Cost Accounting

For Bangalore University

(As per CBCS Syllabus 2014-15 as Revised in March 2017)

B.COM and B.B.A. IV SEMESTER

About the Authors

Dr. V. Rajesh Kumar is an M.Com graduate from Bangalore University. He obtained his PhD in the area of Strategy. While accounting and taxation are his areas of expertise, finance is his area of passion. He has 25 years of experience in teaching at graduate, postgraduate and professional levels and has served at various institutions in different capacities – Mount Carmel Institute of Management, Department of Commerce, Bangalore University, and Alliance Business Academy, to name a few. He is a faculty for Strategic Financial Management and Tax Laws at the Institute of Chartered Accountants of India, Bangalore. He has co-authored textbooks on *Accounting and Taxation* for the requirements of various universities. He has presented papers at various national and international conferences and published articles in reputed journals. His paper on *Capital Asset Pricing Model* was selected for an International Conference at Harvard University, Cambridge, United States of America, during May–June 2011.

Dr. Rajesh also has a rich experience in research, consultancy and training – both at the academic level and corporate level. He has conducted student development programmes and faculty development programmes in various educational institutions and has conducted training programmes for executives and managers of various companies like Wipro, Godrej, FCG, Honeywell, KPCL, Fouress Engineers, Triveni Engineering, Tyco Electronics, etc., in the area of accounting, finance and taxation. He is associated as a resource person for the Finance for Non-finance Executives Programme at the Institute of Chartered Accountants of India, Bangalore.

He is the founder of Vittam Pravina Gurushala (Finance Expert Academy) – an academy engaged in spreading the knowledge of finance to students, faculty, corporate and all others interested in the area of finance.

Presently, he is working as a finance and academic consultant and visits different management institutions for teaching finance courses, in and outside India.

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Dr. Sreekanth has been serving at B.S.V. Arts and Commerce College for Women over the past 32 years. He is one among the most sought professors in Bangalore by various institutions and has been invited to deliver guest lectures to students and faculty members on various areas of commerce and management.

He has participated in various seminars, workshops, national and international conferences and FDPs in various capacities. His acumen in research is highly appreciated and the papers presented by him at various conferences have been acclaimed in the respective domains.

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McGraw Hill Education (India) Private Limited
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San Juan Santiago Singapore Sydney Tokyo Toronto

McGraw Hill Education (India) Private Limited

Published by McGraw Hill Education (India) Private Limited
444/1, Sri Ekambara Naicker Industrial Estate, Alapakkam, Porur, Chennai - 600 116

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This edition can be exported from India only by the publishers,
McGraw Hill Education (India) Private Limited
1 2 3 4 5 6 7 8 9 7 0 9 1 2 9 7 22 21 20 19 18

Printed and bound in India

ISBN-13: 978-93-87572-37-9
ISBN-10: 93-87572-37-4

Vice President Finance & Operations: *Ashutosh Verma*

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Typeset at Pee-Gee Graphics, A-6/95, Sector 15, Rohini, Delhi 110 085 and printed at

Cover Printer:

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Dedicated to

Our teachers who taught us this subject
Our students who made us learn it better
Our friends who encouraged us to write this book

Preface

The most technologically efficient machine man has ever invented is the book

—Northrop Frye

Keep reading books, but remember that a book is only a book, and you should learn to think for yourself

—Maxim Gorky

Accounting in general, and Cost Accounting in particular, is one of the most exciting and essential functions of a business enterprise. This book will explain the need, purpose and usefulness of 'accounting for costs'. Among many expectations corporate sector has from present and potential employees, one highly essential requirement is knowledge in accounting and finance and skills for applying the knowledge. While acquiring the knowledge and skill calls for pursuing various courses, a strong foundation is essential to go further, which a student ought to get at the level of graduation. This book intends to provide the reader a strong foundation on the subject matter. It is written for the specific requirements of the syllabus prescribed by Bangalore University, and hence does not cover the entire ambit of the subject. However, the topics covered are presented in a systematic and meticulous manner, providing the reader a 'feel-good' factor about the subject.

