170.82\%$

Production Overhead	Overhead Amount ₹	Wages ₹	Overhead Recovery Rate
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 53

The Latest 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 Company.

	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 Overhead (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 Overhead of Production Department	9,339	9,062	12,199	-	-
Working Hours	6,226	4,028	4,066	-	-
Overhead 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: Overhead (Working hours x Rate per hour)	
Department A = 4 hours × ₹ 1.50	6.00
Department B = 5 hours × ₹ 2.25	11.25
Department C = 3 hours × ₹ 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, $e = \frac{20,581}{10} = 2,058$

Overhead Cost of Service Department D = ₹ 4,831

and Overhead Cost of Service Department E = ₹ 2,058

Particulars	Production Department			Service Department	
	A ₹	B ₹	C ₹	D ₹	E ₹
Total Overhead (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 Overhead of Production Department	9,339	9,062	12,199	-	-
Working Hours	6,226	4,028	4,066	-	-
Overhead Recovery Rate per hour	1.50	2.25	3.00	-	-

Illustration 54

The following information relates to the activities of a production department of factory for a certain period.

Material used (₹)	36,000
Direct Wages (₹)	30,000
Labour Hours	12,000
Hours of Machinery operation	20,000
Overhead 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 $= \frac{25,000}{30,000} \times 100 = 83\frac{1}{3}\ \%$

3. Overhead Recovery Rate per Labour Hour $= \frac{₹\ 25,000}{12,000 \text{ hours}} = ₹\ 2.083$

4. Overhead 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 × 83⅓ % = ₹ 4,125
3. Overhead Recovery Rate per Labour Hour = 1,650 × ₹2.083 = ₹ 3,437
4. Overhead Recovery Rate per Machine Hour = 1,200 × ₹1.25 = ₹ 1,500

Illustration 55

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	7½ % 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 $\frac{2^{th}}{5}$ and $\frac{3^{th}}{5}$ 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	Workings	Cost per annum per machine (₹)	Total (₹)
Standing Charges			
Rent and Rates	$\frac{₹\ 9,000}{5\ \text{machines}}$	1,800	
Lighting	$\frac{4\ \text{workers}}{16\ \text{workers}} \times ₹\ 400$	100	
Supervision	$₹\ 1,250 \times \frac{2}{5}$	500	
Other Charges	$\frac{₹\ 5,000}{5\ \text{machines}}$	1,000	
Total Standing Charges			**3,400**
Machine Expenses			
Depreciation	₹ 20,000 × 7.5%	1,500	
Repair and Maintenance	$\frac{₹\ 5,200}{13\ \text{years}}$	400	
Sundries		600	
Power		3,000	
Total Machine Expenses			**5,500**
Total Cost p.a.			**8,900**
Machine Hours			2,000
Machine Hour Rate	$\frac{₹\ 8,900}{2,000\ \text{hours}}$		**₹ 4.45 per hour**

Illustration 56

From the following particulars given below compute Machine Hour Rate for a machine.

Cost	₹ 24,000
Scrap value	₹ 4,000
Estimated working life	40,000 hours
Estimated cost of repairs and maintenance during the whole life	₹ 2,000
Standing charges of the shop for 4 weekly period	₹ 3,000
Working hours in 4 weekly period	100 hours
No. of machines in the shop each of which is liable for equal charges are 30 machines.	
Power used per hour 4 units @ 10 paise per unit.	

Solution:

Computation of Machine Hour Rate

Particulars	Workings	Amount (₹) [Cost per hour]
Standing Charges	₹ 3,000 / 100 hours × 30 machines	
Standing Charges		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 57

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 overhead 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% × 2,000)		100
Effective hours		1,900

Computation of Machine Hour Rate

Particulars	Workings	Amount (₹)	Amount (₹) Rate per hour
Standing Charges			
Chemical Solution	50 weeks × ₹ 20	1,000	
Attendants Wage	₹ 140 × 50 weeks × $\frac{1}{7 \text{ machine}}$	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 × ₹ 0.10		1.60
Machine Hour Rate			**4.52**

Illustration 58

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 30-09-2022:

	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:	₹
Overhead Incurred	4,26,544
Less: Overhead 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 overhead rate:

Total of COGS, FG, WIP = 1,41,480 + 2,30,732 + 8,40,588 = 12,12,800

$$\therefore \text{Supplementary Overhead Rate} = \frac{₹\ 60,640}{₹\ 12,12,800} = ₹\ 0.05$$

Particulars	Existing Value ₹	Additional Overhead Absorbed ₹	New Value ₹
Working in Progress	1,41,480	0.05 × 1,41,480 = 7,074	1,48,554
Finished Goods	2,30,732	0.05 × 2,30,732 = 11,537	2,42,269
Cost of Goods Sold	8,40,588	0.05 × 8,40,588 = 42,029	8,82,617
Total	**12,12,800**	**60,640**	**12,73,440**

Illustration 59

In a factory the expenses of factory are charged on a fixed percentage basis on wages and office overhead 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 Overhead and Office Overhead.

Solution:

Let X be the percentage of works overhead on wages, and

Y be the percentage of office overhead 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 Overhead	$\frac{X}{100} \times 10,000 = 100X$	$\frac{X}{100} \times 14,000 = 140X$

Particulars	Order I ₹	Order II ₹
Works Cost	22,500 + 100X	32,000 + 140X
Add: Office Overhead	$\frac{Y}{100} \times (22,500 + 100X) = 225Y + XY$	$\frac{Y}{100} \times (32,000 + 140X) = 320Y + 1.4XY$
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) × 1.40	=>	140X	+	315Y	+	1.40XY	=	23,100
Less: equation (2)	=>	140X	+	320Y	+	1.40XY	=	23,250
				-5Y			=	-150

or, $Y = 30$

Now, putting the value of Y = 30 in equation (1)

We have, $100X + 225 \times 30 + 30X = 16,500$

or, $130X = 16,500 - 6,750$

or, $X = 75$

Hence, Percentage of Works Overhead on Wages = 75%

and Percentage of Office Overhead 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 + 12% Total Cost = 61,880

   or, Total Cost = $61,880 \times \frac{100}{112}$ = ₹ 55,250

Illustration 60

Helping Hand 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 ₹
Cost of Power Generation [Fixed Cost]	H P Hours (5:10:6:4)	2,500	500	1,000	600	400
Cost of Power Generation [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 61

GT Ltd engineering Co. having 25 different types of automatic machines, furnishes you the following data for 2022-23 in respect of machine B:

1. Cost of the machine ₹ 50,000
   Life – 10 years Scrap value is Nil
2. Overhead 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	Workings	Amount (₹)	Amount (₹)
Standing Charges			
Rent	$50{,}000 \times \frac{3{,}000 \text{ sq. ft}}{80{,}000 \text{ sq. ft}}$	1,875	
Heating and Lighting	$40{,}000 \times \frac{3{,}000 \text{ sq. ft}}{80{,}000 \text{ sq. ft}}$	1,500	
Supervision	$1{,}50{,}000 \times \frac{1}{25 \text{ machines}}$	6,000	
Reserve Equipment		5,000	
Total Standing Charges		14,375	
Standing Cost per hour	$\frac{₹\ 14{,}375}{4{,}000 \text{ hours } (3600+400)}$		**3.59**
Machine Expenses:			
Depreciation	$\frac{₹\ 50{,}000}{10 \text{ years} \times 3{,}600 \text{ hours}}$	1.39	
Wages	$\frac{₹\ 24}{8 \text{ hours}} \times \frac{1}{2 \text{ machines}}$	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	$50{,}000 \times \frac{3{,}000 \text{ sq. ft}}{80{,}000 \text{ sq. ft}}$	1,875	
Heating and Lighting	$40{,}000 \times \frac{3{,}000 \text{ sq. ft}}{80{,}000 \text{ sq. ft}}$	1,500	
Supervision	$1{,}50{,}000 \times \frac{1}{25 \text{ machines}}$	6,000	
Reserve Equipment		5,000	
Total Standing Charges		14,375	
Standing Cost per hour	$\frac{₹\ 14{,}375}{4{,}000 \text{ hours}}$		**3.59**
Machine Expenses:			
Depreciation	$\frac{₹\ 50{,}000}{10 \text{ years} \times 3{,}600 \text{ hours}}$	1.39	
Wages	$\frac{₹\ 24}{8 \text{ hours}}$	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 hours × ₹ 7.98	638.40	40 hours × ₹ 7.98	319.20
Operation Cost	130 hours × ₹ 6.98	907.40	160 hours × ₹ 6.98	1,116.80
Total Cost of the Job		**1,545.80**		**1,436.00**

Illustration 62

Yamuna 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 overhead. 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 overhead and production data costs are as follows:

	Printing and Binding	Lithographing	Engraving
Factory Overhead (₹)	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

   $$\text{Overhead Rate per Machine Hour} = \frac{\text{Factory Overhead}}{\text{Machine hours}} = \frac{₹\ 40{,}000}{20{,}000 \text{ hours}} = ₹\ 2 \text{ per machine hour}$$

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.

   $$\text{Overhead Rate per Labour Hour} = \frac{\text{Factory Overhead}}{\text{Labour hours}} = \frac{₹\ 68{,}750}{20{,}000 \text{ hours}} = ₹\ 3.4375 \text{ per Labour hour}$$

3. **Engraving Department**

   In Department 3 it is better and appropriate to use overhead rate based on certain percentage of wages because workers are paid at different rates.

   $$\text{Overhead Percentage on Wages} = \frac{\text{Factory Overhead}}{\text{Wages}} \times 100 = \frac{₹\ 1{,}20{,}000}{₹\ 80{,}000} \times 100 = 150\%$$

Illustration 63

For a department the standard overhead rate is ₹ 2.50 per hour and the overhead allowances are as follows:

Activity Level (Hours)	Budgeted Overhead 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 overhead rate has been worked out.

Solution:

a. Variable Cost per hour $= \frac{\text{Difference in Total Overhead}}{\text{Difference in Activity Level}}$

$= \frac{₹\ 18,000 \times ₹\ 10,000}{7,000 \text{ hrs} \times 3,000 \text{ hours}}$

$= \frac{₹\ 8,000}{4,000 \text{ hours}}$

= ₹ 2 per hour

∴ Fixed Overhead = Total Overhead – Variable Overhead

= ₹ 10,000 – 3,000 hrs × ₹ 2 per hour

= ₹ 10,000 – ₹ 6,000

= ₹ 4,000

Alternatively,

Let Variable Overhead rate be ₹ x

and Fixed Overhead be ₹ y

So, $3,000x + y = 10,000$.....equation (i)

and, $7,000x + y = 18,000$.....equation (ii)

Equation (ii) – Equation (i)

$\Rightarrow (7,000\ x + y) - (3,000\ x + y) = 18,000 - 10,000$

$\Rightarrow 4,000\ x = 8,000$

or, $x = \frac{8,000}{4,000} = 2$

putting $x = 2$ in equation (i)

$\Rightarrow y = 10,000 - 6,000 = 4,000$

∴ Variable Overhead per hour = ₹ 2 per hour

Fixed Overhead = ₹ 4,000

b. Overhead Rate Per Hour = ₹ 2.5 (Given)

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

or, Standard Activity Level = $\frac{4,000}{2.5 - 2}$ = 8,000

Standard Activity Level = 8,000 hours

Illustration 64

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
Overhead (Actual)	800	650	350

Overhead 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 Overhead Incurred	800	650	350
Overhead Recovery Rate is calculated based on historical data. So, actual overhead 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 65

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
No. of salesmen, all paid same salary	10	4	5	1
Units sold	10,400	3,400	4,000	3,000
No. of orders	1,600	700	800	100
% of specific advertisement	100%	30%	40%	30%
Sales turnover (₹)	2,00,000	58,000	80,000	62,000
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

Particulars	Basis of apportionment	Total ₹	A ₹	B ₹	C ₹
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 (WN 1) (17:32:51)	4,000	680	1,280	2,040
Warehouse expenses	Total volume cu. ft. product sold (WN 1) (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
a. Cost p.u.			$= \frac{₹\ 16,634}{3,400 \text{ units}}$ = ₹ 4.89	$= \frac{₹\ 22,456}{4,000 \text{ units}}$ = ₹ 5.61	$= \frac{₹\ 15,302}{3,000 \text{ units}}$ = ₹ 5.10
b. Percentage of Selling Expenses on Sales			$= \frac{₹\ 16,634}{₹\ 58,000} \times 100$ = 28.67%	$= \frac{₹\ 22,456}{₹\ 80,000} \times 100$ = 28.07%	$= \frac{₹\ 15,302}{₹\ 62,000} \times 100$ = 24.69%

Working Note:

1.

Particulars	A	B	C
a. Volume of cu. ft. per unit of finished products	5	8	17
b. Units Sold	3,400	4,000	3,000
c. Total Volume of cu. ft (a × b)	17,000	32,000	51,000

Illustration 66

For a production department of a manufacturing company, you are required to:

a. Prepare a fixed budget of overhead

b. Prepare a flexible budget of overhead, at 70% and 110% of budget volume;

c. Calculate a departmental hourly rate of overhead 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	

Particulars	Particulars	Amount (₹)	₹ per hour
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 overhead cost per hour

Particulars	At 70% Capacity 5,000 × 70% = 3,500 hours		At 100% Capacity 5,000 hours		At 110% Capacity 5,000 × 110% = 5,500 hours	
	Workings	(₹)	Workings	(₹)	Workings	(₹)
Indirect Wages	0.40 × 3,500 hrs	1,400	0.40 × 5,000 hrs	2,000	0.40 × 5,500 hrs	2,200
Repairs	$100 + 35 \times \frac{3,500 - 2,000}{500}$	205	$100 + 35 \times \frac{4,000 - 2,000}{500} + 60$	300	$100 + 35 \times \frac{4,000 - 2,000}{500} + 60 + 70$	370
Rent and Rate		350		350		350
Power	0.25 × 3,500	875	0.25 × 3,600 + 0.20 × 1,400	1,180	0.25 × 3,600 + 0.20 × 1,900	1,280
Consumable Supplies	0.24 × 3,500	840	0.24 × 5,000	1,200	0.24 × 5,500	1,320
Supervision (Slab rounded off to next digit)	$400 + 100 \times \frac{3,500 - 2,500}{600}$	600	$400 + 100 \times \frac{4,900 - 2,500}{600} + 150$	950	$400 + 100 \times \frac{4,900 - 2,500}{600} + 150$	950
Depreciation		650		650		820
Cleaning		60		80		80
Heating and Lighting		120		150		175
Total Overhead		5,100		6,860		7,545
Overhead Rate per hour	**$\frac{₹ 5,100}{3,500 \text{ hours}}$**	**1.457**	**$\frac{₹ 6,860}{5,000 \text{ hours}}$**	**1.372**	**$\frac{₹ 7,545}{5,500 \text{ hours}}$**	**1.372**

If under-absorbed overhead is 10% or more of actual overhead incurred then supplementary overhead rate is applied otherwise the balance amount can be charged to Profit and Loss Account or can be carried forward to next year.

Illustration 67

In a manufacturing unit, overhead was recovered at a predetermined rate of ₹ 25 per man-day. The total factory overhead 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 overhead be treated in Cost Accounts?

Solution:

Particulars		Amount (₹)
Overhead Incurred		41,50,000
Less: Overhead Absorbed	₹ 25 × 1,50,000 man-day	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 overhead rate in the following manner

Supplementary Overhead Rate $= \frac{₹\ 4,00,000}{30,000 + 10,000 + 30,000 \times 66.67\%}$

$= \frac{₹\ 4,00,000}{60,000 \text{ units}}$

$= \frac{₹\ 20}{3}$ per unit

Finished Goods Sold = 30,000 units

Closing Stock of Finished Goods = 10,000 units (40,000 – 30,000)

Work in Progress = 30,000 units

Equivalent finished goods = 30,000 × 66.67%

= 20,000 units

So, under absorbed overhead 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 overhead 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 overhead.
    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. Overhead Absorption

d. None of the above

22. Directors' remuneration and expenses form a part of
    a. Production Overhead
    b. Administration Overhead
    c. Selling Overhead
    d. Distribution Overhead

23. 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

24. Absorption means
    a. Charging of overheads to cost centres
    b. Charging of overhead to cost units
    c. Charging of overheads to cost centres or cost units
    d. None of the above

25. 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

26. When the amount of overhead absorbed is less than the amount of overhead incurred, it is called
    a. Under absorption of overhead
    b. Over absorption of overhead
    c. Proper absorption of overhead
    d. None of the above

27. Selling and Distribution overhead 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

28. Primary packing cost is a part of
    a. Direct material cost
    b. Distribution overhead
    c. Selling overhead
    d. Production cost

29. 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

30. Find out from the following scientific and accurate method of factory overhead 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**	**B**	**23**	**A**	**24**	**B**
25	**B**	**26**	**A**	**27**	**D**	**28**	**D**	**29**	**C**	**30**	**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 overhead 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 overhead rate is a single overhead rate computed for the entire factory.
30. Under absorption of overheads means that actual overheads are more than absorbed overhead

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**	**F**	**19**	**T**	**20**	**F**	**21**	**T**	**22**	**T**	**23**	**T**	**24**	**F**
25	**F**	**26**	**T**	**27**	**T**	**28**	**F**	**29**	**F**	**30**	**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 overhead 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.

Answer:

1	Taylor's differential piece rate	**2**	50%
3	100%	**4**	factory overhead
5	time	**6**	manufacture of a product, 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		

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.

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 A and B from the following particulars:

Standard time per piece		- 20 minutes
Normal rate per hour		- 90 paise
In a 9 hour day:	A produced	- 25 units
	B 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:

Amit – 35 units; Bikash – 40 units; Chaman – 41 units; Dhawan – 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 X and Y of the group:

X worked 44 hours and his basic rate per hour was ₹ 2.20

Y 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	X (₹)	Y (₹)	Z (₹)
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 overhead 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 overhead 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 ½ % 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 Overhead	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 Overhead 150% of Direct Wages	**12**
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

	Amount (₹)
Direct Wages	60,000
Overheads	90,000
Direct Labour Hours	15,000
Machine Hours	30,000

Find out the overhead recovery rate based on at least five different possible methods of absorption of overheads.

23. The following particulars were extracted from the records of Alpha Ltd on 31st December:

	Department A (₹)	Department B (₹)	Department C (₹)
Overhead Incurred	2,000	1,500	2,500
Overhead 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 overhead 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 (b) 400 units; 475 units; 360 units (c) 1,450 units; 1,600 units; 1,350 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.	A: ₹ 6.23; B: ₹ 15.75
10.	Aman - ₹ 200; Bikash - ₹ 240; Chaman - ₹ 266; Dhawan - ₹ 338
11.	(a) Total Bonus for the week is ₹ 100; (b) Earnings of X: ₹ 105.60; Y: ₹ 100.80
12.	(a) X: 13 hours; Y: Nil; Z: 6 hours; Amount of Bonus X: ₹ 2.60; Y: Nil; Z: ₹ 1.60 (b) Total wages cost X: ₹ 15.60; Y: ₹ 30; Z: ₹ 16; (c) Cost per good units produced X: ₹ 0.0065; Y: ₹ 0.0139; Z: ₹ 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

The maintenance of cost records was introduced by the Companies amendment bill 1965 through section 209 (1) (d) which warrants:

"Every company shall keep at its registered office proper books of account with respect to: in the case of a company pertaining to any class of companies engaged in production, processing, manufacturing or mining activities, such particulars relating to utilization of material or labour or to other items of cost as may be prescribed, if such class of companies is required by the Central Government to include such particulars in the books of account."

The primary objective to introduce cost accounting records was to veer the corporate sector to be more efficient. The scheme was intended to serve the best interest of the companies and all its stake holders. This was explained and documented in a few joint select committee reports and parliamentary debate for Company Amendment Bill 1965, while incorporating section 209 (1) (d) (Cost Accounting Records) and 233B (Cost Audit). After the aforesaid amendments, the Government notified Cost Accounting Record Rules for 44 Industries.

Expert Committees

There were various committees formed to evaluate the need & implementation of Cost Records maintenance. The brief on recommendation made by these committees ae given below:

A. Expert Committee chaired by Dr J J Irani, set up by Ministry of Corporate Affairs, said that Cost Records are important instruments that would enable companies make their operations efficient and exist in their competitive environment.

B. Committee on Subordinate Legislation (Fourteenth Loksabha) in its first report (Chapter 3) stated as follows:

i. Authentic cost database is of paramount importance to various existing new regulatory bodies, competition commission and Government Departments for fixation of user charges in respect of services provided by them and would go a long way in fulfilling their respective objectives

ii. In the present scenario authentic Cost database is not only essential for the industries to improve upon their performance and face competitive environment but is useful for various Government agencies, revenue authorities, regulatory bodies, banks and Financial Institutions for meeting their respective objectives.

iii. Service sector such as banking, insurance, health services, education, hotels etc. have admitted by "attained strategic importance to the economy and the public at large, particularly after opening up of the economy for private or foreign companies."

C. Standing Committee on Finance in its report on the Companies Bill 2009, emphasized on the mandatory maintenance of cost records, coverage of more number of companies particularly sectors covering exploration,

mining, processing, manufacturing, infrastructure and utilities under cost audit and due compliance with the cost accounting standards and cost auditing standards.

Cost Accounting Record Rules 2011

Keeping in views the aforesaid recommendations of the committees Government introduced the cost accounting record rules 2011 with the broader scope of working. Highlights of these rules are as under:

a. Detailed definition of the Manufacturing Activity, Mining Activity & Processing Activity is added in the rules.

b. The definition of product included idea, know how, method, information & service. So for the first time service industry was covered under the purview of Cost Records maintenance.

c. The applicability of the rules linked to 3 criteria:

   I. Aggregate net worth of the Company – ₹ 5 crore & above

   II. Total Turnover – ₹ 20 Crore & above

   III. Shares / securities are listed in any stock exchange in or outside Indi.

d. Every company which is required to maintain cost records, shall submit the compliance certificate duly certified by a practicing cost accountant with in prescribed time limit & prescribed format.

Cost Accounting Record Rules 2014

Presently, Section 148 of the Companies Act, 2013 read with companies (Cost Records and Audit) Rules, 2014 and Companies (Cost Records and Audit) Amendment Rules, 2014 deal with provisions relating to maintenance of Cost Records.

Companies to which maintenance of cost records is applicable are divided into two categories viz. Table A (Regulated Sectors) and Table B (Non-regulated Sectors). The rules prescribe an exhaustive list of industries / sectors / products / services, which need to prepare cost records, along with their respective CETA headings. Cost Records are made mandatory across all of these industries wherein overall annual turnover from all its products and services during the immediately preceding financial year exceeds ₹ 35 crores. Requirement of Compliance Certificate has been dispensed with.

Cost Accounting Standards

The Cost Accounting records rules set by the government for the industries deal with the various items of cost and the way in which they have to be reported in the Cost Statement in accordance with the cost accounting principles. Since there were no Generally Accepted Cost Accounting Principles, these were left to be understood by each company or by each cost accountant, as they understand or with reference to the explanations given in various textbooks on the subject.

This led to adoption of practices with a lack of uniformity in preparation and presentation of cost statements. To promote uniformity, there was an urgent need to integrate harmonize, and standardize the cost accounting principles and practices. Therefore, the Generally Accepted Cost Accounting Principles have been clearly defined and well documented in the form of the Cost Accounting Standards.

Advantage of Cost Accounting Standards:

a. Providing a structured approach to measurement of cost in manufacturing process or service industry;

b. Integrating, harmonizing, and standardizing cost accounting principles and practices;

c. Providing guidance to users to achieve uniformity and consistency in classification, measurement, assignment, and allocation of costs to products and services;

d. Arriving at the basis of computing the cost of product, activity, or service where required by legal or regulatory bodies;

e. Enabling practicing members to make use of Cost Accounting Standards in the attestation of General Purpose Cost statements; and

f. Assisting in clear and uniform understanding of all the related issues by various user organizations, government bodies, regulators, research agencies, and academic institutions.

ICMAI has brought out 24 Cost Accounting Standards so far, which is discussed in the later part of this module.

Cost Accounting Standards Board

Composition of the Board

The council of the Institute of Cost Accountants of India, has constituted 'Cost Accounting Standards Board' (CASB) with the objective of formulating Cost Accounting Standards, after recognizing the need for structured approach to the measurement of cost so as to provide guidance to the user organizations, government bodies, regulators, research agencies, academic institutions and others to achieve uniformity and consistency in classification, measurement and assignment of costs.

The composition of the CASB will be broad based and ensure participation of all interest groups in the standard setting process. The chairman of the CASB will be nominated by the council of the Institute. The following will be represented on the CASB :-

(a) Six members of the Council including the Chairman of the Board to be nominated by the Council.

(b) A nominee of the Central Government representing Ministry of Corporate Affairs.

(c) Adviser (Cost), Cost Audit Branch, or his representative nominated by Ministry of Corporate Affairs, Government of India.

(d) A nominee of the Central Government representing the Central Board of Indirect Taxes and Customs, Government of India.

(e) A nominee of the Central Government representing the Central Board of Direct Taxes.

(f) Two members of the Institute representing leading companies.

(g) Four nominees from regulators i.e. CAG, RBI, SEBI, IRDA,TRAI...etc.

(h) Two nominees from professional Institutions i.e. ICAI and ICSI.

(i) Three nominees of Industry Associations viz ASSOCHAM, CII, FICCI....etc.

(j) Two nominees from academic Institutions like IIM, MDI, Universities...etc.

(k) Four eminent practicing members of the Institute.

(l) President is authorized to include a maximum of two eminent persons having knowledge and expertise in the Cost and Management Accounting / Accounting Standards not falling under the categories as defined in the constitution.

Objectives and Functions

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 will be the functions of the CASB :-

(a) To issue the framework for the Cost Accounting Standards.

(b) To equip the Cost & Management Accounting professionals with better guidelines on Cost Accounting Principles.

(c) To assist the members in preparation of uniform cost statements under various statutes.

(d) To provide from time to time interpretations on Cost Accounting Standards.

(e) To issue application guidance relating to a particular standard.

(f) To propagate the Cost Accounting Standards and to persuade the users to adopt them in the preparation and presentation of General Purpose Cost Statement.

(g) 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.

(h) To educate the users about the utility and the need for compliance of Cost Accounting Standards.

Overview of Cost Accounting Standards

In the following table, an overview of the 24 CASs are presented along with the respective objectives of the standards.

CAS No.	Title	Objective
CAS 1	Classification of Cost	For preparation of Cost Statements.
CAS 2	Capacity Determination	To bring uniformity and consistency in the principles and methods of determination of capacity with reasonable accuracy.
CAS 3	Production and Operation Overheads	To bring uniformity and consistency in the principles and methods of determining the Production or Operation Overheads with reasonable accuracy.
CAS 4	Cost of Production for Captive Consumption	To determine the assessable value of excisable goods used for captive consumption.
CAS 5	Average (Equalized) Cost of Transportation	To determine averaged / equalized transportation cost.

CAS No.	Title	Objective
CAS 6	Material Cost	To bring uniformity and consistency in the principles and methods of determining the Material Cost with reasonable accuracy in an economically feasible manner.
CAS 7	Employee Cost	To bring uniformity and consistency in the principles and methods of determining the Employee Cost with reasonable accuracy.
CAS 8	Cost of Utilities	To bring uniformity and consistency in the principles and methods of determining the Cost of Utilities with reasonable accuracy.
CAS 9	Packing Material Cost	To bring uniformity and consistency in the principles and methods of determining the Packing Material Cost with reasonable accuracy.
CAS 10	Direct Expenses	To bring uniformity and consistency in the principles and methods of determining the Direct Expenses with reasonable accuracy.
CAS 11	Administrative Overheads	To bring uniformity and consistency in the principles and methods of determining the Administrative Overheads with reasonable accuracy.
CAS 12	Repairs and Maintenance Cost	To bring uniformity and consistency in the principles and methods of determining the Repairs and Maintenance Cost with reasonable accuracy.
CAS 13	Cost of Service Cost Centre	To bring uniformity and consistency in the principles and methods of determining the Cost of Service Cost Centre with reasonable accuracy.
CAS 14	Pollution Control Cost	To bring uniformity and consistency in the principles and methods of determining the Pollution Control Costs with reasonable accuracy.
CAS 15	Selling and Distribution Overheads	To bring uniformity and consistency in the principles and methods of determining the selling and Distribution over- heads with reasonable accuracy.
CAS 16	Depreciation and Amortisation	To bring uniformity and consistency in the principles and methods of determining the Depreciation and Amortisation with reasonable accuracy.
CAS 17	Interest and Financing Charges.	To bring uniformity and consistency in the principles, methods of determining and assigning the Interest and Financing Charges with reasonable accuracy.
CAS 18	Research and Development Costs	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.
CAS 19	Joint Costs	To bring uniformity and consistency in the principles and methods of determining the Joint Costs.
CAS 20	Royalty and Technical Know- How Fee	To bring uniformity and consistency in the principles and methods of determining the amount of Royalty and Technical Know-how Fee with reasonable accuracy.

CAS No.	Title	Objective
CAS 21	Quality Control	To bring uniformity, consistency in the principles, methods of determining and assigning Quality Control cost with reasonable accuracy.
CAS 22	Manufacturing Cost	To bring uniformity and consistency in the principles and methods of determining the Manufacturing Cost of excisable goods.
CAS 23	Overburden Removal Cost	To bring uniformity and consistency in the principles and methods of determining and assigning Overburden Removal Cost with reasonable accuracy.
CAS 24	Treatment of Revenue in Cost Statements	To bring uniformity and consistency in the principles and methods for treatment of revenue in cost statements with reasonable accuracy.

*Limited Revision 2017 [CAS 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 20, 21, 22, 23 & 24]

Each of the Cost Accounting standards has been explained in brief below.

CAS – 1: COST ACCOUNTING STANDARD ON CLASSIFICATION OF COST

This standard deals with the principles of Classification of Cost for determining the cost of a product or service.

Objective

The objective of this standard is to bring uniformity and consistency in the principles of Classification of Cost for disclosure and presentation in the cost statements of a product or service.

Scope

This standard shall be applied to cost statements, which require classification, presentation and disclosure of cost including those requiring attestation.

Principles of Classification of Costs

Costs shall be classified by the process of grouping the components of cost under a common designation on the basis of similarities of nature, attributes or relations. Items grouped together under common heads shall be further classified according to their fundamental differences.

Scheme of classification shall be such that every item of cost is classified.

Classification of Costs

(a) By Nature of expenses

(b) By nature of traceability to a cost object

(c) By function

(d) By nature of behaviour

(e) By nature of production or operation process

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.

Objective

The objective of this standard is to bring uniformity and consistency in the principles and methods of determination of capacity with reasonable accuracy.

Scope

This standard shall be applied to the cost statements, including those requiring attestation, which require determination of capacity for assignment of overheads.

Determination of Capacity:

Capacity shall be determined in terms of units of production or services or equivalent machine or man hours.

1. Installed capacity:

Installed capacity is usually determined based on:

(i) Technical specifications of facility

(ii) Technical evaluation

(iii) Capacities of individual or interrelated production or operation Centres

(iv) Operational constraints or capacity of critical machines or equipment

(v) Number of shifts or machine hours or man hours.

2. Normal Capacity:

Normal capacity is determined after suitable adjustments to the Installed Capacity.

The adjustments may be of the following nature:

(i) Time lost due to scheduled preventive or planned maintenance

(ii) Number of shifts or machine hours or man hours

(iii) Holidays, normal shut down days, normal idle time

(iv) Normal time lost in batch change over.

CAS-3: COST ACCOUNTING STANDARD ON PRODUCTION AND OPERATION OVERHEADS

This standard deals with the principles and methods of determining the Production or Operation Overheads. This standard deals with the principles and methods of classification, measurement and assignment of Production or Operation Overheads, for determination of the cost of goods produced or services provided and for 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 Production or Operation Overheads with reasonable accuracy.

Scope

This standard shall be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of Production or Operation Overheads including those requiring attestation.

Disclosures

The cost statements shall disclose the following:

1. The basis of assignment of Production or Operation Overheads to the cost objects
2. Production or Operation Overheads incurred in foreign exchange
3. Production or Operation Overheads relating to resources received from or supplied to related parties
4. Any Subsidy, Grant, Incentive or any amount of similar nature received or receivable reduced from Production or Operation Overheads
5. Credits or recoveries relating to the Production or Operation Overheads
6. Any abnormal cost not forming part of the Production or Operation Overheads
7. Any unabsorbed Production or Operation Overheads

Disclosures shall be made only where material, significant and quantifiable.

CAS-4: Cost Accounting Standard on Cost of Production for Captive Consumption

Cost Accounting Standard 4 (CAS-4) 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. CBEC, 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 incidence. 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.

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 Acts/Rules.

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 (Equalized) 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

(a) To bring uniformity in the application of principles and methods used in the determination of averaged/ equalized transportation cost

(b) 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

(c) 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 :

(a) Determination of average transportation cost for claiming the deduction for arriving at the assessable value of excisable goods

(b) Insurance claim valuation

(c) Working out claim for freight subsidy under Fertilizer Industry Coordination Committee

(d) Administered price mechanism of freight cost element

(e) Determination of inward freight costs included or to be included in the cost of purchases attributable to the acquisition

(f) Computation 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 [Limited Revision 2017]

This standard deals with principles and methods of determining the Material Cost. Material for the purpose of this standard includes raw materials, process materials, additives, manufactured / bought out components, sub-assemblies, accessories, semi finished goods, consumable stores, spares and other indirect materials. This standard does not deal with Packing Materials as a separate standard is being issued on the subject.

This standard deals with the principles and methods of classification, measurement and assignment of Material 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 Material Cost with reasonable accuracy.

Scope

This standard should be applied to Cost Statements which require classification, measurement, assignment, presentation and disclosure of Material Costs including those requiring attestation.

CAS-7: Cost Accounting Standard on Employee Cost [Limited Revision 2017]

This standard deals with the principles and methods of determining the Employee Cost. This deals with the principles and methods of classification, measurement and assignment of Employee 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 Employee Cost with reasonable accuracy.

Scope

This standard should be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Employee Cost including those requiring attestation.

CAS-8: Cost Accounting Standard on Cost of Utilities [Limited Revision 2017]

This standard deals with the principles and methods of determining the Cost of Utilities. This 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 (CAS 4) shall apply. This standard shall not be applicable to the organizations 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 [Limited Revision 2017]

This standard deals with the principles and methods of determining the Packing Material Cost. This 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 [Limited Revision 2017]

This standard deals with the principles and methods of determining the Direct Expenses. This deals with the principles and methods of classification, measurement and assignment of Direct Expenses, for determination of the cost of product or service, and the presentation and disclosure in Cost Statements.

Objectives

The objective of this standard is to bring uniformity and consistency in the principles and methods of determining the Direct Expenses with reasonable accuracy.

Scope

This standard should be applied to Cost Statements, which require classification, measurement, assignment, presentation and disclosure of Direct Expenses including those requiring attestation.

CAS-11: Cost Accounting Standard on Administrative Overheads [Limited Revision 2017]

This standard deals with the principles and methods of determining the Administrative Overheads.

This deals with the principles and methods of classification, measurement and assignment of Administrative Overheads, 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 Administrative Overheads with reasonable accuracy.

Scope

The standard should be applied to Cost Statements, which require classification, measurement, assignment, presentation and disclosure of Administrative Overheads including those requiring attestation.

CAS-12: Cost Accounting Standard on Repairs and Maintenance [Limited Revision 2017]

This standard deals with the principles and methods of determining the Repairs and Maintenance Cost.

This 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 [Limited Revision 2017]

This standard deals with the principles and methods of determining Cost of Service Cost Centres. This covers the service cost centre and excludes utilities and repair & maintenance costs dealt with in CAS - 8 & 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 preparation & presentation 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 [Limited Revision 2017]

This standard deals with the principles and methods of determining Pollution Control Cost. This 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

This standard deals with the principles and methods of determining the Selling and Distribution Overheads.

This deals with the principles and methods of classification, measurement and assignment of Selling and Distribution Overheads, for determination of the cost of sales 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 Selling and Distribution Overheads with reasonable accuracy.

Scope

This standard should be applied to cost statements, which require classification, measurement, assignment, presentation and disclosure of Selling and Distribution Overheads including those requiring attestation.

CAS -16 : Cost Accounting Standard on Depreciation and Amortisation [Limited Revision 2017]

This standard deals with the principles and methods of determining Depreciation and Amortisation Cost.

This 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 Standard on Interest and Financing Charges [Limited Revision 2017]

This standard deals with the principles and methods of determining Interest and Financing Charges.

This 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 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

This standard deals with the principles and methods of determining Joint Cost.

The deals with the principles and methods of measurement and assignment of Joint Costs and the presentation and disclosure in cost statement.

Objective

The objective of this standard is to bring uniformity, consistency in the principles, methods of determining and assigning Joint Costs with reasonable accuracy.

Scope

The standard shall be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Joint Costs including those requiring attestation.

CAS-20 : Cost Accounting Standard on Royalty And Technical Know-How Fee [Limited Revision 2017]

This standard deals with the principles and methods of determining the amount of Royalty and Technical Know-how Fee.

This 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 [Limited Revision 2017]

The standard deals with the principles and methods of measurement and assignment of Quality Control cost and the presentation and disclosure in cost statement.

Objective

The objective of this standard is to bring uniformity, consistency in the principles, methods of determining and assigning Quality Control cost with reasonable accuracy.

Scope

The standards shall be applied to cost statements which require classification, measurement, assignment, presentation and disclosure of Quality Control cost including those requiring attestation.

CAS – 22 : Cost Accounting Standard on Manufacturing Cost [Limited Revision 2017]

This standard deals with the principles and methods of determining the Manufacturing Cost of excisable goods.

This 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 [Limited Revision 2017]

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 [Limited Revision 2017]

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. CAS 21 stands for:
   A. Capacity Determination
   B. Joint Cost
   C. Direct Expenses
   D. None of these.
2. CAS 13 is dealt with _____ .
   A. Joint Cost
   B. Interest and financing charges
   C. Employee Cost
   D. Cost of Service cost centre
3. Which standard deals with the principles and methods of determining the manufacturing Cost of excisable goods?
   A. CAS 2
   B. CAS 12
   C. CAS 15
   D. CAS 22
4. Which standards deals with determination of averages/ equalized transportation cost?
   A. CAS 5
   B. CAS 6
   C. CAS 9
   D. CAS 22
5. Which standards deals with the principles and methods of determining depreciation and amortization cost?
   A. CAS 9
   B. CAS 12
   C. CAS 15
   D. CAS 16

Answer

1	**D**	**2**	**D**	**3**	**C**	**4**	**D**	**5**	**D**

⊙ 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**		

⊙ Essay Type Questions

1. What is the basic for cost classification as per CAS-1?
2. Brief the objective of CAS-4.
3. Enumerate the scope of CAS-2
4. Name 3 factors that should be disclosed in the cost statements as per CAS-3.
5. Explain the objective of Cost Accounting Standard Board.
6. Write a short note on Cost Accounting Standards.
7. Write the objective of CAS-24.
8. What is the scope of CAS-23?

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

The Cost Accountant plays a pivotal role in ensuring that the process of cost data collection is smooth. The cost analysis and reporting will not be useful for managerial decision-making if the data collection process is erroneous. A robust cost accounting system is the prerequisite for a comprehensive data collection process. The cost accountant will have to carry out periodical checks to evaluate the system which may also be subjected to internal audit. The cost data collected must be reported in proper format in order to make it more informative. A comprehensive statement of cost and profit is the first step in cost record keeping .For analysis purpose, while the production manager requires the cost of production, the sales manager would be focussing on cost of sales. The cost report should be able to give various cost data separately, broken up into all its elements. The sales and marketing cost may be given for each channel of distribution, customers, regions etc. In addition to the product-wise break up, the cost data should be collected in a manner that will make available cost information to all those who are responsible for the costs. The statement of cost[1] should give the figures of each element of cost broken up into direct and indirect and also according to functions like production, administration and selling & distribution. It is therefore logical that the format of the cost sheet (statement of cost) is derived from the requirements for which it is to be used. Apart from exhibiting the total cost, it should highlight other cost also so that comparison with budget can be made, variances analysed and cost could be controlled to increase profits.

It is important to note that in Financial Accounting, only external transactions (transactions between the organisation and other entities) are recorded which facilitates periodical reporting of assets, liabilities, revenues and expenditure of the organisation as a whole[2]. On the other hand, cost accounting system records internal transactions (transactions between cost centres within the firm such that costs can be assigned to a particular cost unit in a suitable manner). For example, when material is purchased from a supplier it shall be recorded in financial accounting but when the same is issued from the stores department to production department it shall be recorded in cost books. As such, financial accounting records and cost accounting records are complementary to each other. In cost accounting, for record keeping, books are basically maintained under the following two systems:

1. **Non-integral or non-integrated cost accounting** – Under the non-integrated system, separate ledgers are maintained for financial transactions while the cost accounts department is responsible for maintaining cost accounts. CIMA termed this as interlocking accounts. CIMA official terminology defines interlocking accounts as a 'set of accounting records where the cost and financial accounts are distinct, the two being kept continuously in agreement by the use of control accounts or reconciled by other means'[3].
2. **Integral or integrated cost accounting –** Where cost and financial accounts are maintained in a combined way, the system is called integral or integrated cost accounting system.CIMA official terminology[3] defines integrated accounts as a 'set of accounting records that integrates both financial and cost accounts using a common input of data for all accounting purposes'.

1 Students are advised to recapitulate the topic which is discussed at length in Module 1 of this study note.

2 Or for a business segment or geographical segment (for details students may refer to AS 17)

3 CIMA Official Terminology, 2005, The Chartered Institute of Management Accountants (CIMA Publishing, an imprint of Elsevier).

Thus, under the non-integrated system, separate ledgers are maintained for financial transactions and cost transactions. The cost accounts department is responsible for maintaining cost accounts. Under the integral or integrated system, only one set of books are maintained for financial as well as cost accounting transactions.

4.1.1 Maintenance of Accounts

As such, the finance department is responsible for maintaining the financial ledgers. This department maintains the following ledgers.

1. General ledger: It includes all real, nominal and personal accounts except debtors and creditors accounts.
2. Debtors Ledger: It contains the personal accounts of trade debtors.
3. Creditors Ledger: It contains the personal accounts of trade creditors.

On the other hand, the cost accounting department maintains the following cost ledgers:

1. Stores ledger for recording all stores transactions
2. Work-in-progress ledger: Cost of materials, labour and overheads of all jobs, which are in progress, are posted to this account.
3. Finished goods/stock ledger: This ledger has the record of finished goods/stock.
4. Cost ledger: This ledger maintains the accounts relating to income and expenditure. The following accounts are maintained in this ledger.

   A. Cost control accounts: These accounts are maintained to exercise control over the three subsidiary ledgers maintained above and also to complete the double entry in cost accounts. The important cost control accounts are as follows:

   - Stores ledger control a/c
   - Work-in-progress ledger control a/c
   - Finished goods ledger control a/c
   - General ledger adjustment a/c

   B. Other accounts: They include all other impersonal accounts (real as well as nominal) which effect costs, e.g. wages control account, factory overhead accounts, administration overhead account, selling and distribution overhead account, cost of sales account etc. Depending upon the requirement, the following additional accounts may also be maintained.

   - Overhead suspense account
   - Capital orders account
   - Service orders account

4.1.2 Treatment of Elements of Cost

The following treatment is given to the various elements of cost:

- **Materials:** Certain transactions relating to material are recorded in the financial accounts also. Examples of such transactions are purchase of material, return of materials. These transactions are recorded in financial as well as cost accounts. On the other hand, certain transactions like issue of materials from stores, transfer of material from one job to the other one, return of excess materials to stores are recorded only in cost accounts.

- **Labour:** Wages paid are recorded in the cost accounts through wages control account and the general ledger adjustment account.
- **Overheads:** Various types of overheads like production, administration and selling and distribution are absorbed to the products on some suitable basis. The production overhead accounts is credited with the amount of overheads absorbed and the work in progress account is credited. In case of administrative overhead account, the amount absorbed is credited to the administrative overhead account and finished stock account is debited. Selling and distribution overheads are credited to the selling and distribution overhead account and corresponding debit is given to the cost of sales account. Finally, the amount of under/over absorbed overheads is transferred to the Costing Profit and Loss A/C

4.1.3 Non-Integrated Accounting

Non-Integrated Accounting[4] is a system of accounting under which separate ledgers are maintained for cost and financial accounts by accountants. This system is also referred to as cost ledger accounting system. Under this system, cost accounting is restricted to recording only those transactions which relate to the product or service. This leads to the exclusion of certain expenses e.g., interest, bad debts and revenue / income from other than the sale of product or service. Non-Integrated Accounting system contains fewer accounts when compared with financial accounting because of the exclusion of purchases, expenses and also balance sheet items viz. fixed assets, debtors and creditors. Items of accounts which are excluded are represented by an account called Cost Ledger Control Account. The important ledgers to be maintained under non-integrated accounting system in the cost accounting department are discussed below.

1. **Cost Ledger Control Account –** This account is also known as General Ledger Adjustment Account or Financial Ledger Control Account. This ledger establishes a relation with financial account and helps to complete the double entry. This account is debited with the amount received or receivable from sales and credited with the amount paid / payable for material, wages, factory overhead, administration overhead and selling and distribution overhead. Profit / Loss of cost accounts is determined from this ledger. Opening and the closing balance of this account of a particular period represents the total of all balances of impersonal account.
2. **Stores Ledger Control Account / Material Control Account –** This account is debited with the amount of purchase (both cash and credit) and credited with the amount issued from stores. Abnormal losses and gains are transferred to costing profit and loss account. Entries are made on the basis of goods received notes and stores requisition. Stores purchased for special jobs are directly debited to work in progress account and not posted here.
3. **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.
4. **Work in Progress Control Account –** This account reflects total work in progress at any particular time. This account is debited with cost of production i.e., direct material, direct wages, direct expenses and factory overhead recovered. This account is credited with the value of finished goods completed, the value of which is transferred to Finished Goods Control Account.
5. **Manufacturing / Production / Works / Factory Overhead 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 overhead absorbed and is transferred to work in progress control account. The difference between overhead incurred and overhead absorbed (i.e., under or over absorbed overhead) is transferred to costing profit and loss account or overhead adjustment account.

4 CIMA has referred this as 'interlocking accounts'. (CIMA Official Terminology, 2005).

6. **Finished Goods Control Account –** This account is debited with the value of goods transferred from work in progress control account and administrative overhead 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.

7. **Administration Overhead Control Account –** This account is debited with administration overhead incurred. Administration overhead recovered is credited to this account and debited to finished goods control account. The difference between administration overhead incurred and recovered is transferred to overhead adjustment account or costing profit and loss account.

8. **Selling and Distribution Overhead Control Account –** This account is debited with selling and distribution overhead incurred. Selling and distribution overhead recovered is credited to this account and debited to cost of sales account. The difference between selling and distribution overhead incurred and recovered is transferred to overhead adjustment account or costing profit and loss account.