While the chapters are presented in the order of the prescribed syllabus, we suggest the students to read Chapter 7 after Chapters 1, 2 and 3, and continue with Chapters 4, 5 and 6. Complete care has been taken to make the book error-free. However, mistakes might have crept in inadvertently. We request our readers to bring to our notice, any such errors, omissions and mistakes, for enabling us to rectify in our future editions.

We thank Dr. M. Ramachandra Gowda, Registrar, Bangalore Central University and Dr. K.N. Pushpalatha, General Secretary, BSVP Trust, who have encouraged us and extended support in carrying out this work.

We thank Suman Sen of McGraw Hill Education (India) for giving us the opportunity and constant encouragement to pursue this project, Amit Chatterjee for his innovative ideas, constant support, follow up and guidance in bringing out quality content and Suhaib Ali for his excellent DTP and production work.

Our acknowledgments are also due to Mrs. Meera Rajesh, Mrs. Savitha and Mr. Nischal S Kanth, without their support and sacrifice, this work would not have been completed by the deadline.

Last but not the least, our acknowledgements are due to the Almighty who has blessed us with the knowledge and given us strength for spreading the same.

Dr. V. Rajesh Kumar
Dr. R. K. Sreekantha

Syllabus

For Bangalore University
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4.4. Cost Accounting (Semester-IV) (IA: 30 M + Written: 70 M)	Chapter in the Book
UNIT 1: INTRODUCTION TO COST ACCOUNTING Introduction – Meaning and Definition of Cost, Costing and Cost Accounting – Objectives of Costing – Comparison between Financial Accounting and Cost Accounting – Designing and Installing a Cost Accounting System – Cost Concepts – Classification of Costs – Cost Unit – Cost Center – Elements of Cost – Preparation of Cost Sheet – Tenders and Quotations.	**Chapter 1** **Chapter 2** **Chapter 3**
UNIT 2: MATERIAL COST CONTROL Meaning – Types: Direct Material, Indirect Material. Material Control – Purchasing Procedure – Store Keeping – Techniques of Inventory Control – Levels settings – EOQ – ABC Analysis – VED Analysis – Just In-Time – Perpetual Inventory System – Documents used in Material Accounting – Methods of Pricing Material Issues: FIFO, LIFO, Weighted Average Price Method and Simple Average Price Method – Problems.	**Chapter 4**
Unit 3: LABOUR COST CONTROL Meaning – Types: Direct Labour, Indirect Labour – Timekeeping – Time booking – Idle Time – Overtime – Labour Turn Over. Methods of Labour Remuneration: Time Rate System, Piece Rate System, Incentive Systems (Halsey plan, Rowan Plan and Taylor's differential Piece Rate System) – Problems	**Chapter 5**
Unit 4: OVERHEAD COST CONTROL Meaning and Definition – Classification of Overheads – Procedure for Accounting and Control of Overheads – Allocation of Overheads – Apportionment of Overheads – Primary Overhead Distribution Summary – Secondary Overhead Distribution Summary – Repeated Distribution Method and Simultaneous Equations Method – Absorption of Factory Overheads – Methods of Absorption (Theory Only) – Machine Hour Rate – Problems on Machine Hour Rate.	**Chapter 6**
Unit 5: RECONCILIATION OF COST AND FINANCIAL ACCOUNTS Need for Reconciliation – Reasons for differences in Profit or Loss shown by Cost Accounts and Profit or Loss shown by Financial Accounts – Preparation of Reconciliation Statement and Memorandum Reconciliation Account.	**Chapter 7**

Skill Development

- Identification of elements of cost in services sector by visiting any service sector.
- Cost estimation for the making of a proposed product.
- Draft the specimen of any two documents used in material account.
- Collection and classification of overheads in an organisation on the basis of functions.
- Prepare a reconciliation statement with imaginary figures.