9. **Cost of Sales Account –** This account is debited with the cost of finished goods transferred from finished goods control account and selling & distribution overhead recovered (transferred from selling and distribution overhead control account). The balance of this account is transferred to costing profit and loss account.

10. **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 overhead and abnormal gains. The net profit or loss in this account is transferred to cost ledger control account.

11. **Overhead Adjustment Account –** This account will be debited for under recovery of overhead and credited with over recovery of overhead amount. The net balance in this account is transferred to costing profit and loss account. Sometimes, overhead adjustment account is not maintained and under / over absorbed overheads is transferred to costing profit and loss account from the respective overhead accounts.

Illustration 1

On 31st March, 2022 the following balances were extracted from the books of the ABC 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 transaction 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

Particulars	(₹)
Factory overhead expenses incurred	50,000
Selling and Administrative expenses	40,000
Cost of finished goods transferred to warehouse	2,13,000
Cost of Goods Sold	2,10,000
Sales	3,00,000

Factory overheads are applied to production at 150% of direct wages, any under / over absorbed overhead being carried forward for adjustment in the subsequent months. All administrative and 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) Cost Ledger Control A/c	(b) Stores Ledger Control A/c
(c) Wages Control A/c	(d) Factory Overhead Control A/c
(e) Work in Progress Control A/c	(f) Selling and Administrative Expenses A/c
(g) Finished Goods Stock Control A/c	(h) Cost of Goods Sold A/c
(i) Costing Profit and Loss A/c	(j) Trial Balance as at 30th April 2022

Solution:

(a) 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
To, Balance c/d	95,000	By, Wages Control A/c	40,000
		By, Wages Control A/c	25,000
		By, Factory Overhead 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**

(b) 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**

(c) 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 Overhead Control A/c	25,000
	65,000		**65,000**

(d) Factory Overhead Control Account

Particulars	(₹)	Particulars	(₹)
To Wages Control A/c	25,000	By Work in Progress Control A/c	60,000
To Cost Ledger Control A/c	50,000	(150% × 40,000)	
		By Balance c/d	15,000
	75,000		**75,000**

(e) Work in Progress Control Account

Particulars	(₹)	Particulars	(₹)
To Balance b/d	38,000	By Store Ledger Control A/c	3,000
To Store 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 Overhead Control A/c	60,000		
	2,36,000		**2,36,000**

(f) 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**

(g) 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**

(h) 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**

(i) **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**

(j) **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 Overhead Control A/c	15,000	
Cost Ledger Control A/c		95,000
	95,000	**95,000**

Reconciliation of Costing and Financial Profit

4.2

4.2.1 Causes of difference

Where separate set of books are maintained for cost accounting and financial accounting purposes, the profit disclosed by costing profit and loss account might differ from that shown in the financial accounts. This arises as there are certain items which are included in financial accounts of a manufacturing concern but are not included in cost accounts since they are not related to cost of production. These items fall into five categories, as shown below:-

A. Appropriation of profits not dealt in cost accounts

Such appropriation of profits include:

(a) Appropriation to sinking funds
(b) Dividends paid
(c) Taxes on income and profits
(d) Transfers to general reserves
(e) Excess provision for depreciation of buildings, plant etc. and for bad debts
(f) Amount written off – goodwill, preliminary expenses, underwriting commission, discount on debentures issued; expenses of capital issue etc.
(g) Capital expenditures specifically charged to revenue
(h) Charitable donation

B. Purely financial expenses and losses

Such financial expenses and losses are as follows:

(a) Losses on sale of investments, buildings, etc.
(b) Expenses on transfer of company's office
(c) Interest on bank loan, debentures, mortgages, etc.
(d) Damages payable
(e) Penalties and fines
(f) Losses due to scrapping of machinery
(g) Remuneration paid to the proprietor in excess of a fair reward for services rendered

C. Purely financial income

Such financial income include:

(a) Interest received on bank deposits
(b) Profits made on the sale of investments, fixed assets, etc.
(c) Transfer fees received

(d) Rent receivable

(e) Interest, dividends, etc. received on investments.

(f) Brokerage received

(g) Discount, commission received

D. Purely cost accounting matters

Notional costs e.g., rent of premises owned by the proprietor.

Notional cost such as:

(a) Notional rent of the owned building and no rent is payable.

(b) Interest on Capital Employed but not actually paid.

(c) Notional salaries.

E. Items which are accounted for differently in cost accounting and financial accounting

(a) Different bases of stock valuation: In financial accounting stock valuation is as per AS 2 or as per Ind AS 2. In cost accounts, the stock of finished goods is valued at cost by FIFO, LIFO, average rate, etc. Items to be included or to be excluded in financial account is also as per the statutory norm. But that is not applicable in cost accounting. For example, cost of transporting goods to the location of sale is included in the in the cost of finished goods in financial accounting but the same is not true for cost accounting. This cost is excluded in cost accounting.

(b) Treatment of depreciation: In cost accounting, depreciation is charged on the basis of units produced or hours worked, while in financial accounts, it is usually treated as an annual charge.

(c) Abnormal losses and gains: These losses and gains are excluded from cost accounts while the same is incorporated in nominal accounts in financial accounts.

(d) Treatment of overhead: In cost accounting overheads are recovered at predetermined rates. The difference between actual overheads incurred and overhead absorbed is termed as under/over absorption of overheads. If this is not charged to costing profit and loss account, the profit/loss under financial accounting (where overheads are directly charged to profit and loss account) would differ from profit/loss under cost accounting.

Due to the above mentioned, the profit as shown under cost accounting would differ from the profit as shown in financial accounting. For this purpose, reconciliation statement needs to be prepared.

4.2.2 Objects of Reconciliation

The objectives of preparing a reconciliation statement is given below:

(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.

4.2.3 Procedure of Reconciliation

Profits or loss as shown in costing Profit & Loss account may be reconciled with profit or loss as shown in Profit & Loss account (as per financial records) or vice versa. The procedure is simply to start with any of the two (as given in a particular problem) and make adjustments (add or less) for the causes for which the difference have risen. Thus, the profit or loss as per the other statement is derived. If the profit or loss as per Costing Profit & Loss account

is the starting point, then profit or loss as per financial account is to be derived at, and vice versa. The standard format of the reconciliation statement is given in the below:

Profit as per financial accounts		**
Add:	**	
(a) Items of income included in Cost Accounts but not in Financial Accounts.	**	
(b) Items of expenditure included in Financial Accounts and not in Cost Accounts.	**	
(c) Amounts by which items of income have been shown in excess in Cost Accounts over the corresponding entries in Financial Accounts.	**	
(d) Amounts by which items of expenditure have been shown in excess in Financial Accounts over the corresponding entries in Cost Accounts.	**	
(e) Under absorption of Overheads in Cost Accounts.	**	
(f) The amount by which closing stock of inventory is overvalued in Cost Accounts.	**	
(g) The amount by which opening stock of inventory is undervalued in Cost Accounts.	**	
Less:		
(a) Items of income included in Financial Accounts but not in Cost Accounts.	**	
(b) Items of expenditure (as interest on capital, rent on owned premises etc.,) included in Cost Accounts but not in Financial Accounts.	**	
(c) Amounts by which items of expenditure have been shown in excess in Cost Accounts as compared to the corresponding entries in Financial Accounts.	**	
(d) Amounts by which items of incomes have been shown in excess in Financial Accounts as compared to the corresponding entries in Cost Accounts.	**	
(e) Over absorption of overheads in Cost Accounts.	**	
(f) The amount by which closing stock of inventory in undervalued in Cost Accounts.	**	
(g) The amount by which opening stock of inventory is overvalued in Cost Accounts	**	
Profit as per cost accounts		**

Illustration 2

The net profits of a manufacturing company appeared at ₹ 64,500 as per financial records for the year ended 31st December, 2021. 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	(₹)
i.	Income tax provided in financial books	20,000
ii.	Bank Interest (Cr) in financial books	250
iii.	Work overhead under recovered	1,550
iv.	Depreciation charged in financial records	5,600
v.	Depreciation recovered in cost	6,000
vi.	Administrative overheads over-recovered	850

	Particulars	(₹)
vii.	Loss due to obsolescence charged in financial accounts	2,800
viii.	Interest on investments not included in cost accounts	4,000
ix.	Stores adjustments (Credit in financial books)	240
x.	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 31-12-2021

Particulars		Amount (₹)	Amount (₹)
Profit as per Financial Accounts			64,500
Add:	Income tax provided in financial accounts only	20,000	
	Works overhead 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 Overhead 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 3

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.

	Particualars	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 × 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 4

M/s. Mysore Petro Ltd. showed a net loss of ₹ 2,08,000 as per their financial accounts for the year ended 31st March, 2021. The cost accounts, however, disclosed a net loss of ₹ 1,64,000 for the same period. The following information was revealed as a result of the scrutiny of the figures of both the sets of books.

	Particulars	Amount (₹)
i.	Factory overhead under recovered	3,000
ii.	Administration overhead over recovered	2,000
iii.	Depreciation charged in financial books	60,000
iv.	Depreciation recovered in costs	65,000
v.	Interest on investment not included in costs	10,000
vi.	Income tax provided	60,000
vii.	Transfer fee (in financial books)	1,000
viii.	Stores adjustment (credit in financial books)	1,000

Prepare Reconciliation Statement.

Solution:

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts as on 31-03-2021

Particulars	Amount (₹)	Amount (₹)
Profit / (Loss) as per Financial Accounts		(2,08,000)
Add: Under recovery of factory overhead	3,000	
Income tax	60,000	63,000
		(1,45,000)
Less: Over recovery of administration overhead	2,000	
Excess depreciation charged in cost accounts (65,000 – 60,000)	5,000	

Particulars	Amount (₹)	Amount (₹)
Interest on investments included in financial accounts	10,000	
Transfer fee charged in financial accounts only	1,000	
Stores adjustment (credit in financial accounts)	1,000	19,000
Profit / (Loss) as per Cost Accounts		(1,64,000)

Illustration 5

During a particular year, the auditor certified the financial accounts, showing profit of ₹ 1,68,000 where as 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 difference.

Dr. **Trading and Profit & Loss Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
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 overhead 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 the following:

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

Particulars	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	

Particulars	Amount (₹)	Amount (₹)
Under recovery of factory overhead (2,10,000 – 1,89,800)	20,200	
Under recovery of Selling Expenses in Cost Accounts (2,25,000 – 5% × 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% × 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, 2021 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 overhead at 75% of wages and office overhead 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 Overhead (75% × Wages)	60	32,400
Works Cost	380	2,05,200
Add: Office Overhead (30% × 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

Dr. Trading and Profit & Loss Account (Computation of Profit as per Financial Accounts) Cr.

Particulars	(₹)	Particulars	(₹)
To Material A/c	1,29,600	By Sales A/c	3,24,000
To Wages A/c	43,200		
To Works Overhead 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 Overhead (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, 2021.

Dr. Trading and Profit & Loss Account Cr.

Particulars	(₹)	Particulars	(₹)
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 Overhead		
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 Overhead		
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 Overhead (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 Overhead (92,500 – 80,000)	12,500	37,500
Profit / (Loss) as per Cost Accounts		(27,500)

Illustration 8

The following is the Trading and Profit & Loss Account of M/s. Time and Trading Limited for the year ended 31.12.2021.

Dr. **Trading and Profit & Loss Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Material (consumed) A/c	7,08,000	By Sales A/c (30,000 units)	15,00,000
To Direct Wages A/c	3,71,000	By Finished Stock A/c (1,000 units)	40,000
To Works Overhead A/c	2,13,000	By Work in Progress A/c	
To Administration Overheads A/c	95,500	– Materials	17,000
To Selling and Distribution Overheads A/c	1,13,500	– Wages	8,000
To Net Profit	69,000	– Works Overheads	5,000
	15,70,000		15,70,000

Manufacturing a standard unit, the company's cost records show that:

i. Works overheads have been charged to work in progress at 20% on prime cost.
ii. Administration overheads have been recovered at ₹ 3 per finished unit.
iii. Selling and distribution overheads have been recovered at ₹ 4 per unit sold.
iv. The unabsorbed or over absorbed overheads have not been adjusted into Costing Profit and Loss Account.

Prepare:

a) A Costing Profit and Loss Account indicating Net profit.
b) A Statement Reconciling the Profit as disclosed by Cost Accounts and that shown in Financial Accounts.

Solution:

Cost Sheet (Computation of Profit as per Cost Accounts)

Particulars	(₹)
Materials	7,08,000
Direct Wages	3,71,000
Prime Cost	**10,79,000**
Works Overhead	2,15,800
Less: Closing WIP	30,000
Works Cost	**12,64,800**
Administration Overhead A/c	93,000
Cost of Production	**13,57,800**
Less: Closing Stock of Finished Goods	43,800
Cost of Goods Sold	**13,14,000**
Selling & Distribution OH	1,20,000
Cost of Sales	**14,34,000**
Profit (Bal. Fig)	66,000
Sales	**15,00,000**

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts

	Amount (₹)	Amount (₹)
Profit as per Financial Accounts		69,000
Add: Under recovery of Office Expenses (95,500 – 93,000)	2,500	
Over Valuation of Closing Stock of Finished Goods in Cost Accounts (43,800 – 40,000)	3,800	6,300
		75,300
Less: Over recovery of Works Overhead (2,15,800 – 2,13,000)	2,800	
Over recovery of Selling & Distribution Overhead (1,20,000 – 1,13,500)	6,500	9,300
Profit as per Cost Accounts		66,000

Illustration 9

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	1,82,200
To Selling Expenses A/c	46,500	By Miscellaneous Revenue A/c	26,800
To Bad Debts A/c	15,600		
To Net Profit	1,26,400		
	2,09,000		2,09,000

The cost accounts of the concern showed a net profit of ₹ 1,26,200. 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 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	1,26,400
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	1,26,200	By Bad Debts not considered in Cost A/c	15,600
		By Administration Expenses not considered in Cost A/c	20,500
	1,66,300		1,66,300

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 10

The following figures have been extracted from financial accounts of a manufacturing firm for the first year of its operation.

Particulars	Amount (₹)
Direct material consumption	50,00,000
Direct wages	30,00,000
Factory overheads	16,00,000
Administration overheads	7,00,000
Selling and distribution overheads	9,60,000
Bad debts	80,000
Preliminary expenses written off	40,000
Legal charges	10,000
Dividend received	1,00,000
Interest on deposit received	20,000
Sales (1,20,000 units)	1,20,00,000
Closing stock	
– Finished stock – 4,000 units	3,20,000
– Work in progress	2,40,000

The cost accounts for the same period reveal that the direct material consumption was ₹ 56,00,000. Factory overheads recovered at 20% of prime cost; Administration overheads is recovered @ ₹ 6 per unit of production; Selling and distribution overheads are recovered at ₹ 8 per unit sold.

You are required to prepare Costing and Financial Profit and Loss Accounts and reconcile the difference in the profit in the two sets of accounts.

Solution:

Dr. **Financial Profit and Loss Account** **Cr.**

Particulars	Amount (₹)	Particulars	Amount (₹)
To Material A/c	50,00,000	By Sales A/c	1,20,00,000
To Direct Wages A/c	30,00,000	By Dividend A/c	1,00,000
To Factory Overhead A/c	16,00,000	By Interest A/c	20,000
To Administration Overhead A/c	7,00,000	By Closing Stock A/c	
To Selling & Distribution Overhead A/c	9,60,000	– Finished Goods	3,20,000
To Bad Debts A/c	80,000	– WIP	2,40,000
To Preliminary Expenses Written Off A/c	40,000		
To Legal Charges A/c	10,000		
To Net Profit	12,90,000		
	1,26,80,000		**1,26,80,000**

Cost Sheet (Computation of Profit as per Cost Accounts)

Particulars	Amount (₹)
Material	56,00,000
Direct Wages	30,00,000
Prime Cost	**86,00,000**
Factory Overhead	17,20,000
Less: Closing WIP	2,40,000
Factory Cost	**1,00,80,000**
Administration Overhead (1,24,000 × 6)	7,44,000
Cost of Production	**1,08,24,000**
Less: Closing Stock of Finished Goods	3,49,161
Cost of Goods Sold	**1,04,74,839**
Selling & Distribution Overhead (1,20,000 × 8)	9,60,000
Cost of Sales	**1,14,34,839**
Profit	5,65,161
Sales	**1,20,00,000**

Statement showing Reconciliation of Profit shown by Cost and Financial Accounts

	Amount (₹)	Amount (₹)
Profit as per Financial Accounts		12,90,000
Add: Over Valuation of Closing Stock as per Cost Accounts (3,49,161 – 3,20,000)	29,161	
Financial Expenses not considered in Cost Account		
i) Bad Debt	80,000	
ii) Preliminary Expenses Written off	40,000	
iii) Legal Charged	10,000	1,59,161
		14,49,161
Less: Over recovery of Material Cost (56,00,000 – 50,00,000)	6,00,000	
Over recovery of Factory Overhead (17,20,000 – 16,00,000)	1,20,000	
Over recovery of Administration Overhead (7,44,000 – 7,00,000)	44,000	
Financial Income not considered in Cost Account		
i) Dividend	1,00,000	
ii) Interest	20,000	8,84,000
Profit as per Cost Accounts		5,65,161

Illustration 11

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	29,150.00	By Sales A/c	75,000.00
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	13,650.00	By Gross Profit b/d	20,527.50
To Net Profit	6,877.50		
	20,527.50		20,527.50

During the year, 1,550 Extinguishers were manufactured 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 foregoing information, you are required to prepare:

a) Factory Overhead Control Account

b) Administration Overhead 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:

Dr. Factory Overhead Control Account Cr.

Particulars	(₹)	Particulars	(₹)
To General Ledger Adjustment A/c	14,055.00	By Finished Goods Control A/c	
		(1,550 × 8.25)	12,787.50
		By WIP Control A/c	1,170.00
		By Under Recovery	97.50
	14,055.00		14,055.00

Dr. Administration Overhead Control Account Cr.

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 × 9.0625)	
	14,046.875		14,046.875

Memorandum Reconciliation Account

Particulars	(₹)	Particulars	(₹)
To Over Recovery of Administrative Overhead	396.875	By Profit as per Financial A/c	6,877.500
		By Under Recovery of Factory Overhead	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) Alternative (50 × 9.0625)	453.125
	7,428.125		7,428.125

Workings:

1.

Cost Sheet

Particulars	(₹)	(₹)
Materials		29,150.00
Wages		18,610.00
Prime Cost		47,760.00
Add: Factory Expenses	1,550 × 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 Overhead	1,550 × 9.0625	14,046.875
Cost of Production		70,234.375
Less: Closing Stock of Finished Goods		2,265.625
Cost of Goods Sold		67,968.75

Integrated Accounting System 4.3

In integral accounting or integrated cost accounting system, cost and financial records are kept in the same set of books. There is no separate set of books for costing and financial records. Thus there is no need for reconciliation of costing and financial results.

4.3.1 Features of Integrated Accounting System

The following are the features of the integrated accounting system:

a) Complete analysis of costs and sales are kept.

b) Complete details of all receipts and payments in cash are kept.

c) Since, only one set of books is kept for both Financial and Cost Accounts. It avoids duplicate recording of transactions.

d) General Ledger Adjustment Account or Cost Ledger Adjustment Account is not maintained. Complete details of all assets and liabilities are kept and this system does not use a notional account to represent all impersonal accounts.

e) Subsidiary ledgers are kept for Stores, Work in Progress and Finished Goods Account.

4.3.2 Advantages of Integrated Accounting System

The advantages of maintaning integrated accounting system are as follows:

a) As only one Profit and Loss Account is prepared under this system, the question of reconciling costing profit and financial profit does not arise.

b) Significant saving in the clerical efforts, as only one set of books is maintained.

c) Retrieving of information is easy and quick.

d) It is economical also as it is based in the concept of centralization of accounting function.

4.3.3 Essential Pre-requisites for integrated accounts

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

a) The management decision about the extent of integration of the two sets of books. Some concerns find it useful to integrate upto the stage of primary cost or factory cost, while others prefer full integration of the entire accounting records.

b) A suitable coding system must be made available so as to serve the accounting purposes of financial and cost accounts.

c) An agreed routine, with regard to the treatment of provision for accruals, prepaid expenses, other adjustment necessary for preparation of interim accounts.

d) Perfect co-ordination should exist between the staff responsible for the financial and cost aspects of the accounts and an efficient processing of accounting documents should be ensured.

In the following table a comparative analysis of the journal entries in financial accounts, cost accounts and integral accounts are presented.

Sl. No.	Transactions	Financial Accounts	Cost Accounts	Integrat 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 Dr To Creditors A/c
2.	Cash purchase of Material	Purchases 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	Material 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 Materials Control A/c
8.	Issue of indirect materials to production shope	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 direct 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

Sl. No.	Transactions	Financial Accounts	Cost Accounts	Integrat Accounts
14.	Payment of Wages	Wages A/c Dr To Cash / Bank A/c	Wages Control A/c Dr To G L Adjustment A/c	Factory OH 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 Overhead	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

Sl. No.	Transactions	Financial Accounts	Cost Accounts	Integrat Accounts
25.	Under absorption	No Entry	Costing Profit and Loss A/c Dr To Overhead Adjustment A/c	Profit and Loss A/c Dr To Overhead Adjustment A/c
26.	Over absorption of Overheads	No Entry	Overhead Adjustment A/c Dr To Costing Profit and Loss A/c	Overhead Adjustment A/c Dr To Profit and Loss A/c

G L Adjustment - Work in Progress Control

WIP Control - Factory Overheads Control

Admin OH Control - Administration Overhead Control

S & D OH Control - Selling and Distribution Overhead Control

Costing P & L - Costing Profit and Loss

Illustration 12

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 overhead 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

Particulars			Dr. Amount (₹)	Cr. Amount (₹)
Factory Overhead Control A/c	(24,000 x 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 Overhead Control A/c		Dr	19,000	
To Cash				19,000
Work in Progress Control A/c		Dr	18,000	
To Factory Overhead Control A/c				18,000
Selling and Distribution Overhead Control A/c		Dr	4,000	
To Cash A/c				4,000
Cost of Sales A/c		Dr	4,000	
To Selling and Distribution Overhead 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 13

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 overhead:	
- Factory (Over)	20,000
- Administration (Under)	10,000

Solution:

Journal

Particulars		Dr. Amount (₹)	Cr. Amount (₹)
Work in Progress Control A/c	Dr	5,50,000	
Factory Overhead 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 Overhead 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 Overhead Control A/c			1,50,000
Finished Goods Control A/c	Dr	50,000	
To Administrative Overhead Control A/c			50,000
Cost of Sales A/c	Dr	30,000	
To Selling and Distribution Overhead Control A/c			30,000
Factory Overhead 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 Overhead Control A/c			10,000

Illustration 14

M/s. Essbee Ltd maintains Integrated Accounts of Cost and Financial Accounts. From the following details preapre 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	Amount (₹)
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

Particulars	Amount (₹)
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:

Dr. **Share Capital Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Balance c/d	3,00,000	By Balance b/d	3,00,000
	3,00,000		3,00,000

Dr. **Reserve Account** **Cr.**

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

Dr. **Sundry Creditors Account** **Cr.**

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

Dr. **Plant and Machinery Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Balance b/d	5,75,000	By Balance c/d	5,75,000
	5,75,000		5,75,000

Dr. **Sundry Debtors Account** **Cr.**

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

Dr. **Material Control Account** **Cr.**

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

Dr. **Cash and Bank Account** **Cr.**

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 Overhead 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

Dr. **Work in Progress Control Account** **Cr.**

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

Dr. **Wages Control Account** **Cr.**

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

Dr. **Manufacturing Overhead Control Account** **Cr.**

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

Dr. **Selling and Distribution Overhead Control Account** **Cr.**

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

Dr. **Finished Goods Control Account** **Cr.**

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

Dr. **Profit and Loss Account** **Cr.**

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

Dr. **Cost of Sales Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To S & D Overhead 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 15

The following balances are shown in the Cost Ledger of Vinak Ltd as on 1st October, 2021:

Particulars	Dr. (₹)	Cr. (₹)
Work-in-Progress	7,056	
Factory Overheads Control Account	360	
Finished Stock Account	5,274	
Stores Ledger Control Account	9,450	
Administration Overheads Control Account	180	
General Ledger Adjustment Account		22,320

Transactions for the year ended 30th September, 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 30.9.2022	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:

Dr. **Work in Progress Control Account** **Cr.**

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		
To General Ledger Adjustment A/c	1,135	– Factory OH	3,080	
To Wages Control A/c	55,080	– Others	17,471	20,551
To Factory Overhead Control A/c	16,830			
To Factory Overhead Control A/c	3,080			
	1,28,551			1,28,551

Dr. **Factory Overhead Control Account** **Cr.**

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

Dr. **Finished Goods Control Account** **Cr.**

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 Control A/c	4,580		
	1,17,854		1,17,854

Dr. **Material Control Account** **Cr.**

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 Overhead Control A/c	2,000
		By Costing Profit and Loss A/c	150
		By Balance c/d	12,830
	61,850		61,850

Dr. **Administration Overhead Control Account** **Cr.**

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

Dr. **General Ledger Adjustment Account** **Cr.**

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 Overhead Control A/c	15,600
		By Costing Profit and Loss A/c	9,570
	1,70,025		1,70,025

Dr. **Wages Control Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To General Ledger Adjustment A/c	57,600	By Work in Progress Control A/c	55,080
		By Factory Overhead Control A/c	2,520
	57,600		57,600

Dr. **Costing Profit and Loss A/c** **Cr.**

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

Dr. **Selling and Distribution Overhead Control A/c** **Cr.**

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

Dr. **Capital Work in Progress Account** **Cr.**

Particulars	(₹)	Particulars	(₹)
To Material Control A/c	1,500	By Balance c/d	1,500
	1,500		1,500

Dr. **Cost of Sales Account** **Cr.**

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 Overhead Control A/c	570	
Finished Goods Control A/c	14,274	
Material Control A/c	12,830	
Administrative Overhead Control A/c	1,000	
General Ledger Adjustment A/c		51,225
Capital Work in Progress A/c	1,500	
Selling and Distribution Overhead 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 overhead?
   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 overhead
   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 overhead 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 overhead
    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. Overhead adjustment account
    D. None of the above

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**		

⊙ 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 Overhead**	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**		

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

Costing is the technique and process of ascertaining costs. In order to do the same, it is necessary to follow a particular method of ascertaining cost. A costing method is designed to suit the way goods are processed or manufactured or the way services are provided. Each organisation's costing method will therefore have unique features but costing methods of firms in the same line of business will more than likely have common aspects. Broadly, the costing methods are classified in the following:

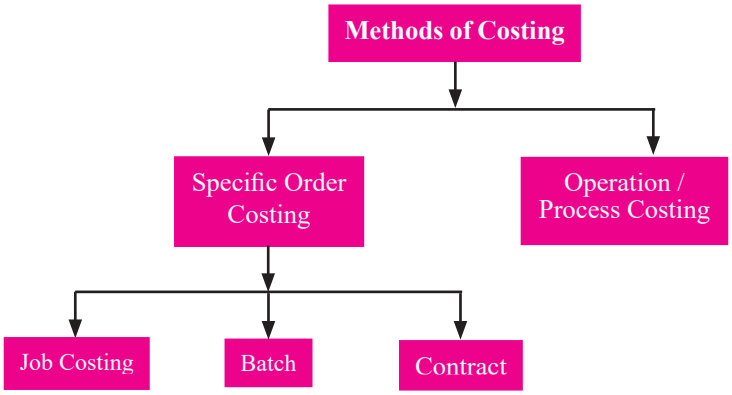


Figure 5.1: Methods of Costing

Specific Order Costing: Specific order costing is the category of basic costing methods applicable where the work consists of separate jobs, batches or contracts each of which is authorised by a specific order or contract. It includes job costing, batch costing and contract costing.

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 overhead 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 overhead rates in job costing necessitates the application of a system of budgetary control of overhead with all its advantages.

(e) The actual overhead costs are compared with the overhead applied at predetermined rates; thus, at the end of an accounting period, overhead 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.

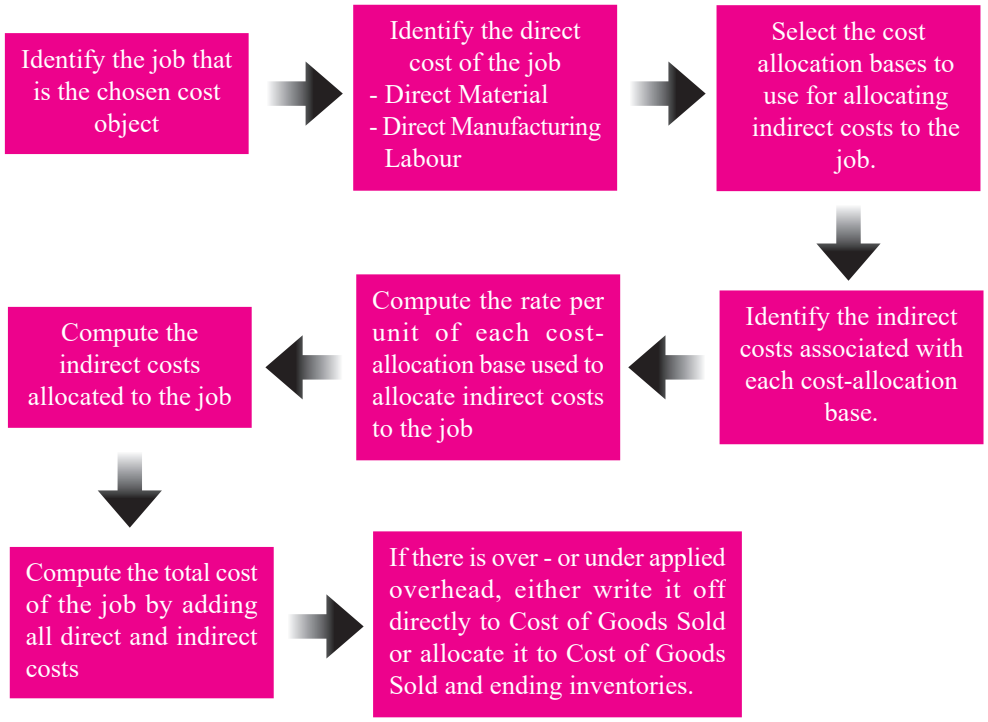


Figure 5.2: Steps in Preparation of Job Cost Sheet

- **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.

$$\textbf{Budgeted manufacturing overhead rate} = \frac{\text{Budgeted manufacturing overhead costs}}{\text{Budgeted total quantity of cost - allocation base}}$$

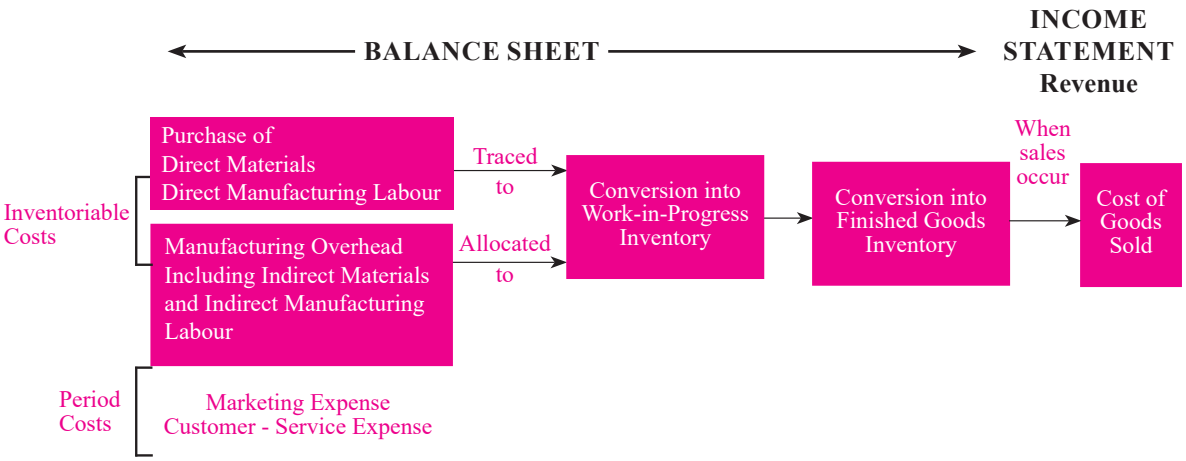


Figure 5.3: Cost Allocations in Preparation of Job Cost Sheet

- **Work-in-progress:** On the completion of a job, the total cost is worked out by adding the overhead 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 overhead 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**				**Overhead**			
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 Overhead				
Works Cost				
Administration Overhead				
Cost of Production				
Selling and Distribution Overhead				
Cost of Sales				

*MR No. – Material Requisition

Accounting of Costs for a Job:

Entries in Control Accounts

1. **For purchase of materials**

   Stores Ledger Control A/c Dr

   To Cost Ledger Control A/c

2. **For the value of direct materials issued to job**

   Work-in-Progress Control A/c Dr

   To Stores Ledger Control A/c

3. For return of direct materials from jobs

Stores Ledger Control A/c Dr
To Work-in-Progress Control A/c

4. For return of materials to suppliers

Cost Ledger Control A/c Dr
To Stores Ledger Control A/c

5. For indirect materials

Factory Overhead Control A/c Dr
To Stores Ledger Control A/c

6. For wages paid

Wages Control A/c Dr
To Cost Ledger Control A/c

7. For direct wages incurred on jobs

Work-in-Progress Control A/c Dr
To Wages Control A/c

8. For indirect wages

Factory Overhead Control A/c Dr
To Wages Control A/c

9. For indirect expenses paid

Factory Overhead Control A/c Dr
To Cost Ledger Control A/c

10. For charging overhead to jobs

Work-in-Progress Control A/c Dr
To Factory Overhead Control A/c

11. For the total cost of job completed

(i) Finished Goods Ledger Control A/c Dr
To Work-in-Progress Control A/c

(ii) Cost of Sales A/c Dr
To Finished Goods Ledger Control A/c

12. The balance of Cost of Sales A/c is transferred to Costing Profit and Loss A/c

Costing Profit and Loss A/c Dr
To Cost of Sales A/c

13. For the sales value of job completed

Cost Ledger Control A/c Dr
To Costing Profit and Loss A/c

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 overhead 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 Overhead Recovery Rates based on Labour Hours

Direct Wages ₹ 5.50

Labour Hours $\frac{₹\ 5.50}{₹0.25 \text{ per hour}}$ = 22 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 Overhead Rate per Labour Hour	$\frac{₹2,500}{20,000}$	₹ 0.125	$\frac{₹4,000}{24,000}$	₹ 0.167	$\frac{₹1,000}{16,000}$	₹ 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 Overhead (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 = $(\frac{₹30,000}{₹1,00,0000}) \times 100 = 30\%$

(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	

Particulars	Workings	Amount (₹)
- Department B	4 hours × ₹ 0.25 = ₹ 1.00	
- Department C	8 hours × ₹ 0.25 = ₹ 2.00	5.50
Prime Cost		17.58
Factory Overhead		
- 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
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 overhead 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 overhead 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 Overhead		
- 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 Overhead	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 overhead ₹ 5,25,000; Administration overhead ₹ 4,20,000; Factory overhead ₹ 4,50,000 and Profit ₹ 6,09,000.

(a) Prepare a Cost Sheet showing all the details.

(b) For 2021-22, 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 overhead has gone up by 15%? The factory recovers factory overhead 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 Overhead	4,50,000
Works Cost	21,00,000
Add: Administration Overhead	4,20,000
Cost of Production / Cost of Goods Sold	25,20,000
Add: Selling & Distribution Overhead	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 Overhead	60% × 7,50,000	4,50,000
Works Cost		24,00,000
Add: Administration Overhead	20% × 24,00,000	4,80,000
Cost of Production / Cost of Goods Sold		28,80,000
Add: Selling & Distribution Overhead	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 Overhead on Direct Wages = $\frac{₹\ 4,50,000}{₹\ 7,50,000} \times 100 = 60\%$

(iii) Percentage of Administration Overhead on Works Cost = $\frac{₹\ 4,20,000}{₹\ 21,00,000} \times 100 = 20\%$

(iv) Percentage of Selling and Distribution Overhead to Works Cost = $\frac{₹\ 5,25,000}{₹\ 21,00,000} \times 100 = 25\%$

$\therefore$ Revised Percentage of Selling and Distribution Overhead 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 detect, after a careful analysis of the limited available information, the fundamental fallacy of the company's method assuming that the 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 overhead 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

Particulars	(₹)
Department X – 8 hours	
Department Y – 6 hours	
Department Z – 4 hours	
Chargeable expenses (special stores items)	5
Prime Cost	120
Add: 33 1/3 % 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 Overhead 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 Overhead 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 Overhead	₹ 5,000	₹ 9,000	₹ 2,000
iv. Overhead 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: Overhead		
- 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 Overhead (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 overhead 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
Overhead	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 Overhead @ 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.

Overhead 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 that form of specific order costing under which each batch is treated as a cost unit and costs are accumulated and ascertained separately for each batch. Each batch consists of a number of like units.

> 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.

5.2.1 Economic Batch Quantity (EBQ)

Economic Batch Quantity refers to the optimum quantity batch which should be produced at a point of time so that the set up and processing costs and carrying costs are together optimized.

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 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:

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 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 × 10) = 100 Minutes or, $\frac{100}{60}$ hours	(100 × 10) = 1,000 Minutes or, $\frac{1,000}{60}$ hours	(1000 × 10) = 10,000 Minutes or, $\frac{10,000}{60}$ hours
1. Machine Operators Wage @ ₹ 0.72 per hour	$\frac{100}{60}$ × 0.72 = ₹ 1.20	$\frac{1,000}{60}$ × 0.72 = ₹ 12	$\frac{10,000}{60}$ × 0.72 = ₹ 120
2. Overheads @ ₹ 1.50 per hour	$\frac{100}{60}$ × 1.50 = ₹ 2.50	$\frac{1,000}{60}$ × 1.50 = ₹ 25	$\frac{10,000}{60}$ × 1.50 = ₹ 250

Setting up Cost:

3. Machine Operators Wages = 2 hours 20 minutes × ₹ 0.72 = $2\frac{1}{3}$ × 0.72 = ₹ 1.68

4. Overhead = 2 hours 20 minutes × ₹ 1.50 = $2\frac{1}{3}$ × 1.50 = ₹ 3.50

Contract Costing

5.3

Contract Costing is a method used in construction industry to find out the cost and profit of a particular construction assignment. The principles of job costing are also applicable in contract costing. In fact, Contract Costing can be termed as an extension of Job Costing as each contract is nothing but a job completed. Contract Costing is used by concerns like construction firms, civil engineering contractors, and engineering firms. One of the important features of contract costing is that most of the expenses can be traced to a particular contract. Those expenses that cannot be traced to a particular contract are apportioned to the contract on some suitable basis.

> Contract Costing is a 'form of specific order costing where costs are attributed to contracts'.
>
> **CIMA Official Terminology**

Essential features of contract costing

- A formal contract is made between customer and supplier.
- Work is undertaken to customers' special requirements.
- The work is for a relatively long duration.
- The work is frequently constructional in nature.
- The method of costing is similar to job costing.
- The work is frequently based on site.
- It is not unusual for a site to have its own cashier and time-keeper.

5.3.1 Types of Contracts

(1) Cost-Plus Contracts: Cost-plus contract is a contract where the value of the contract is determined by adding an agreed percentage of profit to the total cost. These types of contracts are entered into when it is not possible to estimate the contract cost with reasonable accuracy due to unstable condition of factors that affect the cost of material, employees, etc. This type of contract is generally adopted when the probable cost of contract cannot be ascertained in advance with reasonable accuracy. In this type of contract, the contractor receives his total cost plus a profit, which may be a percentage of cost. These types of contracts give protection to the contractor against fluctuations in profits as he is guaranteed about his profit irrespective of the actual costs. However, in order to avoid any dispute in future, it is always advisable to specify the admissible costs in advance. Similarly, the customer may also reserve the right of demanding 'cost audit' in order to check the reliability of the claim of the contractor regarding increase in the costs.

(2) Target-price contracts: In such cases, the contractor receives an agreed sum of profit over his pre-determined costs. In addition, a figure is agreed as the target figure and if actual costs are below this target, the contractor is eligible for bonus for the savings.

5.3.2 Accounting of Cost for 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 overhead 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 Some Important Terminologies

1. **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. Payment is made on the basis of work certified.

2. **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. There is no role of work uncertified in payment.

Examle

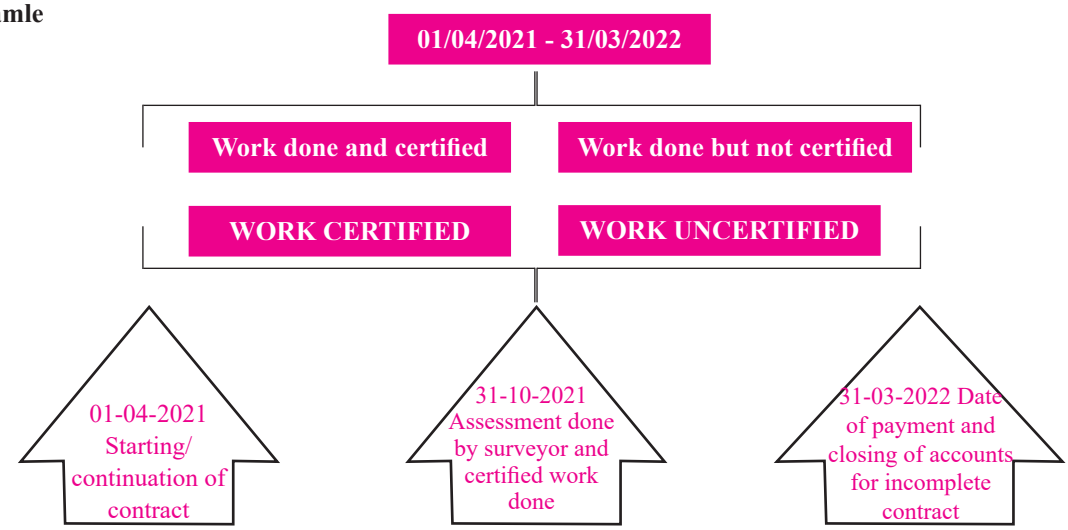


Figure 5.4 : Works Certified and Work Uncertified

3. **Work-in-Progress:** It 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 (reserve for contingencies).

   [amount received from the contractee is subtracted from the WIP in the Balance Sheet]

   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.

4. **Retention Money:** In a contract, a contractee generally keeps some amount payable to contractor with himself

as security deposit. To ensure that the work carried out by the contractor is as per the plan and specifications, it is monitored periodically by the contractee. To have a cushion against any defect or undesirable work, the contractee upholds some money payable to the contractor. This security money upheld 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.

Value of Work Certified	×××
Add Cost of Work not yet Certified	×××
	×××××
Less Total cost of contract to date	×××
Notional Profit	×××

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 is near].

7. **Escalation Clause:** In order to protect the contractor from the rise in the price, an escalation clause may be inserted in the contract. Escalation clause in a contract empowers a contractor to revise the price of the contract in case of increase in the prices of inputs due to some macro-economic or other agreed reasons.As per this clause, the contract price is increased proportionately if there is a rise in input costs like material, labour or overheads. The condition that may be laid down is that the contractor will have to produce a proof regarding the rise in the price

5.3.4 Profit on Incomplete Contract

The long duration of a contract usually means that an estimate must be made of the profit earned on each incomplete contract at the end of an accounting period. This avoids excessive fluctuations in reported profits. A more difficult problem emerges when a contract is incomplete at the end of an accounting period. The contractor may have spent considerable sums of money on the work, and received substantial progress payments (payments received by the contractee with the progress of the contract), and even if the work is not finished, the contractor will want to claim some profit on the work done so far.

There are several different ways of calculating contract profits, but the overriding consideration must be the application of the prudence concept. If a loss is expected on a contract, the total expected loss should be taken into account as soon as it is recognised, even if the contract is not complete. While estimating the size of the profit on an incomplete contract the guidelines in the following paragraphs should be noted.

- **If the contract is in its early stages:** No profit should be credited to Profit and Loss Account. Profit should only be taken when the outcome of the contract can be assessed with reasonable accuracy. As a general rule, no profit should be recognised unless a contract is at least 25% complete.
- **If the contract is reasonably advanced:** In this case the portion of notional profit to be transferred to Profit & Loss Account 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 (Cash received/Work Certified).

1. If the degree of completion of work is above 25% but less than 50% of total work, $\frac{1}{3}$ × Notional Profit × $\frac{\text{Cash Received}}{\text{Work Certified}}$ will be transferred to Profit & Loss Account and the remaining amount would be kept as reserve.

2. If the degree of completion of work is more than or equal to 50% of the total work but less than 90%, $\frac{2}{3} \times$ Notional Profit $\times \frac{\text{Cash Received}}{\text{Work Certified}}$ will be transferred to Profit & Loss Account and the remaining amount would be kept as reserve.

⊙ **If the contract is almost complete (Degree of composition is 90% or more)**

In this case, the portion of the profit to be transferred to Profit & Loss Account is calculated by using the estimated total profit which is ascertained by subtracting the total cost to date and the additional cost to complete the contract from the contract price. The different formulas for such computations of profit are as follows:

1. Estimated Profit $\times \frac{\text{Work Certified}}{\text{Contract Price}}$ or,
2. Estimated Profit $\times \frac{\text{Work Certified}}{\text{Contract Price}} \times \frac{\text{Cash Received}}{\text{Work Certified}}$ or,
3. Estimated Profit $\times \frac{\text{Total Cost to date}}{\text{Estimated Total Cost}}$ or,
4. Estimated Profit $\times \frac{\text{Total Cost to date}}{\text{Estimated Total Cost}} \times \frac{\text{Cash Received}}{\text{Work Certified}}$

⊙ When an incomplete contract reveals a loss, the whole amount of the loss must be charged to the profit and loss account of the accounting year.

Following is a pictorial representation of the above principles.