Question Paper Pattern

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Maximum Marks: **70** **Duration: 03 Hours**

Note: *1. Question paper consists of three sections: Section A, B and C*
2. Question 1 carries 10 marks
3. Questions 2 to 6 each carries 6 marks
4. Questions 7 to 11 each carries 14 marks

Particulars	Marks	Nature of Question
SECTION-A (Conceptual Questions) **Q-1:** Answer any ***five*** sub questions out of ***seven*** (a) (b) (c) (d) (e) (f) (g) (5Q × 2 marks)	10 marks	Theoretical
SECTION-B (Analytical Questions) Answer any ***three*** questions out of ***five*** **Q-2** **Q-3** **Q-4** (3Q × 6 marks) **Q-5** **Q-6**	18 marks	Numerical
SECTION-C (Essay Type Questions) Answer any ***three*** questions out of ***five*** **Q-7** **Q-8** **Q-9** (3Q × 14 marks) **Q-10** **Q-11**	42 marks	Numerical
Gross Total	**70 Marks**	

Contents

CHAPTER 1

Introduction

CHAPTER OUTLINE

1.1 INTRODUCTION

An external stakeholder of a business enterprise makes decisions based on financial statements of the entity, the preparation of which is based on the principles of financial accounting. While financial accounting is inevitable and forms basis for many decisions of a business, it does not completely facilitate internal decision making on account of various limitations. Such limitation of financial accounting has led to the development of another form of accounting, i.e., cost accounting.

1.2 LIMITATIONS OF FINANCIAL ACCOUNTING

To comprehend the purpose, process, principles, contents and components of cost accounting, it is essential to understand the various limitations of financial accounting.

1. Financial accounting provides the results and financial position of the business, but does not provide reasons for change in results.
2. It provides results of the past period and hence offers a post-mortem analysis of the performance of the enterprise, which might not facilitate any corrective action.
3. It provides only the overall performance of the business and does not offer any information about performance of each product, division, department, individual, etc., thereby hindering any related decision and corrective measures.
4. Financial accounting is not helpful in managerial decisions like
   (a) Pricing of a product
   (b) Making or buying a component
   (c) Adding a new product to the existing product line
   (d) Discontinuing an existing product or line
   (e) Profitable product mix
   (f) Choice of marketing channels
5. Financial accounting does not provide any basis for future estimations and planning.

These limitations can be overcome by systematically accounting for costs apart from other financial transactions. Such system of accounting for costs and enabling effective decision making is known as cost accounting.

THEORY QUESTIONS

1. State any four limitations of financial accounting.
2. What is the need for cost accounting when financial accounting already exists? Justify.
3. What is cost accounting?

1.3 APPLICATIONS OF COST ACCOUNTING

Cost accounting can be adopted and applied in every form of business entity viz., manufacturing or non-manufacturing, wholesale or retail, product-related or service-related, government or private, and profit oriented or non-profit oriented. Even entities which are not engaged in business activities can also adopt and apply cost accounting.

THEORY QUESTIONS

Write a short note on applications of cost accounting.

1.4 PURPOSES/OBJECTIVES OF COST ACCOUNTING

The following are the major objectives or purposes of cost accounting:

1. The foremost purpose of cost accounting is cost ascertainment. It involves collecting cost information, recording them under suitable heads and ascertaining cost – product-wise, process-wise, function-wise, etc.

2. Cost accounting determines the selling price. Although many factors influence selling price, cost being the prominent factor, forms the base for selling price.
3. Contributing to profitability is another objective of cost accounting and it can be achieved through cost control and cost reduction. That is possible only when cost is accounted for. Hence, cost control and cost reduction is another major objective of cost accounting.
4. For enabling appropriate decision making, it is essential to know the result of each product, process and activity. Cost accounting ascertains the profits of each product, process, activity, function, department, and division.
5. Providing the management with necessary inputs for decision making.