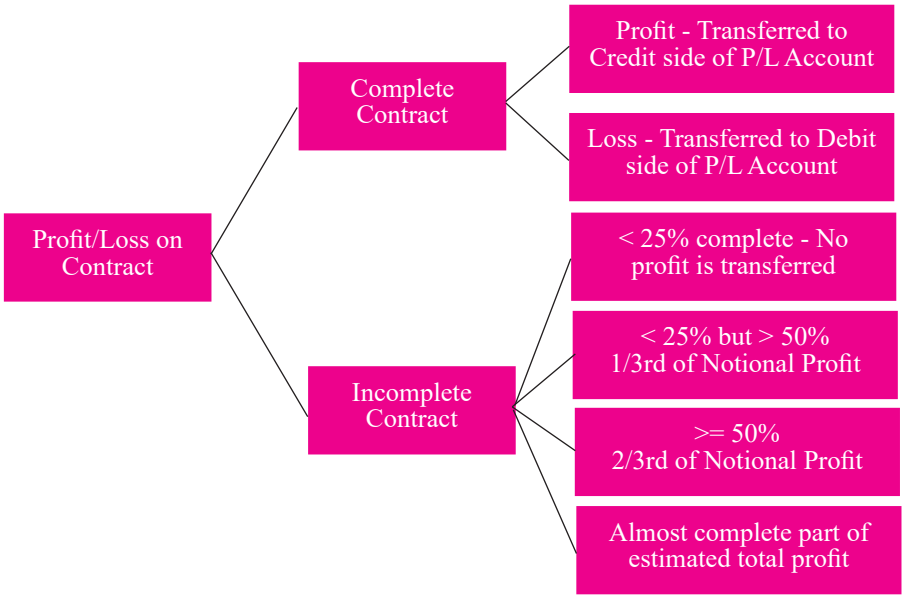


Figure 5.5: Principles of Incomplete Contracts

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**

Particulars	(₹)	Particulars	(₹)
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 × $\frac{3}{2}$ = ₹ 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 = $\frac{2}{3}$ × 66,905 × 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 Ledger 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

	Year I	Year II	Year III
	Amount (₹)	Amount (₹)	Amount (₹)
Indirect expenses	750	1,000	-
Wages	42,500	57,500	42,500
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 Work in Progress A/c	
To Notional Profit c/d (Bal. fig)	41,250	- Value of Work Certified	3,75,000
	3,75,000		**3,75,000**
To Profit & Loss A/c	41,250	By Notional Profit b/d	41,250
	41,250		**41,250**

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	400

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	50,625	By Notional Profit b/d	90,000
To Work in Progress c/d			
- Provision for Contingencies (Bal. fig.)	39,375		
	90,000		**90,000**

Working Notes:

1. Depreciation on Plant = $2,00,000 \times \frac{10}{100} \times \frac{9}{12} + 50,000 \times \frac{10}{100} \times \frac{3}{12} = 15,000 + 1,250 = ₹\ 20,000$
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 = $\frac{9}{12} \times 90,000 \times 75\% = ₹\ 50,625$

Dr. Profit & Loss Account Cr

Particulars	(₹)	Particulars	(₹)
To Contract A/c	6,000	By Contract A/c	50,625
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	37,625		
	50,625		**50,625**

Balance Sheet as on 31.12.2022

Liabilities	(₹)	Assets	(₹)	(₹)
Capital	5,00,000	Work in Progress		
Profit & Loss A/c	37,,625	- 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	39,375	
			4,55,625	
		Less: Cash Received	3,00,000	1,55,625
		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
	6,09,625			**6,09,625**

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 $\times \frac{\text{Total Cost to date}}{\text{Total Cost}} \times \frac{\text{Cash Received}}{\text{Work Certified}} = 3,20,000 \times \frac{14,20,000}{36,80,000} \times 90\% = ₹\ 1,11,130$

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**

Particulars	(₹)	Particulars	(₹)
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 applied when output consists of a continuous stream of identical units. It is a costing method used where it is not possible to identify separate units of production, or jobs, usually because of the continuous nature of the production processes involved.

> 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 and it is common to identify it with continuous production such as the following:

- Oil refining
- The manufacture of soap
- Paint manufacture
- Food and drink manufacture

The features of process costing which make it different from other methods of costing such as job or batch costing are as follows:

- 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 of each individual unit of output because production in progress is an indistinguishable homogeneous mass.
- There is often a loss in process due to spoilage, wastage, evaporation and so on.
- The output of one process becomes the input to the next until the finished product is made in the final process.
- Output from production may be a single product, but there may also be a by-product (or by-products) and/or joint products (Later discussed in detail.)

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. The following are the various elements of 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.

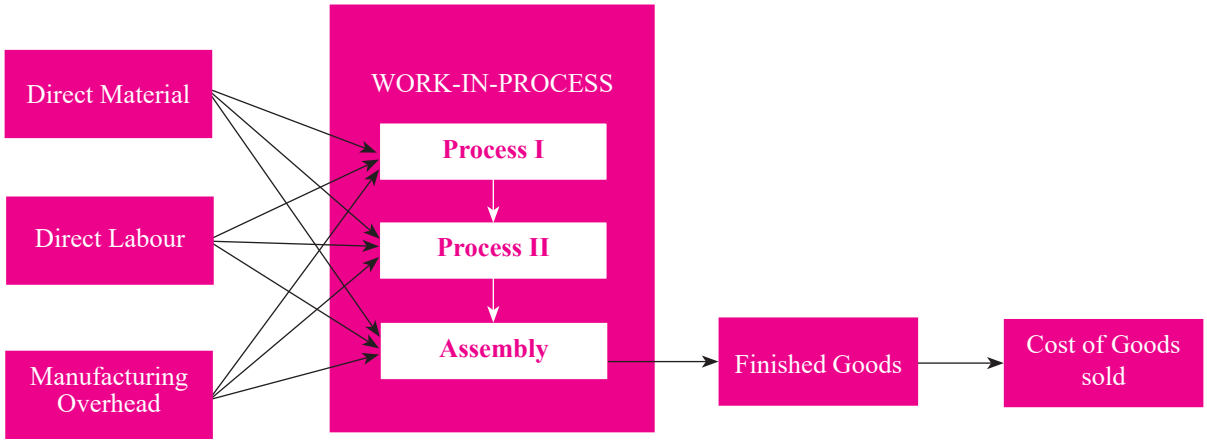


Figure 5.6: Preparation of Process Accounts

5.4.2 Important Aspects of Process Account:

While preparing process cost accounts, some important aspects are to be taken into consideration. These aspects are given below:

- **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 Process 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.

> Normal loss is 'expected loss, allowed for in the budget, and normally calculated as a percentage of the good output, from a process during a period of time. Normal losses are generally either valued at zero or at their disposal values.'
>
> **CIMA Official Terminology**

- **Abnormal Process 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:

  $$\text{Value of Abnormal Loss} = \frac{\text{Total Cost incurred in the process - Scrap value of Normal loss units}}{\text{Input units - Normal loss units}}$$

> 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:

  $$\text{Value of Abnormal Gain} = \frac{\text{Total Cost incurred in the process - Scrap value of Normal loss units}}{\text{Input units - Normal loss units}}$$

> 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	100	0
			By Output (finished goods a/c)	860	4,300
			By Abnormal loss	40	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

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.

Illustration 24

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	$16\frac{2}{3}$
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 ($\frac{100 \text{ kg}}{40 \text{ kg}}$).

Therefore, for variation of every rupee in the cost of raw material the final effect will be ₹2.50

Equivalent Production:

This represents the production of a process in terms of completed units. In other words, it means converting the incomplete production units into its equivalent of complete units. In each process an estimate is made of the percentage completion of any work-in-progress. A production schedule and a cost schedule will then be prepared. The work-in-progress is inspected and an estimate is made of the degree of completion, usually on a percentage basis. It is most important that this estimate is as accurate as possible because a mistake at this stage would affects the stock valuation used in the preparation of final accounts.

The formula for equivalent production is:

Equivalent Production = Actual no. of units in process of manufacture × Percentage of work completed

For example, if 20% work has been done on the average of 1,000 units still in process, then 1,000 such units will be equal to 200 completed units. The cost of work-in-progress will be equal to 200 completed units.

Calculation of Equivalent Production

The following steps are adopted to calculate statement of equivalent production:

(i) State the opening work-in-progress in equivalent completed units by applying the percentage of work needed to complete the unfinished work of the previous period. If the opening work-in-progress is 100 units is which 40% is completed, then the equivalent units of the current period will be 100 x 60% i.e., 60 units.

(ii) Add to (i), the number of units introduced and completed during the period. This can be found out by deducting the units in the closing work-in-progress from the number of units put into the process.

(iii) Add to the above, the equivalent completed units of closing work-in-progress. This can be found out by applying the percentage of work done on the finished units at the end of the period.

Illustration 25

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)

There are mainly three methods of calculating cost per unit, out of which FIFO method and Weighted Average Methods are frequently used in equivalent production.

First In First Out (FIFO)

In this method, the assumption is that the incomplete units from the opening stock are completed first and then the units introduced in the process are completed. The costs added in each process during the current period is prorated to the production necessary to complete the opening work-in-progress, to complete the units added in the process and units in the work-in-progress. The objective of the first in first out method is to value the inventory at the current costs and as such the main problem is to calculate the equivalent production under this method.

Average Method

Process costs are sometimes computed on the basis of average costs. Where degree of completion of opening work-in-progress is not given, average method is used. The average process cost is obtained by adding the cost of opening work-in-progress and the cost of units introduced in the process during the current period and dividing this total cost by total equivalent units obtained by adding the number of units completed and equivalent units of the closing work-in-progress of each element, material, labour and overheads. The main objective of average method is to even out the fluctuations in prices and hence is used when the prices fluctuate widely during a particular period.

Weighted Average Method

In a manufacturing unit where two or more products are manufactured and the products are quite dissimilar to each other, weighted average method is used. Under this method, weighted average is computed and used in valuation of the incomplete units.

Illustration 26

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 27

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	$(\frac{₹34,000}{855 \text{ units}} = ₹ 40)$			
	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	$(\frac{₹54,264}{714 \text{ units}} = ₹ 76)$	714	76	54,264
	840		**55,524**		**840**		**55,524**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
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 28

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 overhead 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	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	(₹25,075 / 9,500 units =₹ 2.64)			
To Overhead 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	(₹48,185 / 9,120 units =₹ 5.28)			
To Overhead 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.			
To Overhead A/c (160% × 6,500)			10,400	fig.)			
	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

$\therefore$ 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, $x = \frac{4,872}{7} = 696$

$\therefore$ Percentage of Normal Loss = $\frac{696}{9,120} \times 100 = 7.63\%$

Illustration 29

	Degree of completion	
Opening stock	1,600 units	Material 70% Labour 60% Overhead 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% Overhead 40%

Prepare a Statement of Equivalent Production.

Solution:

Statement of Equivalent Production.

Inputs		Output		Equivalent Production Units					
Items	Units	Items	Units	Material		Labour		Overhead	
				% 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 30

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 Overhead	1,125
	4,425

Solution:

(i) Statement of Equivalent Production

Inputs		Output		Equivalent Production Units					
Items	Units	Items	Units	Material		Labour		Overhead	
				% 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 Overhead	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 Overhead	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	By Finished Stock A/c	1,100	$\frac{4,760}{1,100}$ = 4.33	4,760
To Production Overhead A/c			1,125				
	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 Overhead	120	1	120
Units Introduced and Completed			
Material	900	1	900
Labour	900	2	1,800
Production Overhead	90	1	900
			4,760

Illustration 31

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%

Opening Stock		Degree of Completion
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 & Overhead	
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
Overhead (16,670 - 1,100)	15,570	10,380	1.50

Cost of Overhead	₹ 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
Overhead	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
Overhead	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 Overhead A/c			16,670				
	12,800		**69,080**		**12,800**		**69,080**

Illustration 32

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 Overhead – 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		Overhead	
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
Overhead	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 Overhead A/c			42,000	By Finished Stock A/c	9,500	$\frac{1,04,500}{9,500} = 1.10$	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
Overhead	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
Overhead	40	4.3232	172.928
			485.000

Illustration 33

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		Overhead	
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
Overhead	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
Overhead	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
Overhead	40	10	400
			2,800

Dr. **Process X Account** **Cr.**

Particulars	Units	Rate	Amount (₹)	Particulars	Units	Rate	Amount (₹)
To Material (Introduced) A/c	2,000	29	58,000	By Normal Loss A/c	100	10	1,000
To Material (Additional) A/c			14,400	By Closing Stock A/c	460	$\frac{20,700}{460} = 45$	20,700
To Direct Labour A/c			33,400	By Abnormal Loss A/c	40	$\frac{2,800}{40} = 70$	2,800
To Overhead A/c			16,700	By Finished Stock A/c	1,400	$\frac{98,000}{1,400} = 70$	98,000
	2,000		1,22,500		2,000		1,22,500

Illustration 34

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 35

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 Overhead - ₹ 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 Overhead – 60%
Closing Stock	2,000 units
Degree of completion	Direct Material – I 100%
	Direct Material - II 60%
	Direct Labour - 50%
	Production Overhead - 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		Overhead	
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
Overhead	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
Overhead	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
Overhead	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 Overhead 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 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:

- Are produced in the same process.
- Are indistinguishable from each other until the separation point.
- Have a substantial sales value (after further processing, if necessary).
- May require further processing after the separation point.

For example, in the oil refining industry the following joint products arise from the same process:

- Aviation fuel
- Diesel fuel
- Paraffin
- Petrol
- Lubricants

By-products:

A by-product is an incidental product from a process which has an insignificant value compared to the main product(s).

> 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.

Distinguishing joint products from by-products

The answer lies in management attitudes to their products, which in turn is reflected in the cost accounting system. The difference between joint product and by-product are as follows:

(a) A joint product is regarded as an important saleable item, and so it should be separately considered in costing. The profitability of each joint product should be assessed in the cost accounts.

(b) A by-product is not important as a saleable item, and whatever revenue it earns is a 'bonus' for the organisation. It is not worth costing by-products separately, because of their relative insignificance. It is therefore equally irrelevant to consider a by-product's profitability. The only question is how to account for the 'bonus' net revenue that a by-product earns.

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:

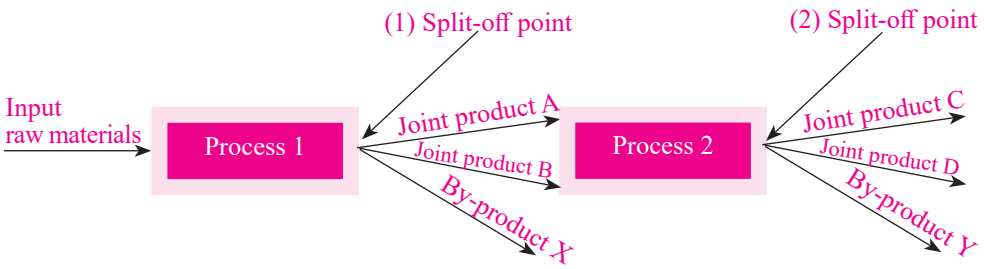


Figure 5.7: Accounting for Joint Products

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 36

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	$33\frac{1}{3}$% × 6,000 = 2,000	25% × 4,000 = 1,000	15% × 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 37

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
Overhead	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 38

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 overhead 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 Overhead 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
Overhead	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 39

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 Overhead 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	$\left(@\frac{₹\ 21,200}{150\ \text{quintals}} = ₹\ 141.33\right)$	
To Overhead 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	$\left(@\frac{₹\ 7,500}{50\ \text{quintals}} = ₹\ 150\right)$	
To Overhead A/c	1,000		
To Joint Expense A/c	1,200		
	7,500		7,500

Illustration 40

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 41

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 42

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 Overhead (150% on Labour)	1,65,000
Fixed Overhead	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 Overhead (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 43

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 44

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 45

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 (₹)	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

(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 × $\frac{25}{125}$	*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 × $\frac{100}{125}$ = ₹ 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

Particulars	Komal	Lovely	Makeup	Nice	Total
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 46

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' $= \frac{40}{100} \times 14{,}950 = ₹\ 5{,}980$

Illustration 47

"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	$\frac{100\ Qtls}{250\ Qtls} \times ₹12{,}000 = 4{,}800$	$\frac{150\ Qtls}{250\ Qtls} \times ₹12{,}000 = 7{,}200$	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	$\frac{8,000}{14,000}$ × 12,000 = 6,857	$\frac{6,000}{14,000}$ × 12,000 = 5,143	12,000
Profit	1,143	857	2,000

Operating Costing – Transport, Hotel and Healthcare

5.5

Cost Accounting although has been 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 on each 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?

Profit-seeking service organisations include accountancy firms, law firms, management consultants, transport companies, banks, insurance companies and hotels. Almost all not-for-profit organisations - hospitals, schools, libraries and so on – are also service organisations. Service organisations also include charities and the public sector.

Specific characteristics of services are as follows:

i. Services are intangible.

ii. The production and consumption of a service are simultaneous.

iii. Services are perishable (cannot be stored for later sale or use.

iv. Services are heterogeneous.

v. Services are inseparable– cannot be seperated from their providers.

vi. Quality of services are variable.

Service costing versus other costing methods

- With many services, the cost of direct materials consumed will be relatively small compared to the labour, direct expenses and overheads cost. In product costing, the direct materials are often a greater proportion of the total cost.
- Because of the difficulty of identifying costs with specific cost units in service costing, the indirect costs tend to represent a higher proportion of total cost compared with product costing.

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

- The output of most service organisations is often intangible and hence difficult to define. Therefore, it is difficult to establish a measurable cost unit.
- The service industry includes such a wide range of organisations which provide such different services and have such different cost structures that costing will vary considerably from one service to another.
- There is often a high fixed cost of maintaining an organisation's total capacity, which may be underutilised at certain times.

Nature of Operating Costing: Ascertainment of Cost Unit

The main objective of operating costing is to compute the cost of the services offered by the organisation. For doing this, it is necessary to decide the unit of cost in such cases. One main problem with service costing is the ability to define a realistic cost unit that represents a suitable measure of the service provided. The cost units vary from industry to industry. Generally, two different kinds of cost unit are ascertained under service costing: Simple Cost unit and Composite Cost unit.

Simple Cost Unit:

The cost unit, which uses only one single parameter for measurement of the service cost, is termed as a simple cost unit. For example, in goods transport industry, cost per ton kilometer is to be ascertained.

Composite Cost Unit:

If the service is a function of two activity variables, a composite cost unit may be more appropriate. Hotels, for example, may use the 'occupied bed-night' as an appropriate unit for cost ascertainment and control. Each organisation will need to ascertain the Composite Cost Unit most appropriate to its activities.

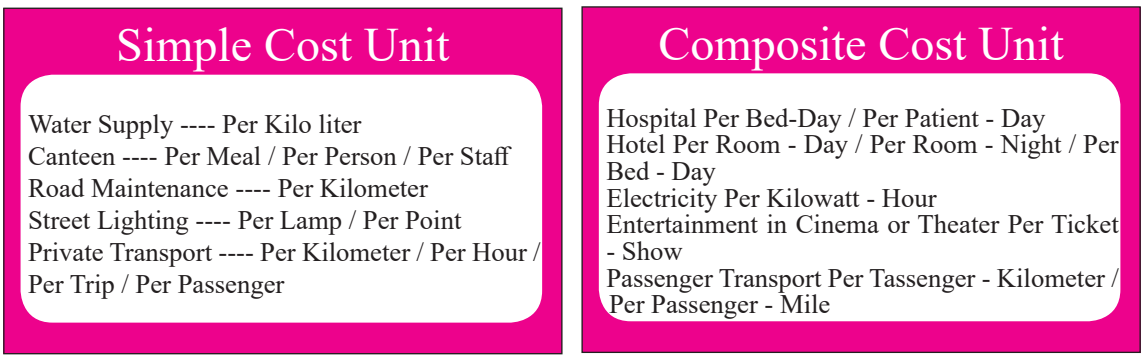


Figure 5.8: Simple and Composite Cost Unit

Composite unit may be computed in two ways. They are:

i. Absolute (Weighted Average) basis

ii. Commercial (Simple Average) basis

In both bases of computation of service cost unit, weightage is also given to qualitative factors rather than quantitative (which are directly related with variable cost elements) factors alone.

i. **Weighted Average or Absolute Basis–** It is summation of the products of qualitative and quantitative factors.

ii. **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:

$$\text{Average cost per unit of service} = \frac{\text{Total costs incurred in the period}}{\text{Number of service units supplied in the period}}$$

Illustration 48

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

The next step is to collect and identify various costs under different heads. Such as:

i. Fixed or standing charges

ii. Semi-fixed or maintenance charges

iii. Variable or running charges.

One of the important features of operating costing is that mostly such costs are fixed in nature. For example, in case of passenger transport organisation, most of the costs are fixed while few costs like diesel and oil are variable and dependent on the kilometers run

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 49

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 50

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

Particulars	Amounts ₹
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 51

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	
Other services to patients (variable)	3,00,000	

Particulars	(₹)	(₹)
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 52

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 53

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 54

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 55

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 56

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

Particulars	Workings	₹ (Cost per month)
General Supervision Charges	$\frac{₹\ 4,800}{12}$	400
Maintenance Charges		
Repairs and Maintenance		500
Running Charges		
Depreciation	$\frac{₹90,000}{10\ years} \times \frac{1}{12}$	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 57

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 58

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 59

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

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**								

⊙ 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

⊙ 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.

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

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

Traditional costing evolved in the early 1900s. In 1901, the British Federation of Master Printers set out to find a solution to the problem of setting prices on the basis of the cost of the product. Twelve years later, in 1913, they issued 'The Printer's Cost Finding System', which was basically the absorption costing system that revolutionised the cost accounting scenario. The traditional system of cost accounting also known as the absorption costing is the most widely and the accepted methodology which records the cost accumulation process and is most significant in product pricing, but it is important to note that since it was designed for production companies, it dealt with production costs only and, as a consequence, it is less suitable for service or retail organisations.

It is important to note that traditional costing or absorption costing is used exclusively for pricing and external reporting purpose. It is not designed to make decisions of a short-term nature, and is therefore never be used for this purpose.

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.

CIMA Official Terminology[1] defines absorption costing or traditional costing as 'a costing system which assigns direct costs and all or part of overhead to cost units using one or more overhead 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.

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.

1 CIMA Official Terminology, 2005 Edition, The Chartered Institute of Management Accountants. (https://www.e-bookdownload.net/search/cima-official-terminology

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.

6.1.1 Concept of Marginal Cost and Marginal Costing

Definitions

Marginal cost

Fully absorbed product costs include fixed overhead, 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 to absorption costing. In marginal costing, 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, the 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,

2 Certificate Paper C1 (Study text: Fundamentals of Management Accounting) Published by BPP Learning Media Ltd [ISBN 9780 7517 8068 0]

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 and marginal or variable cost.

CIMA Official Terminology[2] 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 overhead 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 overhead	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 overhead 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 is not a method of costing but it is a technique of costing distinct from the traditional costing absorption costing. The distinguishing features of marginal costing are as follows:

1. In marginal costing, costs are segregated into fixed and variable. Only variable costs are charged to the production, i.e. included in the cost of production. Fixed costs are not included in the cost of production, which means that they are not absorbed in the production. However, this does not mean that they are ignored or not taken into consideration. These costs are considered while computing the final profit or loss by debiting them to the Costing Profit and Loss Account. This primarily counters the problem of under and over absorption of overheads also.

2. The second important feature of marginal costing is that the valuation of inventory is done at only variable cost. This implies that only variable costs are taken into consideration while valuing the inventory. Fixed costs are eliminated from the inventory valuation because they are period costs and relate to a particular period. If they are included in the inventory valuation, they will be carried forward to the next period because the closing inventory for a particular year is the opening inventory for the next year. Thus, charging current year's costs to the next year will be against the basic principle of the fixed element of the cost. It is also pertinent to note that as discussed in the previous point fixed costs are not included in the cost of production, and so including them in the inventory valuation is not justifiable.
3. There is significant difference in preparation of the Income statement under Marginal costing. The income statement (under marginal costing) is shown as under:

Income Statement

XYX Ltd

Particulars	Amount (₹)	Amount (₹)
Sales		
Less: Variable Cost		
Contribution		
Less: Fixed costs		
Profit		

If the company is producing more than one product, the contribution from each product is combined as a pool from which the total fixed cost is deducted. Fixed cost is not charged to each product unless it is identifiable with a product.

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.

Absorption Costing	Marginal Costing
1. Costs are classified as direct and indirect, direct costs are identifiable with a particular product and hence charged directly. Indirect costs i.e. overheads are first identified, apportioned to the cost centers and finally absorbed in the product units on some suitable basis.	1. Costs and classified as fixed and variable. While direct costs are mostly variable, indirect costs, i.e. overheads may be semi variable. The variable portion in the total overhead cost is identified and thus, the total variable costs are computed. Only variable costs are charged to the product while the fixed costs are not absorbed in the product units. They are finally debited to the Costing Profit and Loss Account for computing the final figure of profit or loss. Thus, the cost of production under marginal costing is only the variable portion of the total costs.

Absorption Costing	Marginal Costing
2. The year-end inventory of finished goods under absorption costing is valued at total cost, i.e. fixed and variable.	2. The year-end inventory is valued at variable cost only. Fixed costs are not taken into consideration while valuing inventory, as they are not absorbed in the product units.
3. The fixed overhead absorption may create some problems like over/under absorption. This happens because of the overhead absorption rate which is pre determined. Suitable corrective entries are to be made to rectify the over/under absorption of overheads; otherwise the cost of production with be distorted.	3. The fixed overheads are charged directly to the Costing Profit and Loss Account and not absorbed in the product units. Therefore there is no question of under/over absorption of overheads.
4. Due to the inventory valuation, which is done at the full cost, the costs relating to the current period are carribe forward to the subsequent period. This will distort the cost of production.	4. Fixed costs are not taken into consideration while valuing the inventory and hence there is no distortion of profits.
5. The total cost of production is charged to the product without distinguishing between the fixed and variable components. The selling price is thus fixed on the basis of total costs.	5. Only variable costs are charged to the cost of production and therefore the selling price is also based on only variable costs. This will result in fixation of selling price below the total costs. There is a possibility of starting a price war in such situations, which will be harmful to all the companies in the industry.

The impact on the profit under the two cost accounting systems is 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 overhead 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 overhead		-----
• Fixed manufacturing overhead		-----
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 overhead		-----
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 overhead	-----
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 overhead	-----
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.

Similarities

1. Both differential costs and marginal costs are techniques of cost analysis and cost presentation.
2. Management decisions and policies are evaluated on the basis of differential costs and marginal costs technique.
3. When there is no change in fixed cost on account of change in the level of activity then differential costs and marginal costs remains the same.

Differences

1. Fixed costs are not added to get the marginal cost of a product whereas differential cost analysis takes into consideration changes in fixed costs due to change in the level of activity.
2. Differential costs are not incorporated in the accounting records. It is used in evaluation of management decisions separately. Marginal costs may be incorporated in the accounting records.
3. Marginal costs are calculated on the basis of contribution approach whereas differential costs may be ascertained on the basis of both absorption costing as well as marginal costing.
4. In marginal costing, contribution margin, contribution per unit of limiting factor and profit volume ratio are the main tools for evaluating management decisions whereas in differential cost analysis, incremental revenue is compared with the incremental cost to evaluate alternative course of actions.

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. Surely the term CVP analysis is much broader in context and uses the similar technique as embedded in 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:

$$\text{Breakeven point in units} = \frac{\text{Fixed costs}}{\text{Contribution per unit}}$$

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

3 For the student, in solving a analytical question, the first step is to attempt to calculate the contribution per unit.

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 put it in perspective. To quote a margin of safety of 700 units without relating it to the projected sales figure is not giving the full 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 one route to a profit calculation. We have seen that the contribution goes towards fixed costs and profit. Once breakeven point is reached the fixed costs have been covered. After the break-even point there are no more fixed costs to be covered and all of the contribution goes towards making profits grow.

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.

For example, 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 more quickly 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.

4 This can also be calculated on per unit basis. This is also referred as the contribution margin.

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,

$$\text{P/V Ratio (C/S ratio)} = \frac{\text{Total Contribution}}{\text{Total Sales}} \times 100$$

$$= \frac{20,000}{50,000} \times 100 = 40\%$$

$$\therefore \text{The Breakeven point (₹)} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}}$$

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%

5 It is assumed that fixed cost remains fixed over the two periods.
6 Expressed as a fraction.

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

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

7 Selling price per unit – variable cost per unit = contribution per unit. This is elaborately discussed a previous section.

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,

$$\Rightarrow q = \frac{FC}{(p-u) - \%(p)}$$

$$\Rightarrow q = \frac{15000}{(25-10)-(20\% \times 25)}$$

$$q = \frac{15000}{(15-5)} = 1500 \text{ units}$$

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,

$25 \times q = 10 \times q + 15000$

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.

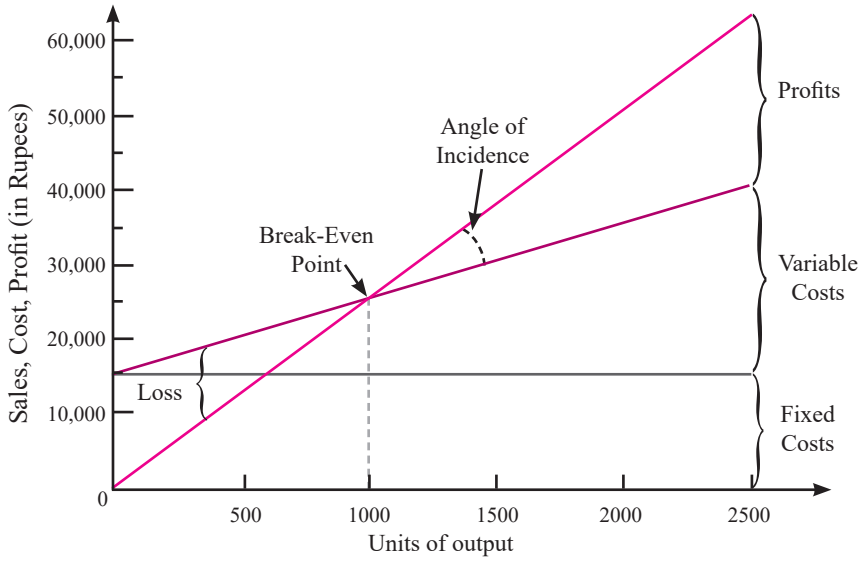


Figure 6.1: Break Even Chart

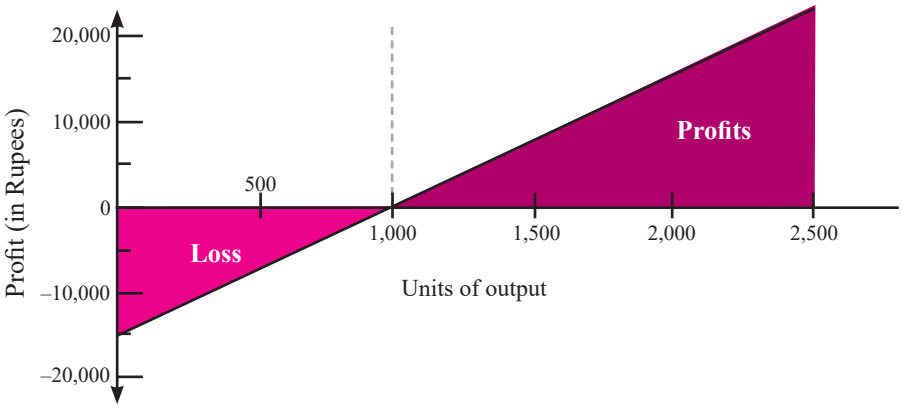


Figure 6.2 Profit-Volume Chart

The change in profit can be studied through Break even charts in different situations as mentioned below:

1. Increase in No. of Units

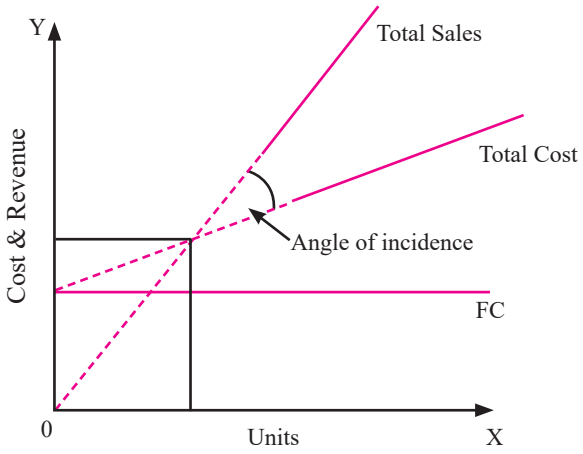


Figure 6.3: Change in BEP due to increase in No. of Units

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

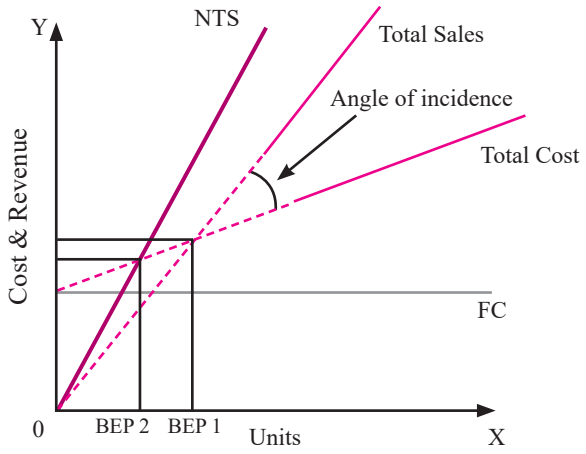


Figure 6.4: Change in BEP due to increase in Selling Price

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

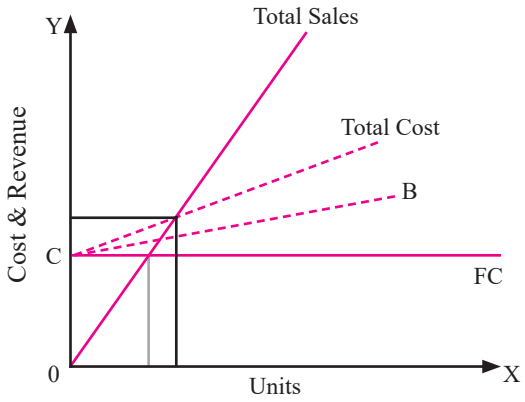


Figure 6.5: Change in BEP due to decrease in Variable cost

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

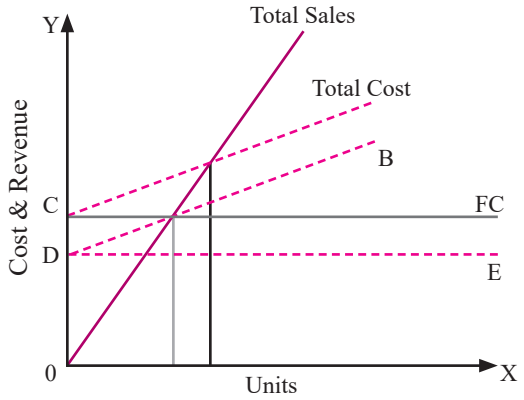


Figure 6.6: Change in BEP due to change in Fixed Cost

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.

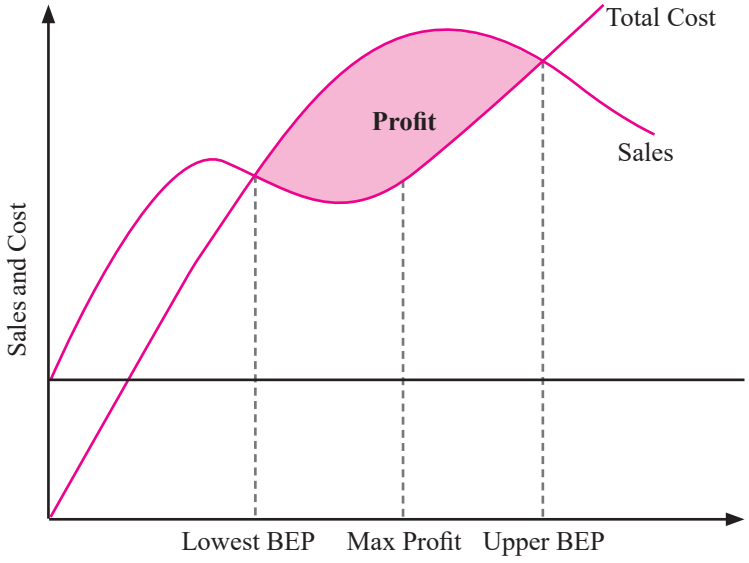


Figure 6.7: Non-Linear Break-Even Chart

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.

8 Referred as relevant range

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.

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.

9 This is simply refferd as the 'Make or Buy' decision.

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?

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 overhead (1/4 quarters of ₹ 1,60,000)	40,000
Absorbed fixed production overhead	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
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.	

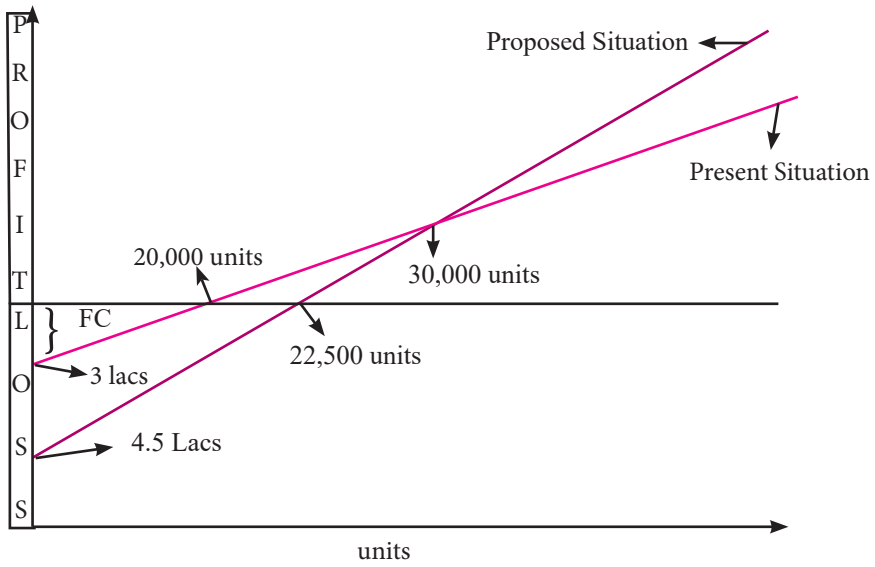


Figure 6.8: Profit Volume Graph

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
(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

	Income Statement		P/V Ratio	BE Sales	MOS
(viii) 10% Increase in selling price and 10% decrease in sales volume		₹	$= \frac{63,000}{99,000} \times 100$	$= \frac{50,000}{63.63\%}$	= 99,000 – 78,597
	Sales (90,000 × 1.10)	99,000			
	Less: VC (90,000 × 0.40)	36,000			
	Contribution	63,000	= 63.63%	= ₹ 78,579	= ₹ 20,421
	FC	50,000			
(ix) ₹ 5,000 variable cost decrease accompanied by ₹15,000 increase in fixed cost		₹	$= \frac{65,000}{1,00,000} \times 100$	$= \frac{65,000}{65\%}$	= 1,00,000 -1,00,000
	Sales (1,00,000 ×1)	1,00,000			
	Less: VC (40,000 - 5,000)	35,000			
	Contribution	65,000	= 65%	= ₹ 1,00,000	= Nil
	FC	65,000			

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 = $\frac{\text{Contribution}}{\text{Sale}} \times 100$	$\frac{30,000}{1,50,000} \times 100 = 20\ \%$	$\frac{50,000}{1,50,000} \times 100 = 33\frac{1}{2}\%$

Particulars	AB Ltd (₹)	CD Ltd (₹)
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 Overhead	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

	Particulars	40%		50%		90%	
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 = Sales × P/V Ratio	2,00,000 × 20% = 40,000	3,00,000 × 20% = 60,000	1,80,000 × 20% = 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) $\text{Desired Sales} = \frac{\text{Fixed Cost + Desired Profit}}{\text{P / V Ratio}}$

$$= \frac{17{,}500 + 40{,}000}{25\%} = \frac{57{,}500}{25\%} = ₹\ 2{,}30{,}000$$

(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

SV Ltd a multi product company furnishes you the following data relating to the year 2021:

	First Half of the year	Second Half of the year
Sales	₹ 45,000	₹ 50,000
Total Cost	₹ 40,000	₹ 43,000

Assuming that there is no change in prices and variable cost and that the fixed expenses are incurred equally in the two half year period, calculate for the year, 2021:

(i) P/V Ratio

(ii) Fixed Expenses

(iii) Break Even Sales

(iv) Percentage of Margin of Safety

Solution:

	First Half of the year	Second Half of the year
Sales	₹ 45,000	₹ 50,000
Total Cost	₹ 40,000	₹ 43,000
Profit	₹ 5,000	₹ 7,000

(i) $\text{P/V Ratio} = \frac{\text{Change in Profit}}{\text{Change in Sales}} \times 100$

$= \frac{7,000 - 5,000}{50,000 - 45,000} \times 100$

$= \frac{2,000}{5,000} \times 100 = 40\%$

(ii) Fixed Expenses = Sales × P/V Ratio – Profit; [Sales × P/V Ratio = Contribution]

Fixed Expenses for the First half = 45,000 × 40% – 5,000 = ₹ 13,000

Fixed Expenses for the Second half = 50,000 × 40% – 7,000 = ₹ 13,000

Fixed Expenses for the year = 13,000 + 13,000 = ₹ 26,000

(iii) $\text{Break Even Sales} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}} = \frac{26,000}{40\%} = ₹\ 65,000$

(iv) $\text{Percentage of Margin of Safety} = \frac{\text{Margin of Safety}}{\text{Sales}} \times 100$

$= \frac{\text{Sales} - \text{Break Even Sales}}{\text{Sales}} \times 100$

$= \frac{95,000 - 65,000}{95,000} \times 100$

$= \frac{30,000}{90,000} \times 100$

$= 31.58\ \%$

[Total Sales for the year = 50,000 + 45,000 = ₹ 95,000]

Illustration 9

S Ltd furnishes you the following information relating to the half year ended 30th June, 2021

Fixed Expenses	₹ 45,000
Sales Value	₹ 1,50,000
Profit	₹ 30,000

During the second half of the year the company has projected a loss of ₹ 10,000.

Calculate:

(i) The Break Even Sales and Margin of Safety for the six months ending 30th June, 2021.

(ii) Expected sales volume for the second half of the year assuming that the P/V Ratio and Fixed expenses remain constant in the second half year also.

(iii) The Break Even Sales and Margin of Safety for the whole year 2021.

Solution:

(i) $$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{\text{Fixed Cost + Profit}}{\text{Sales}} \times 100 = \frac{45,000 + 30,000}{1,50,000} \times 100 = 50\%$$

$$\text{Break Even Sales for the six months ending 30th June, 2021} = \frac{\text{Fixed Cost}}{\text{P / V Ratio}} = \frac{45,000}{50\%} = ₹\ 90,000$$

Margin of Safety for the six months ending 30th June, 2021 = Sales – Break Even Sales

= 1,50,000 – 90,000 = ₹ 60,000

(ii) Income Statement for the second half of the year 2021

Particulars	Workings	(₹)
Sales	$\text{Sales} = \frac{\text{Contribution}}{\text{P/V Ratio}} = \frac{35,000}{50\%}$	70,000
Less: Variable Cost	Bal. fig. or Sales × (1 – P/V Ratio)	35,000
Contribution	Fixed Cost – Loss = 45,000 – 10,000	35,000
Less: Fixed Cost		45,000
Loss		10,000

Step 1 – Calculation of Contribution = Fixed Cost – Loss = 45,000 – 10,000 = ₹ 35,000

Step 2 – Calculation of Sales

Step 3 – Calculation of Variable Cost

(iii) $$\text{Break Even Sales for the year 2021} = \frac{\text{Fixed Cost for the year}}{\text{P/V Ratio}} = \frac{45,000 + 45,000}{50\%} = ₹\ 1,80,000$$

Margin of Safety for the year 2021 = Sales for year – Break Even Sales

= (1,50,000 + 70,000) – 1,80,000

= ₹ 40,000

Illustration 10

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 60% to Product L & 40% to Product M

(ii) Sales revenue divided 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%

	Product L (₹)	Product M (₹)	Total (₹)
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%		$\frac{36,600}{72,000} \times 100$ = 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 11

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
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 12

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

Sl. No.	Particulars	Product A (₹)	Product B (₹)	Total (₹)
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 13

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
Overhead 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 overhead	15	20
iii.	Total Variable Cost per unit	45	51
iv.	Contribution per unit (i. – iii.)	55	69
v.	P/V Ratio = $\frac{\text{Contribution per unit}}{\text{Selling Price per unit}}$	55%	57.50%
vi.	Contribution per kg of material	$\frac{₹\ 55}{2kg} = ₹\ 27.50$	$\frac{₹\ 69}{3kg} = ₹\ 23$
vii.	Contribution per machine hour	$\frac{₹\ 55}{3\ hours} = ₹\ 18.33$	$\frac{₹\ 69}{2\ hours} = ₹\ 34.50$

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 14

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 15

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

Particulars	Amount (₹)
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 16

The operating statement of a company is as follows:

Particulars	Amount (₹)	Amount (₹)
Sales (80,000 @ ₹ 15 each)		12,00,000
Variable Costs:		
Material	2,40,000	
Labour	3,20,000	
Overheads	1,60,000	
Total Variable Cost		7,20,000
Fixed Cost		3,20,000
Total Cost		10,40,000
Profit		1,60,000

The capacity of the plant is 1 lakh units. A customer from USA is desirous of buying 20,000 units at a net price of ₹ 10 per unit. Advice the producer whether or not offer should be accepted. Will your advice be different, if the customer is local one?

Solution:

Statement showing computation of profit before and after accepting the order

Sl. No.	Particulars	Present Position (Before accepting) 80,000 units		Order Value (20,000 units)		Total (after accepting) 1,00,000 units
		Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)	(₹)
i.	Sales	15	12,00,000	10	2,00,000	14,00,000
ii.	Variable Cost					
	Material	3	2,40,000	3	60,000	3,00,000
	Labour	4	3,20,000	4	80,000	4,00,000
	Variable Overheads	2	1,60,000	2	40,000	2,00,000

Sl. No.	Particulars	Present Position (Before accepting) 80,000 units		Order Value (20,000 units)		Total (after accepting) 1,00,000 units
		Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)	(₹)
iii.	Total variable cost	9	7,20,000	9	1,80,000	9,00,000
iv.	Contribution (i. – ii.)	6	4,80,000	6	20,000	5,00,000
v.	Fixed cost		3,20,000			3,20,000
vi.	Profit (iv. – v.)		1,60,000		20,000	1,80,000

As the profit is increased by ₹ 20,000 by accepting the order, it is advised to accept the same. If the order is from local one, it should not be accepted because it will adversely affect the present market.

Illustration 17

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 overhead 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
Overhead	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 18

An umbrella manufacturer marks an average net profit of ₹ 2.50 per piece on a selling price of ₹14.30 by producing and selling 6,000 pieces or 60% of the capacity. His cost of sales is:

	Amount (₹)
Direct material	3.50
Direct wages	1.25
Works overhead (50% fixed)	6.25
Sales overhead (25% variable)	0.80

During the current year, he intends to produce the same number but anticipates that fixed charges will go up by 10% which direct labour rate and material will increase by 8% and 6% respectively but he has no option of increasing the selling price. Under this situation, he obtains an offer for further 20% of the capacity. What minimum price you will recommend for acceptance to ensure the manufacturer an overall profit of ₹ 16,730.