THEORY QUESTIONS

1. State any three objectives of cost accounting.
2. What is cost accounting? State its purposes.

1.5 SOME TERMS AND CONCEPTS IN ACCOUNTING FOR COSTS

1. **Cost:** Cost refers to the expenditure incurred for producing a product or for rendering a service. It is expressed from the viewpoint of producer or service provider.
2. **Costing:** Costing refers to the methods and process of ascertaining cost.
3. **Cost Accounting:** It refers to the process of accounting for cost which begins with recording of income and expenditure or the bases on which they are calculated. It ends with the preparation of periodical statements and reports for ascertaining and controlling costs.
4. **Cost Accountancy:** Cost accountancy refers to the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived therefrom for the purpose of managerial decision making.
5. **Cost Unit:** Cost unit refers to the unit of production, service or time or combination of these, in relation to which costs may be ascertained or expressed. It differs from business to business.

   For example, cost per kg, cost per labour hour, cost per kilometer, cost per seat one-way, cost per ticket per show, cost per plate, cost per square feet, cost per ton, cost per 1000 bricks, cost per bed per day, cost per room per night, etc.
6. **Responsibility Center:** A responsibility center is an activity center of a business organisation entrusted with a special task. Responsibility center may be of different types viz., cost center, revenue center, profit center and investment center.
7. **Cost Center:** Cost center is defined as a location, a person, an item of equipment or a group of these, for which cost may be ascertained and used for the purpose of cost control. It refers to a section of the business to which costs can be charged. The primary responsibility of a cost center is cost control and reduction.

   Cost centers can be classified into following different types:
   - *Personal cost center* consists of a person or a group of persons
   - *Impersonal cost center* consists of a location or an item of equipment or a group of these
   - *Production cost center* where actual production work take place
   - *Service cost center* which are ancillary to and render service to production cost centers

8. **Revenue Center:** It is a center devoted to raising revenue but has no responsibility of production. The main responsibility of a revenue center is generation of sales revenue.
9. **Profit Center:** Profit center's performance is measured in terms of income earned and cost incurred (i.e., profit earning). The primary responsibility of a profit center is profit earning.
10. **Investment Center:** Investment center is responsible for earning profits and also for asset utilisation. The primary responsibility of an investment center is earning return on investment.
11. **Methods of Costing**: Methods of costing are used for ascertaining costs. They include, job costing, output costing, contract costing, process costing and operating costing.
12. **Techniques of Costing:** Techniques of costing help in cost control and cost reduction. They include, budgetary control, standard costing, marginal costing, differential costing, target costing, life cycle costing, activity based costing, etc.

THEORY QUESTIONS

1. What is cost? **[*BU BBM, May (2013)*]**
2. What is costing?
3. Define cost accounting. **[*BU BBM, May (2013)*]**
4. What is cost accountancy?
5. What is cost unit? Give examples. **[*BU BBM, May (2011)*]**
6. What is a responsibility center?
7. State the different types of responsibility centers.
8. What is a cost center? State its different types.
9. What is a revenue center?
10. What is a profit center?
11. Explain the meaning of investment center.
12. What are the methods of costing?
13. What are the techniques of costing?

Problem 1 (Problem on Identifying the Cost Unit)

State the cost unit for the following:

1. Cement manufacturing
2. Paper mills
3. Bicycles
4. Toy making
5. Ship building
6. Brick works
7. Chemical manufacturing
8. Printing works
9. Pharmaceutical manufacturing
10. Textile mills
11. Oil refinery
12. Steel manufacturing
13. Refrigerators
14. Automobile manufacturing
15. Aircraft industry
16. Coal
17. Manufacture of furniture

18. Transport undertaking
19. Advertising
20. Hotels
21. Hospitals
22. Canteens
23. Educational institutions
24. Theaters
25. Water supply

Solution

Industry/Activity	Cost Unit/s
Cement manufacturing	Per ton or per quintal or per bag
Paper mills	Per ton or per ream
Bicycles	Per cycle
Toy making	Per batch
Ship building	Per ship
Brick works	Per thousand bricks
Chemical manufacturing	Per ton or per liter or per kg
Printing works	Per thousand invitation cards/per hundred visiting cards, etc.
Pharmaceutical manufacturing	Per thousand liters, per 100 kg, per pack, etc.
Textile mills	Per meter, per kilogram, etc.
Oil refinery	Per ton, per liter, etc.
Steel manufacturing	Per ton,
Refrigerators	Per refrigerator
Automobile manufacturing	Per car, per scooter, etc.
Aircraft industry	Per aircraft
Coal	Per ton
Furniture manufacturing	Per chair/per table, etc.
Transport undertaking	Per kilometer, per mile, per passenger km, per passenger mile, per ton per km, per ton mile, etc.
Advertising	Per job
Hotels	Per room night, per meal, per person per meal, etc.
Hospitals	Per patient-day, per bed, etc.
Canteens	Per meal, per plate, etc.
Educational Institutions	Per student – year
Theaters	Per person per show
Water supply	Per gallon, per liter, per thousand liters, etc.

1.6 ADVANTAGES OF COST ACCOUNTING

A cost accounting system would ensure the following benefits for a business enterprise:

1. It enables objective cost and profit measurement and also provides for an objective analysis of the same.
2. It facilitates cost control and cost reduction, and thereby contributes to improved and enhanced profitability.

3. It enables cost comparison period-wise, product-wise, and function-wise, thereby facilitating better cost control.
4. It helps in identifying unviable, unfeasible and unprofitable products and activities, thereby making managerial decision-making easier and simpler.
5. It provides sufficient and meaningful inputs for all managerial decisions and thereby helps in avoiding any financial mis-implications.
6. It helps in appropriate price determination and helps in maintaining profits along with capturing better market share.
7. It also supplies information to settle disputes with government and government bodies.

THEORY QUESTIONS

1. List any four benefits of cost accounting. **[*BU BBM, May (2013)*]**
2. What is cost accounting? Briefly explain the advantages of cost accounting. **[*BU BBM, May (2013)*]**

1.7 DIFFERENCES BETWEEN FINANCIAL ACCOUNTING AND COST ACCOUNTING

The major differences between financial accounting and cost accounting are listed as follows:

Element of Difference	Financial Accounting	Cost Accounting
Purpose	The main purpose of financial accounting is recording business transactions and ascertainment of profitability and financial position.	The main purpose of cost accounting is accounting for cost for enabling cost control and cost reduction.
Nature	Subjective, since the recording is based on policies.	Objective, since the recording is based on facts.
Users of information	It mainly caters to the requirements of external stakeholders of the business enterprise.	It is mainly for the use of management for decision making purposes
Time period	Financial statements (the outcome of financial accounting) are prepared in periodic intervals, generally, once in a year. Hence, the information is not contemporary.	Cost reports are prepared on continuous basis. Hence, the information is contemporary in nature.
Analysis and decision making	The analysis based on financial statements is post-mortem and might not be useful for all managerial decisions.	The analysis based on cost information are concurrent and facilities most decisions of the management.
Performance of individual products, divisions, etc.	Financial accounting does not provide performance of each product, process, division, function, etc. It only provides the overall results of the organisation.	Cost accounting provides the performance of each and every product, process, division, function, etc., and thereby facilitates better decision making.
Inventory Valuation	Inventory is valued on the convention of conservatism, i.e., at cost price or net realisable value, whichever is less.	Inventory is valued at cost price, projecting more realistic data.

Element of Difference	Financial Accounting	Cost Accounting
Statutory Requirements	Financial accounting is mandatory for most business enterprises.	Cost accounting is voluntary in most cases, other than cases where cost accounting record rules are applicable.

THEORY QUESTIONS

1. State any two differences between financial accounting and cost accounting. **[*BU BBM, May (2015)*]**
2. What is cost accounting? State the differences between cost accounting and financial accounting. **[*BU BBM, May (2013), May (2015)*]**
3. What are the limitations of financial accounting? Explain the need for cost accounting and distinguish between cost and financial accounting.