Solution:

Statement showing present and anticipated cost structure

Particulars	Present Cost Structure (₹)	Workings	Anticipated Cost Structure (₹)
Variable Cost per unit			
Material	3.50	3.50 × 106%	3.71
Labour	1.25	1.25 × 108%	1.35
Works overhead (50% × 6.25)	3.125		3.125
Sales overhead (25% × 0.80)	0.20		0.20
Total Variable Cost per unit	**8.075**		**8.385**
Fixed Cost			
Works overhead (50% × 6.25 × 6,000)	18,750	18,750 × 110%	20,625
Sales overhead (75% × 0.80 × 6,000)	3,600	3,600 × 110%	3,960
Total Fixed Cost	**22,350**		**24,585**

Computation of Profit at Present at an anticipated Cost Structure

Particulars	6,000 units	
	Workings	(₹)
Sales	6,000 × 14.30	85,800
Less: Variable Cost	6,000 × 8.385	50,310
Contribution		35,490
Fixed Cost		24,585
Profit		10,905

Computation of Minimum Selling Price per unit from additional 2,000 units so as to get an overall profit of ₹ 16,730

Particulars	Workings	(₹)
Variable Cost to recover from 2,000 units	2,000 × 8.385	16,770
Balance amount of Profit to recover	16,730 – 10,905	5,825
Minimum Sales Value for 2,000 units		22,595

Expected Selling Price per unit = $\frac{₹\ 22,595}{2000\ \text{units}}$ = ₹ 11.2975 or ₹ 11.30

Illustration 19

The Dynamic company has three divisions. Each of which makes a different product. The budgeted data for the coming year are as follows:

Particulars	Division A (₹)	Division B (₹)	Division C (₹)
Sales	1,12,000	56,000	84,000
Direct Material	14,000	7,000	14,000
Direct Labour	5,600	7,000	22,400
Direct Expenses	14,000	7,000	28,000
Fixed Cost	28,000	14,000	28,000
Total Cost	61,600	35,000	92,400

The management is considering to close down the Division C. There is no possibility of reducing fixed cost. Advise whether or not Division C should be closed down.

Solution:

Statement showing computation of profit before closing down Division C

Sl No.	Particulars	Division A	Division B	Division C	Total
		(₹)	(₹)	(₹)	(₹)
i.	Sales	1,12,000	56,000	84,000	2,52,000
ii.	Variable Cost				
	Direct Material	14,000	7,000	14,000	35,000
	Direct Labour	5,600	7,000	22,400	35,000
	Direct Expenses	14,000	7,000	28,000	49,000
iii.	Total Variable Cost	33,600	21,000	64,400	1,19,000
iv.	Contribution (i. – iii.)	78,400	35,000	19,600	1,33,000

Sl No.	Particulars	Division A	Division B	Division C	Total
		(₹)	(₹)	(₹)	(₹)
v.	Fixed Cost	28,000	14,000	28,000	70,000
vi.	Profit (iv. – v)				63,000

Statement showing computation of profit closing down Division C

Sl No.	Particulars	Division A	Division B	Total
		(₹)	(₹)	(₹)
i.	Sales	1,12,000	56,000	1,68,000
ii.	Variable Cost			
	Direct Material	14,000	7,000	21,000
	Direct Labour	5,600	7,000	12,600
	Direct Expenses	14,000	7,000	21,000
iii.	Total Variable Cost	33,600	21,000	54,600
iv.	Contribution (i. – iii.)	78,400	35,000	1,13,400
v.	Fixed Cost			70,000
vi.	Profit (iv. – v.)			43,400

If Division C is closed down then there is a reduction in the overall profit by ₹ 19,600 (63,000 – 43,400). Since, there is no possibility of reducing the fixed cost of Division C, so as long as if there is a contribution of ₹ 1 from division C, it should not be closed down.

Illustration 20

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) $$\text{Shut Down Sales} = \frac{\text{Fixed Cost – Shut Down Cost}}{\text{P / V Ratio}} = \frac{75{,}000 – 25{,}000}{40\%} = ₹\ 1{,}25{,}000$$

Illustration 21

The manager of a Co. provides you with the following information:

	Amount (₹)
Sales	4,00,000
Costs: Variable (60% of Sales)	?
Fixed Cost	80,000
Profit before tax	80,000
Income tax (60%)	?
Net Profit	32,000

The company is thinking of expanding the plant. The increased fixed cost with plant expansion will be ₹ 40,000. It is estimated that the maximum production in new plant will be worth ₹ 2,40,000. The company also wants to earn additional income ₹ 3,200 on investment. On the basis of computations give your opinion on plant expansion.

Solution:

Statement showing computation of profit before and after plant expansion

Sl. No.	Particulars	Present Situation (Before Expansion)	Additional Revenue and Cost (On Plant Expansion)	Total (After Expansion)
i.	Sales	4,00,000	2,40,000	6,40,000
ii.	Variable Cost (60% of i.)	2,40,000	1,44,000	3,84,000
iii.	Contribution (i. – ii.)	1,60,000	96,000	2,56,000
iv.	Fixed Cost	80,000	40,000	1,20,000
v.	Profit before tax (iii. – iv.)	80,000	56,000	1,36,000
vi.	Tax (60% of v.)	48,000	33,600	81,600
vii.	Profit after tax (v. – vi.)	32,000	22,400	54,400

There is an increase of overall profit by ₹ 22,400 after plant expansion, so the plant expansion should be carried out.

Standard Costing And Variance Analysis

6.2

Efficient management of an organisation pivots around the two fundamental issues of 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. Thus, for evaluating performance, it is necessary to compare the actual performance with some pre-determined or pre-planned targets. One of the important parameters of performance is the cost of production. It is of principal importance that the various costs are monitored closely and there is a constant comparison of the actual costs with some 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 also referred to as post-mortem costs. They represent the cost of actual operational performance. However, for decision making purpose these costs are often 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. Various limitations attached to the historical cost accounting system led to the emergence of standard costing which use scientifically pre-determined standard cost under various elements. The need for standard costing is now accepted in almost all industries.

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. The following three points regarding standard cost are noteworthy:

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 an accounting system used by some manufacturers to identify the differences or variances between:

- The actual costs of the goods that were produced
- The costs that should have occurred for the actual goods produced.

The costs that should have occurred for the actual good output are known as standard costs, which are likely integrated with budgets and profit plan.

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.

Standard costing therefore 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 use 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. 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.

1 Certificate Paper C1 Fundamentals of Management Accounting, Chartered Institute of Management Accounting (CIMA)

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 overhead 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 overhead 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.

The following types of standards are noted by some authors:

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]. 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

In the previous section a list of criticisms of standard costing are produced which may lead the reader to believe that such systems have little use in today's business environment. However standard costing systems can be adapted to remain useful. The following are some of the important reasons standard costing is relevant in the new business environment which is often termed as the VUCA[3] world:

1. Even when output is not standardized, it may be possible to identify a number of standard components and activities whose costs may be controlled effectively by the setting of standard costs and identification of variances.

2. The use of computer power enables standards to be updated rapidly and more frequently, so that they remain useful for the purposes of control by comparison.

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.

3 VUCA is an acronym, first used in 1987 and based on the leadership theories of Warren Bennis and Burt Nanus, and stands for Volatility, Uncertainty, Complexity and Ambiguity. Details are available at https://www.vuca-world.org/.

3. The use of ideal standards and more demanding performance levels can combine the benefits of continuous improvement and standard costing control.
4. Standard costing can be applied in service industries, where a measurable cost unit can be established.

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.

Points of similarity between standard costing and budgetary control

It is important to note that both are control mechanisms and have the same principles – setting targets, comparing actual performance with pre-set targets, analysing and reporting of variances. The points of similarities between the two are identified as:

1. The establishment of predetermined targets of performance.
2. The measurement of actual performance.
3. The comparison of actual performance with the predetermined targets to find out variations, if any.
4. Analysis of variations between actual and predetermined performance.
5. To take remedial action, where necessary.

Conceptual difference between standard costing and budgetary control

Though both the systems aim at controlling the business operations by means of predetermined standards with the objects of having better efficiency and of reducing costs, there are some significant differences. Six key differences are listed below for the purview of the reader:

1. Budgetary control deals with the operation of a department or business as a whole while standard costing mainly applies to manufacturing of a product or providing a service. As such budgetary control system is more extensive as it relates to the operations of the business as a whole and covers capital, sales and financial expenses in addition to production. But standard costing is more intensive and is concerned with controlling amount involved in various elements of cost.
2. Standard costing can be adopted in a business without any particular policy. Sole object of standard costing is to maximise efficiency in operation by determining standard costs before the start of operations. But in case of budgetary control it is necessary to lay down the objective or the policy of the firm for the period for which budgets are being laid down.
3. Budgetary control is exercised by putting the budgets and actuals side by side. Variances are not revealed through the accounts. Under the Standard Costing system, actuals are recorded in accounts and the variances are revealed through different accounts.
4. Budgetary control system can be employed in parts such as budget for cash, selling and distribution expenses, research and development expenses, but partial application of standard costing system is not possible.

5. In budgetary control system, the variances are revealed in total but detailed analysis in accordance with the originating causes is not feasible. But in standard costing, the different variances are analysed in detail according to their originating causes.
6. Budgetary control is the projection of financial accounts, whereas standard costing is the projection of cost accounts.

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). Such differences may occur between individual items, such as cost of material, cost of labour, volume of sales etc., and between the total expected contribution and the total actual contribution.

It is important to note that the top management have spent considerable time and trouble setting standards. Thus, after 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[4]. In the following chart a comprehensive classification of variances is considered.

4 A conceptual understanding of variance analysis is available at https://corporatefinanceinstitute.com/resources/knowledge/accounting/variance-analysis/

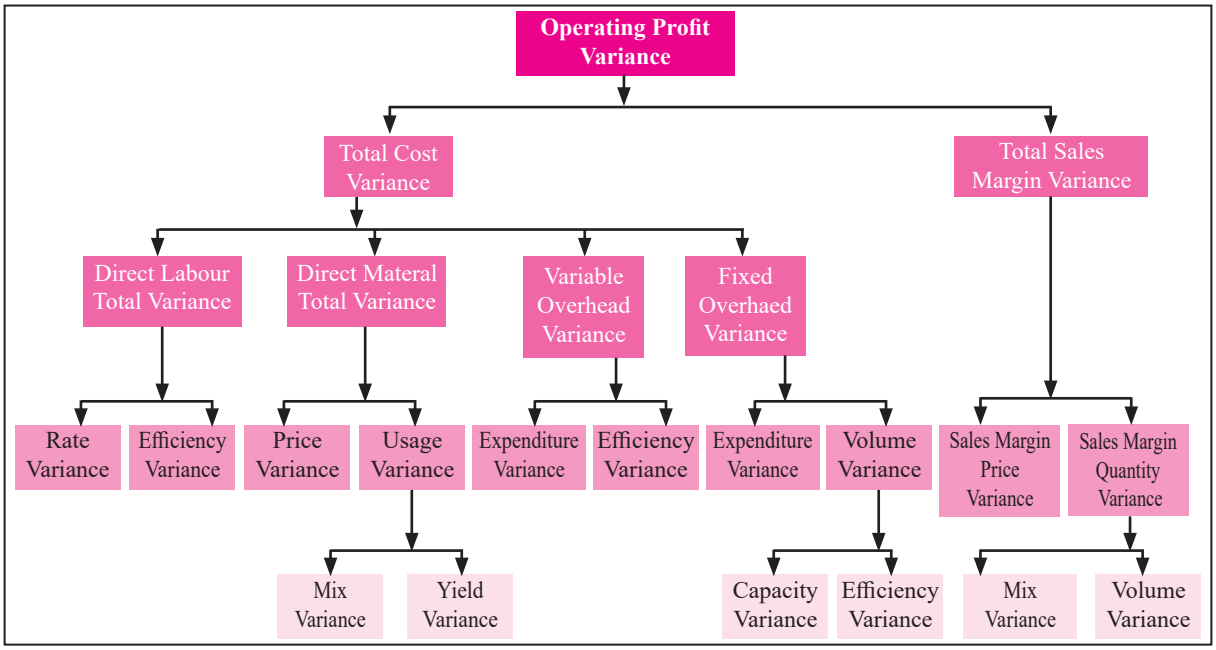


Figure 6.9: Chart of common variance, adapted from Lucey, T. ((1996). Costing, 5th ed.

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 favourable 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[5] is taken up for discussion in the following lines:

Material Cost Variance

In the material variances, 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 broken down into other variances.

5 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 overhead variances, fixed overhead variances, sales variances and other advanced topics in variance analysis would be covered up in Paper 12 and Paper 16.

CIMA Official Terminology[6] 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)[7]

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:

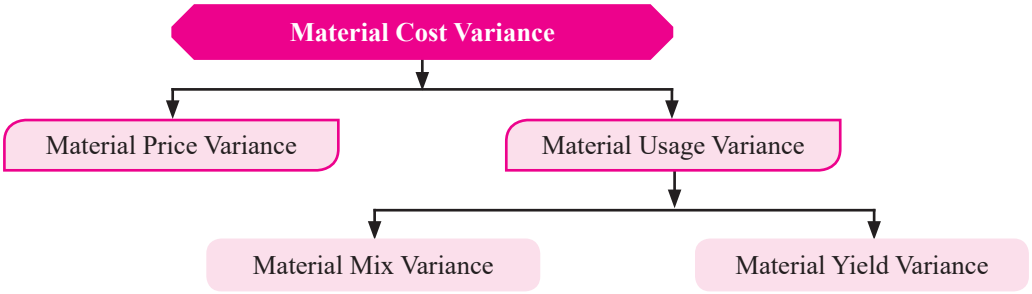


Figure 6.10: Classification of Material Cost Variance

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[1] 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.

6 CIMA Official Terminology, 2005, The Chartered Institute of Management Accountants (CIMA Publishing, an imprint of Elsevier).

7 This may be derived into AQAP (actual quantity × actual price) – standard cost of actual yield.

The formula for calculating the material price variance is given as under:

Material price variance

= **{(actual quantity of material purchased × standard price) – actual cost of material purchased}**

= **Actual Quantity (Standard Price – Actual Price)**[8]

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]**[9]

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)[10]

8 This may be derived into AQAP (actual quantity × actual price) – AQSP (actual quantity × standard price)

9 This may be derived into AQAP (actual quantity × actual price) – standard cost of actual yield.

10 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

Material price variance

= Actual Quantity (Standard Price – Actual Price[11])

= 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.

production of 500 units.

11 The actual price per kg is ₹ 6 (2700 kg of material is purchased at ₹16,200).

	(₹)
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)

Excess usage valued at standard price results in disadvantageous and is adverse[12].

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**[13]

12 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.

13 This is also written as [AQSP (actual quantity × standard price) – RSQSP (revised standard quantity × standard price)]

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.

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][14]

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:[15]

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)

14 This is also written as [RSQSP (revised standard quantity × standard price) – standard material cost of actual yeild]

15 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.

D. Standard Material Cost for Actual yield[16] = [(100 kgs × ₹1) ÷ 70 kgs] × 210000 kgs = ₹ 3,00,000

Material Cost Variance = D – A = ₹48,000 (Favourable[17])

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.

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) = $\frac{₹\ 2,52,000}{2,80,000\text{kg}} = ₹\ 0.09$ 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.

16 This is also referred as Standard Cost of Standard Material (SQSP).

17 Actual Material Cost is lower than what has been stipulated (Standard) for the actual production. Thus, favourable variance, implying efficiency regarding Material Cost.

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

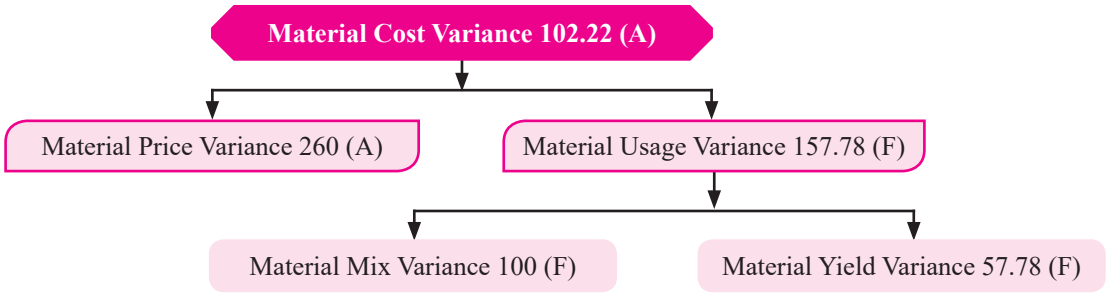


Figure 6.11: Reconciliation of Material Cost Variance

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 and 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[18]

18 Material Price variance is calculated at the point of purchase as it is specifically required. The material price variance can also be

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)**

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

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)

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[19]) × 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:

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)**

19 This is same as standard hours for actual production as stated in the formula for total labour cost variance.

Reconciliation

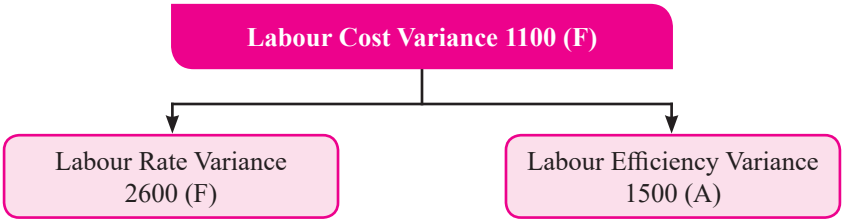


Figure 6.12: Reconciliation of Labour Cost Variance

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	**1100 (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)	**₹ 1500 (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[20]:

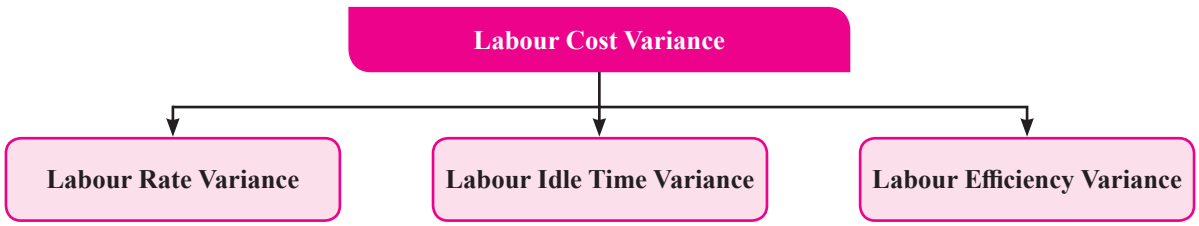


Figure 6.13: Classification of Labour Cost Variance

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.

20 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

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**

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

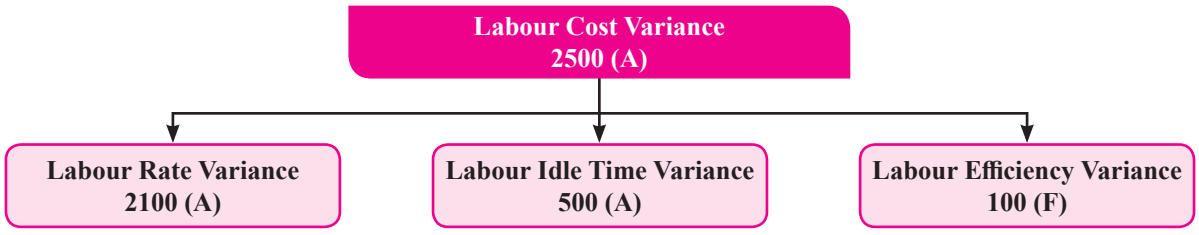


Figure 6.14: Reconciliation of Labour Cost Variance

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)[21]	2980 hrs
Direct labour efficiency variance in hrs	20 hrs (F)
× Standard rate per hour	× ₹ 5 per hour
Direct Labour efficiency variance	**₹ 100 (F)**

21 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.

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 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[22]

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 usu-

22 This is also referred as labour sub-efficiency variance.

ally 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.

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)**[23]

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

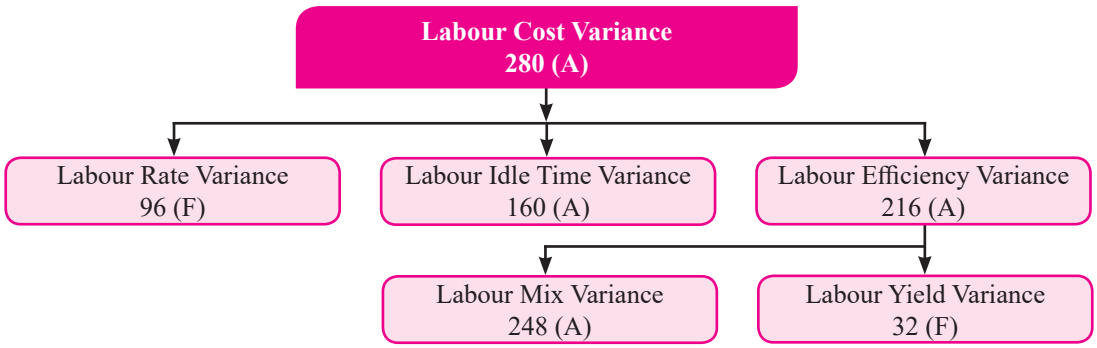


Figure 6.15: Reconciliation of Labour Cost Variance

23 Labour idle time variance is shown separately from efficiency variance as discussed in previous section.

Illustration 22

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.

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

$$\text{Material A} = \frac{40}{90} \times 360 = 160 \text{ kg}$$

$$\text{Material B} = \frac{60}{90} \times 360 = 240 \text{ kg}$$

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 23

The standard quantity and standard price of raw material required for one unit of product A are given as follows:

	Quantity (kg.)	S.P (₹)
Material X	2	4
Material Y	4	2

The actual production and relevant data are as follows:

Material X 1,100 kgs.@ ₹ 3,410

Material Y 1,800 kgs.@ ₹ 3,960

Calculate Variances. Actual production was 500 units.

Solution:

Since there are more than one input so five parameters will be calculated

1. SQ – Standard Quantity for Actual Output

   Material X = 500 × 2 = 1,000 kg

   Material Y = 500 × 4 = 2,000 kg

2. SP – Standard Price per unit

   Material X = ₹ 3 per kg Material Y = ₹ 2 per kg

3. AQ – Actual Quantity

   Material X = 1,100 kg

   Material Y = 1,800 kg Total AQ = 1,100 + 1,800 = 2,900

4. AP – Actual Price per unit

   $$\text{Material X} = \frac{₹\ 3,410}{1,100\ \text{kg}}$$

   $$\text{Material Y} = \frac{₹\ 3,960}{1,800\ \text{kg}}$$

5. RSQ – Revised Standard Quantity for Actual Input

   $$\text{Material X} = \frac{2}{6} \times 2,900 = 966.67\%$$

   $$\text{Material Y} = \frac{4}{6} \times 2,900 = 1,933.33\ \text{kg}$$

   i. Material Cost Variance = SQ × SP – AQ × AP

   $$\text{Material X} = (1,000 \times 3) - \left(1,100 \times \frac{3,410}{1,100}\right) = 3,000 - 3,410 = ₹\ 410\ (A)$$

   $$\text{Material Y} = (2,000 \times 2) - \left(1,800 \times \frac{3,960}{1,800}\right) = 4,000 - 3,960 = ₹\ 40\ (F)$$

   = ₹ 370 (A)

   ii. Material Price Variance = (SP – AP) × AQ = SP × AQ – AP × AQ

   $$\text{Material X} = (3 \times 1,100) - \left(\frac{3,410}{1,100} \times 1,100\right) = 3,300 - 3,410 = ₹\ 110\ (A)$$

   $$\text{Material Y} = (2 \times 1,800) - \left(\frac{3,960}{1,800} \times 1,800\right) = 3,600 - 3,960 = ₹\ 360\ (A)$$

   = ₹ 470 (A)

iii. Material Usage Variance = (SQ – AQ) × SP

Material X = (1,000 – 1,100) × 3 = ₹ 300 (A)

Material Y = (2,000 – 1,800) × 2 = ₹ 400 (F)

= ₹ 100 (F)

iv. Material Mix Variance = (RSQ – AQ) × SP

Material × = ₹ (966.67 – 1,100) × 3 = ₹ 399.99 (A)

Material Y = ₹(1933.33 – 1,800) × 2 = ₹ 266.66 (F)

= ₹ 133.33 (A)

v. Material Yield Variance = (SQ – RSQ) × SP

Material × = (1,000 – 966.67) × 3 = ₹ 99.99 (F)

Material Y = (2,000 – 1,933.33) × 2 = ₹ 133.34 (F)

= **₹ 233.33 (F)**

Illustration 24

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

$$AP = \text{Actual Price per unit} = \frac{₹\ 9,000}{3,000 \text{ units}} = ₹\ 3 \text{ per unit}$$

(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 25

From the following information, compute material variances.

	Quantity (Kg.)	Unit Rate (₹)	Total (₹)
Standard:			
Material A	10	2	20
Material B	20	3	60
Material C	20	6	120
	50		**200**
Actual:			
Material A	5	3	15
Material B	10	6	60
Material C	15	5	75
	30		**150**

Solution:

It is assumed that the data given here is for the production of one unit of output.

SQ – Standard Quantity for Actual Output

Material A = 10 kg Material B = 20 kg Material C = 20 kg

SP –Standard Price per unit

Material A = ₹ 2 Material B = ₹ 3 Material C = ₹ 6

AQ – Actual Quantity used for Production

Material A = 5 kg Material B = 10 kg Material C = 15 kg

AP – Actual Price per unit

Material A = ₹ 3 Material B = ₹ 6 Material C = ₹ 5

RSQ – Revised Standard Quantity for Actual Input

Material A $= \frac{10}{50} \times 30 = 6$ kg Material B $= \frac{20}{50} \times 30 = 12$ kg Material C $= \frac{20}{50} \times 30 = 12$ kg

i. Material Cost Variance = SQ × SP – AQ × AP

Material A = (10 × ₹ 2) – (5 × ₹ 3) = 20 – 15 = ₹ 5 (F)

Material B = (20 × ₹3) – (10 × ₹6) = 60 – 60 = Nil

Material C = (20 × ₹6) – (15 × ₹5) = 120 – 75 = ₹ 45 (F)

= ₹ 50 (F)

ii. Material Price Variance = (SP – AP) × AQ

Material A = (2 – 3) × 5 = ₹ 5 (A)

Material B = (3 – 6) × 10 = ₹ 30 (A)

Material C = (6 – 5) × 15 = ₹ 15 (F)

= **₹ 20 (A)**

iii. Material Usage Variance = (SQ – AQ) × SP

Material A = (10 – 5) × ₹2 = ₹ 10 (F)

Material B = (20 – 10) × ₹3 = ₹ 30 (F)

Material C = (20 – 15) × ₹6 = ₹ 30 (F)

= **₹ 70 (F)**

iv. Material Mix Variance = (RSQ – AQ) × SP

Material A = (6 – 5) × ₹2 = ₹ 2 (F)

Material B = (12 – 10) × ₹3 = ₹ 6 (F)

Material C = (12 – 15) × ₹6 = ₹ 18 (A)

= **₹ 10 (A)**

v. Material Yield Variance = (SQ – RSQ) × SP

Material A = (10 – 6) × ₹2 = ₹ 8 (F)

Material B = (20 – 12) × ₹3 = ₹ 24 (F)

Material C = (20 – 12) × ₹6 = ₹ 48 (F)

= **₹ 80 (F)**

Illustration 26

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 27

The standard material cost for 100 kg of Product 'Delta' is made up:

Alpha: 30 kg @ ₹ 4 per kg

Beta: 40 kg @ ₹ 5 per kg

Gamma: 80 kg @ ₹ 6 per kg

In a batch of 500 kg of Delta were produced from a mix of:

Alpha: 140 kg for ₹ 588

Beta: 220 kg for ₹ 1,056

Gamma: 440 kg for ₹ 2,860

How do yield, mix and price of factors contribute to the variance in the actual cost per 100 kg of Delta over the standard cost?

Solution:

Analysis of the Given Data

	Standard		Actual	
Raw Material	Quantity (kg)	Price per kg (₹)	Quantity (kg)	Price per kg (₹)
Alpha	30	4	$\frac{140}{500} \times 100 = 28$	$\frac{588}{140}$

	Standard		Actual	
Beta	40	5	$\frac{220}{500} \times 100 = 44$	$\frac{1,056}{200}$
Gamma	80	6	$\frac{440}{500} \times 100 = 88$	$\frac{2,860}{440}$
Input	150		160	
Less : Loss	50		60	
Output (Delta)	100		100	

SQ – Standard Quantity for Actual Output

Alpha $= \frac{30}{100 \text{ (Standard output)}} \times 100 \text{ (Actual output)} = 30 \text{ kg}$

Beta $= \frac{40}{100} \times 100 = 40 \text{ kg}$

Gamma $= \frac{80}{100} \times 100 = 80 \text{ kg}$

SP – Standard Price per unit

Alpha = ₹ 4 per kg Beta = ₹ 5 per kg Gamma = ₹ 6 per kg

AQ – Actual Quantity used

Alpha = 28 kg Beta = 44 kg Gamma = 88 kg

AP – Actual Price per unit

Alpha = ₹ $\frac{588}{140}$ per kg Beta = ₹ $\frac{1,056}{200}$ per kg Gamma = ₹ $\frac{2,860}{440}$ per kg

RSQ – Revised Standard Quantity for Actual Input

Alpha $= \frac{30}{150} \times 100 = 32 \text{ kg}$

Beta $= \frac{40}{150} \times 160 = 42.67 \text{ kg}$

Gamma $= \frac{80}{150} \times 160 = 85.33 \text{ kg}$

i. Material Cost Variance = SQ × SP – AQ × AP

Alpha = (30 × 4) – (28 × 588/140)	= ₹ 2.40	(F)
Beta = (40 × 5) – (44 × 1,056/220)	= ₹ 11.20	(A)
Gamma = (80 × 6) – (88 × 2,860/440)	= ₹ 92	(A)
	= ₹ 100.80	**(A)**

ii. Material Price Variance = (SP – AP) × AQ = SP × AQ – AQ × AP

Alpha = ₹ $(4 \times 28) - (28 \times \frac{588}{140})$ = ₹ 5.60 (A)

Beta = ₹ $(5 \times 44) - (44 \times \frac{1,056}{220})$ = ₹ 8.80 (F)

Gamma = ₹ $(6 \times 88) - (88 \times \frac{2,860}{440})$ = ₹ 44 (A)

= ₹ 40.80 (A)

iii. Material Usage Variance = (SQ – AQ) × SP

Alpha = (30 – 28) × 4	= ₹ 8	(F)
Beta = (40 – 44) × 5	= ₹ 20	(A)
Gamma = (80 – 88) × 6	= ₹ 48	(A)
	= ₹ 60	**(A)**

iv. Material Mix Variance = (RSQ – AQ) × SP

Alpha = (32 – 28) × 4	= ₹ 16	(F)
Beta = (42.67 – 44) × 5	= ₹ 6.65	(A)
Gamma = (85.33 – 88) × 6	= ₹ 16.02	(A)
	= ₹ 6.67	**(A)**

v. Material Yield Variance = (SQ – RSQ) × SP

Alpha = (30 – 32) × 4	= ₹ 8	(A)
Beta = (40 – 42.67) × 5	= ₹ 13.35	(A)
Gamma = (80 – 85.33) × 6	= ₹ 31.98	(A)
	= ₹ 53.33	**(A)**

Illustration 28

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 29

A manufacturing concern which has adopted standard costing furnishes the following information:

Standard

Material for 70 kg of finished product of 100 kg

Price of materials ₹ 1 per kg

Actual

Output	2,10,000 kg.
Material used	2,80,000 kg.
Cost of materials	**₹ 2,52,000**

Calculate:

a. Material Cost Variance

b. Material Price Variance

c. Material Usage Variance

Solution:

SQ – Standard Quantity for Actual Output = $\frac{100}{70} \times 2,10,000 = 3,00,000$ kg

SP – Standard Price per unit = ₹ 1 per kg

AQ – Actual Quantity used = 2,80,000 kg

AP – Actual Price per unit = $\frac{₹\ 2,52,000}{2,80,000\ kg}$ = ₹ 0.90 per kg

(a) Material Cost Variance = SQ × SP – AQ × AP

= (3,00,000 × 1) – (2,80,000 × 0.90) = ₹ 48,000 (F)

(b) Material Price Variance = (SP – AP) × AQ

= (1 – 0.90) × 2,80,000 = ₹ 28,000 (F)

(c) Material Usage Variance = (SQ – AQ) × SP

= (3,00,000 – 2,80,000) × 1 = ₹ 20,000 (F)

Illustration 30

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 31

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 × SR – AH × 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) × AH = SR × AH – AR × 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) × SR

= (8,640 – 8,200) × 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 × SR – AH × AR

$$= (6,015 \times ₹3.40) - (6,395 \times \frac{19,370}{6,395}) = ₹\ 1,081\ (F)$$

ii. Labour Rate Variance = (SR – AR) × AH = SR × AH – AR × AH

$$= (₹3.40 \times 6,395) - (\frac{19,370}{6,395} \times 6,395) = ₹\ 2,373\ (F)$$

iii. Labour Efficiency Variance = (SH – AH) × SR

= (6,015 – 6,395) × ₹3.40 = ₹ 1,292 (A)

Illustration 32

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

Workers	Standard		Actuals	
Input	2,000 hours		2,000 hours	
Output	2,000 hours		1,800 hours	

SH – Standard Labour Hours for Actual output

Skilled = $\frac{1,280}{2,000} \times 1,800 = 1,152$ hours

Semi – Skilled = $\frac{480}{2,000} \times 1,800 = 432$ hours

Unskilled = $\frac{240}{2,000} \times 1,800 = 216$ 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

Skilled = $\frac{1,280}{2,000} \times 2,000 = 1,280$ hours

Semi-Skilled = $\frac{480}{2,000} \times 2,000 = 480$ hours

Unskilled = $\frac{240}{2,000} \times 2,000 = 240$ 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 33

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

Material A = $\frac{450}{720} \times 760 = 475$ kg

Material B = $\frac{360}{720} \times 760 = 380$ 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

Material A = $\frac{450}{810} \times 810 = 450$ kg

Material B = $\frac{360}{810} \times 810 = 360$ 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

$$\text{Skilled} = \frac{2,400}{720} \times 760 = 2,533.33 \text{ hours}$$

$$\text{Unskilled} = \frac{1,200}{720} \times 760 = 1,266.67 \text{ hours}$$

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

$$\text{Skilled} = \frac{2,400}{720} \times 810 = 2,400 \text{ hours}$$

Unskilled = $\frac{1,200}{720} \times 810 = 1,200$ 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 34

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

1. Budget and budgetary control – an Introduction

In order to sustain in the competitive world, an organisation must achieve its strategic goal which is embodied in the mission and vision of the organisation. Objectives are specific, actionable targets that need to be achieved within a smaller time frame. These are mostly in financial terms and helps attainment of the strategic goal. Objectives laid down in financial terms are aspects of the planning process and also aids the control process. While planning helps an organisation to work systematically towards achieving the objectives, controlling helps to review the progress made and to monitor whether the work is progressing as per the plan or not.

Budgeting is one such technique that helps in planning as well as controlling. It is a technique of cost accounting with the twin objectives of facilitating planning and ensuring controlling.

A budget, since it has different purposes, mean different things to different people. A budget might be a forecast, a means of allocating resources, a yardstick or a target.

2. What 'budget' means?

CIMA Official Terminology[24] 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

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 :

24 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.

Means of allocating resources

A budget facilitates allocation of resources. It can be used to decide how much resources are needed and how much should be given to each area of the organisation's activities. It is important to note that in limiting factor analysis[25], resource allocation is of crucial importance when a particular resource is in short supply. Budgets often set limits on how much administrative departments and other service departments are allowed to spend in the period. For example, public expenditure budgets set spending limits for each government department.

Yardstick

Budgets acts as yardsticks. Budget statistics are compared with actuals and thus it acts as a control mechanism.

Target

A budget might be a means of motivating the workforce to greater personal accomplishment, another aspect of control.

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.

2.1 Objectives of Budgeting

An effective budgeting system plays a crucial role in the success of a business organisation. The budgeting

25 Discussed under 'application of marginal costing' in the previous section of Module 6.

system has the following objectives, which are of crucial importance for the overall effectiveness of the business organisation. These objectives are discussed below.

a. Planning: Planning is necessary for doing any work in a systematic manner. A well- prepared plan helps the organisation to use the scarce resources in an efficient manner and thus achieving the predetermined targets becomes easy. A budget is always prepared for future period and it lays down targets regarding various aspects like purchase, production, sales, manpower planning etc. This automatically facilitates planning.

b. Co-ordination: For achieving the predetermined objectives, apart from planning, coordinated efforts are required. Budgeting facilitates coordination in the sense that budgets cannot be developed in isolation. For example, while developing the production budget, the production manager will have to consult the sales manager for sales forecast and purchase manager for the availability of the raw material. Thus, production budget cannot be developed in isolation. Hence, the coordination is automatically facilitated.

c. Control: Planning is looking ahead while controlling is looking backwards. Preparation of budgets involves detailed planning about various activities like purchase, sales, production, and other functions like marketing, sales promotion, manpower planning, but planning alone is not sufficient. There should be a proper system of controlling which will ensure that the work is progressing as per the plan. Budgets provide the basis for such controlling in the sense that the actual performance can be compared with the budgeted performance. Any deviation between the two can be found out and analyzed to ascertain the reasons behind the deviation so that necessary corrective action can be taken to rectify the same. Thus, budgeting in itself a controlling function.

2.2 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.

2.3 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[26] - 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 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 overhead cost centre budgets.
b. The purchasing manager should draft the material purchases budget.
c. The production manager should draft the direct production cost budgets.

3. 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

26 Except for capital expenditure budgets, the budget period is usually the accounting year (sub-divided control periods).

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

4. The Budgeting Process

4.1 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[27].

- 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.

27 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/].

- 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.

4.2 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 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 overhead 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.

From point number one and point number two above, 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. An overview of the classification of various budgets is presented in the following chart:

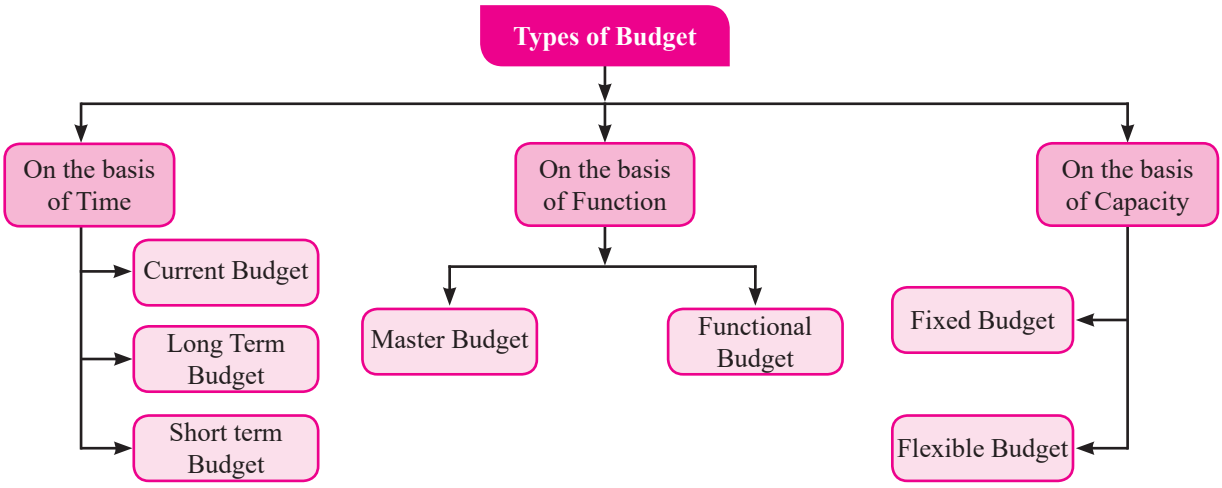


Figure 6.16: Classification of Various of Budgets

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.

5. 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 35

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 36

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 37

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 Overhead [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 Overhead Rate per unit

$$\text{Product X} = \frac{₹\ 6,60,000}{2,20,000 \text{ units}} = ₹\ 3$$

$$\text{Product Y} = \frac{₹\ 9,60,000}{2,40,000 \text{ units}} = ₹\ 4$$

Illustration 38

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 39

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 40

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 41

You are required to prepare a Selling Overhead 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 Overhead Budget

Particulars	₹	₹	₹
Sales	80,000	90,000	1,00,000
A. Fixed Overhead			
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 Overhead			
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**

6. 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 and hence its preparation can lead to a modification of budgets if it shows that there are insufficient cash resources to finance the planned operations. It can also give management an indication of potential problems that could arise and allows them the opportunity to take action to avoid such problems. A cash budget can show four positions. Management will need to take appropriate action depending on the potential position. 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 42

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 $\Rightarrow (1 - 0.7 - 0.2) = ₹\ 3600 \Rightarrow 3600 \div (1 - 0.9) = ₹\ 36000$

   March Sales $\Rightarrow (1 - 0.7) = ₹\ 14400 \Rightarrow ₹\ 14400 \div 0.3 = ₹\ 48000$

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 43

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

Month	Total Sales (₹)	Materials (₹)	Wages (₹)	Overheads	
				Production (₹)	Selling & Distribution (₹)
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

Particulars	January	February	March	April	May	June
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

7. 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. Overhead 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[28]

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.

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.

28 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)

Illustration 44

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 overhead	30,500	32,000	33,500
Administrative Overhead	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 overhead, 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 overhead 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 overhead of 20% = ₹ 3,000

Or, Variable cost of 1% change in activity = 3,000/20 = ₹ 150

Now, Fixed cost portion in Production overhead = 33,500 – (90 × 150) = ₹ 20,000

Therefore, Total Production overhead cost at 45% level of activity = 20,000 + (45 × 150) = ₹ 26,750

Illustration 45

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.	

Items of Cost	Nature of Cost	Variable Cost p.u	Fixed
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 46

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

8. 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.

9. 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.

Illustration 47

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 48

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

	Opening Stock	Estimated Closing Stock	Anticipated cost per kg
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 49

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

Quarter	1st	2nd	3rd	4th
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)	13,000	13,200	13,200	12,600	52,000
(Production × 2 kg p.u)					2,000
Add: Closing Stock (kg)					
					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

Quarter	Receipt			Issue			Balance (Closing Stock)		
	Quantity (kg)	Rate	Amount (₹)	Quantity (kg)	Rate	Amount (₹)	Quantity (kg)	Rate	Amount (₹)
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 50

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

Overhead : $\frac{1}{2}$ 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
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	_

Month	Total Sales	Cash Sales	Credit Sales	Collection			
				March	April	May	June
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 51

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

	Cost Per unit (₹)
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 Overhead 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 52

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

Plant Capacity	at 80% capacity
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 Overhead:			
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 Overhead (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
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

Plant Capacity	80% (₹)	70% (₹)	90% (₹)
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 53

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 Overhead	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

		Amount (₹)
i.	Sales	1,50,000
ii.	Costs	
	Raw Materials $\left(53,000 \times \frac{60,000}{40,000} \times \frac{105}{100}\right)$	83,475
	Wages $\left(11,000 \times \frac{60,000}{40,000} \times \frac{110}{100} \times \frac{105}{100}\right)$	19,058
	Variable Overheads $\left(16,000 \times \frac{60,000}{40,000}\right)$	24,000
	Fixed Overheads $\left(10,000 + (25,000 + 12,000) \times \frac{10}{100}\right)$	13,700
	Total Cost	1,40,233
iii.	Profit (i. – ii.)	9,767

Illustration 54

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 $\left(80,000\times133\frac{1}{3}\%\times\frac{0.75}{0.80}\times\frac{100}{95}\right)$	1,05,263
ii. Materials $\left(1,20,000\times133\frac{1}{3}\%\right)$	1,60,000
iii. Variable Overhead $\left(60,000\times133\frac{1}{3}\%\right)$	80,000
iv. Fixed Overhead	40,000
Production Cost (i + ii + iii)	3,85,263

Illustration 55

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 overhead	10,105	9,009
Total marketing overhead	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**

Particulars	Product A	Product B	Total
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 Overhead	1,200	1,100	2,300
Profit	6,480	3,872	10,352

Illustration 56

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

Exercise

A. Theoretical Questions:

⊙ Multiple Choice Questions

1. The cost of a product under marginal costing system includes
   a. Prime cost plus variable overhead
   b. Prime cost plus fixed overhead
   c. Prime cost plus factory overhead
   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 overhead
   c. Prime cost
   d. Variable overhead
3. Fixed costs are treated as
   a. Overhead 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 overhead 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 overhead
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.[29] 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.

29 Adopted from Management and Cost Accounting (10th edition) by Colin Drury.

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.[30] 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 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.

30 Adopted from Management and Cost Accounting, eighth edition by Colin Drury

CMA COURSE FLOW CHART

FROM ADMISSION TO MEMBERSHIP ..... WAY FORWARD

ADMISSION

Foundation Course

Passed Class X-Eligible for Admission in Foundation Course

Passed Class XII - Eligible to appear in Exam

Qualify FOUNDATION EXAM

Direct Entry to Intermediate Course

- Graduate in any discipline other than Arts & Music
- Qualified CAT Level-I / CA Intermediate

Register to Intermediate Course (Oral/Postal)

World Class Employability and Techno Skill Development Training Facility & Certification

SAP Learning Hub

- SAP Finance Power User Course - 60 Hrs
- Microsoft Education - 40 Hrs
- Cambridge University Press Soft Skills - 20 Hrs
- E - Filing - 20 Hrs
- Online Training Support from the Institute (DoS) - 140 Hrs

Tutorial Workshops - 44 Hours

Eligible to appear in Intermediate Exam (Both / Remaining Groups)

Qualify INTERMEDIATE EXAM

Enroll for Final Course (Oral/Postal)

- Industry Oriented Training Programme (IOTP) - 7 Days
- Practical Training - 3 Years (15 months mandatory)

Eligible to appear in Final Exam (Both / Remaining Groups)

Qualify FINAL EXAM

- Pre-Placement Orientation Programme
- Campus/Off Campus Placement

Minimum 3 Years Work Experience

Apply and Become MEMBER OF THE INSTITUTE

THE INSTITUTE OF COST ACCOUNTANTS OF INDIA

Statutory Body under an Act of Parliament

www.icmai.in

Headquarters: CMA Bhawan, 12 Sudder Street, Kolkata - 700016
Delhi Office: CMA Bhawan, 3 Institutional Area, Lodhi Road, New Delhi - 110003

Behind Every Successful Business Decision, there is always a CMA

The Institute of Cost Accountants of India

Statutory Body under an Act of Parliament

www.icmai.in

Headquarters:
CMA Bhawan; 12, Sudder Street; Kolkata - 700016
Ph: +91-33-2252-1031/34/35/1602/1492/1619/7373/7143

Delhi Office:
CMA Bhawan; 3, Institutional Area; Lodhi Road; New Delhi - 110003
Ph: +91-11-24666100/24622156/57/58; 24666124/129

Toll Free: 1800 346 0092 / 1800 110 910

E-mail: studies@icmai.in

ISBN: 978-93-95303-07-1

Follow us on

Behind Every Successful Business Decision, there is always a CMA