1.8 CLASSIFICATION OF COST

Cost accounting deals with accounting of costs. However, the accounting of costs depends upon the nature and type of costs. Hence, it is essential to understand the types of costs, on different bases.

Costs are classified on the following basis:

1. Elements of cost
2. Functions
3. Relationship
4. Behaviour
5. Time period
6. Controllability
7. Normality
8. Attributability
9. Cash outflow
10. Relevance to decision making

THEORY QUESTIONS

1. List any four bases for classification of cost.
2. What is cost? State the various bases for classification of cost.

Each basis and the classification of costs have been explained in the following paragraphs.

A. On the basis of Elements of Cost

Elements of cost refer to 'on what' the cost is incurred. Based on the elements of cost, cost is classified into the following:

(a) ***Material Cost*** It refers to the cost of inputs used in production. It includes cost of raw materials, cost of consumable stores, etc.

(b) ***Labour Cost*** It refers to the cost incurred in relation to people or human resources of the organisation. It includes wages paid for converting raw material into finished goods, salary, incentives, benefits, perquisites, training and development expenses, etc.

(c) ***Other Expenses*** All other expenses, other than material and labour, incurred for operating the business are included in these expenses. They include rent of factory, maintenance expenses, sales promotion expenses, freight charges, etc.

THEORY QUESTIONS

1. State the meaning of 'elements of cost'. **[*BU BBM, May (2013)*]**
2. Briefly explain the element wise classification of cost. **[*BU BBM, May (2011)*]**
3. What is material cost?
4. What is labour cost?
5. What are included under 'other expenses', when costs are classified on the basis of elements of cost?

B. On the basis of Functions

On the basis of the purpose for which it is incurred, cost is classified into the following:

(a) ***Production Cost*** It refers to the cost of producing the product till the primary packing. It includes material cost, cost of converting material into finished goods (i.e., labour cost and other expenses for production and related to factory).

(b) ***Administration Cost*** It refers to the cost incurred to administer and manage the business. It includes all expenses which are not directly relating to production, selling, distribution, research or development activities. Examples of Administration cost are office rent, office stationery, legal expenses, accounting expenses, audit expenses, directors' remuneration, etc.

(c) ***Selling Cost*** It refers to the expenses incurred to promote sales, increase demand and generate revenues. These are also called marketing costs. Selling cost includes advertisement expenses, salesman salary and commission, cost of samples, cost of promotional offers, etc.

(d) ***Distribution Cost*** It refers to the expenses incurred for making available the final product to the customer. It includes expenses incurred to deliver the finished product to customer's location, expenses incurred to deliver the goods to point-of-sale, expenses incurred on delivery vehicles, salary of delivery personnel, etc.

(e) ***Research Cost*** It refers to the cost of researching for new or improved products, new application of materials or improved methods.

(f) ***Development Cost*** It refers to the cost of the process which begins with the implementation of the decision to produce a new or improved product, or to employ a new or improved method and ends with commencement of formal production of that product or by that method.

(g) ***Conversion Cost*** It refers to the cost of converting raw material into finished goods. It includes Direct Wages (i.e., wages paid for labour involved in production process), direct expenses (i.e., other expenses directly attributable to the final product) and factory expenses (i.e., expenses incurred at the point of production in relation to the product).

(h) ***Pre-production Cost*** It refers to the cost incurred in making a trial production run prior to formal production.

THEORY QUESTIONS

1. What is the meaning of 'functional classification of costs'?
2. List the different types of cost on the basis of functions they perform.
3. What is production cost?
4. What are administration costs?
5. Explain the meaning of selling costs.
6. What does distribution cost include?
7. What are Research Costs?
8. What is Development Cost?
9. What are Research Costs? How are they different from development costs'?
10. Explain the meaning of conversion cost.
11. What does pre-production cost include?

C. On the basis of Relationship

On the basis of the relationship of cost with the final product, cost is classified into the following:

(a) ***Direct Cost*** It refers to the cost which is directly related to/identified with/attributable to a cost center or a cost unit. It includes raw material used in the finished product, wages paid to worker engaged in conversion of raw material to finished product and any other expenses which can be directly attributed to the product.

(b) ***Indirect Cost*** These are not directly identified with a cost center or a cost unit. They are costs which are apportioned over different cost centers using appropriate basis. Indirect costs are popularly called 'overheads'. Factory expenses, administration expenses, selling expenses, distribution expenses are some examples of indirect costs.

THEORY QUESTIONS

1. List the different types of costs on the basis of their relationship with final product.
2. What are direct costs? What do they include?
3. What are indirect costs? Give examples.
4. What are overheads? **[*BU BBM, May (2011), BU BBM, May (2013)*]**

D. On the basis of Behaviour

On the basis of 'how cost behaves for change in production', it is classified into the following:

(a) ***Fixed Cost*** It refers to the cost which remains the same in total but varies inversely per unit with production. For example, let us say the monthly rent for factory building is ₹10,000. The total rent remains the same each month, irrespective of the quantum of production. However, the rent per unit will vary inversely with production.

For a production of one unit in a month, the rent per unit would be ₹10,000. For a production of 100 units in a month, the rent per unit would be ₹100. For a production of 1000 units in a month, the rent per unit would be ₹10 and so on.

(b) ***Variable Cost*** It refers to the cost which remains the same per unit but the total varies proportionately with production or sales. For example, let us say the raw material requirement per unit of a finished product is 2 kg and each kg costs ₹5. So, the per unit raw material cost is ₹10.

For a production of 10 units, the total raw material cost is ₹100. For a production of 1000 units, the total raw material cost is ₹10,000 and so on.

(c) ***Semi-variable Cost*** This cost refers to the cost, a portion of which is fixed in nature and the remaining portion is variable with production or sales. For example, electricity bills, water bills, internet bills, etc., have a fixed charge for a certain period and additional charges based on usage.

THEORY QUESTIONS

1. What do you mean by 'behavioural classification of costs'?
2. List the different types of cost on the basis of their behaviour.
3. What is fixed cost? How can it be identified?
4. Give two examples of fixed costs. **[*BU BBM, May (2015)*]**
5. What is variable cost? What are its features?
6. What is variable cost? Give two examples. **[*BU BBM, May (2013)*]**
7. Explain the meaning of the term 'semi-variable cost'.

E. On the basis of Time-period

On the basis of the period to which the cost incurred belongs to, it is classified into the following:

(a) ***Historical Costs*** These refer to the costs relating to the past period. They are the costs which have already been incurred.

(b) ***Current Costs*** Current costs refer to the costs relating to the present period.

(c) ***Pre-determined Costs*** These costs refer to the costs relating to the future period. These are computed in advance on the basis of specification of all factors affecting them.

THEORY QUESTIONS

1. List the types of cost on the basis of the time they belong to.
2. What are historical costs?
3. What are current costs?
4. Explain the meaning of the term 'pre-determined costs'.

F. On the basis of Controllability

On the basis of the ability to control costs, they are classified into the following:

(a) ***Controllable Costs*** These costs can be influenced and controlled by management action; for example, a long-term agreement with a supplier for supply of raw-materials at a pre-determined price.

(b) ***Non-controllable Costs*** These costs cannot be influenced and controlled by any specific management action or by any specific member of the organisation.

Note: The line of difference between controllable and non-controllable costs is very thin. Further, no cost is uncontrollable. In the long run, most costs can be controlled.

THEORY QUESTIONS

1. What are controllable costs? Give an example.
2. What are non-controllable costs?

G. On the basis of Normality

On the basis of the conditions under which costs are incurred, they are classified into the following:

(a) ***Normal Costs*** These refer to the costs which are reasonably expected to be incurred under normal, routine and regular operating conditions.

(b) ***Abnormal Costs*** These refer to the costs over and above normal costs which are not incurred under the normal operating conditions, for example, fines and penalties, wages for idle hours, etc.

THEORY QUESTIONS

1. List the types of cost on the basis of the conditions under which it is incurred.
2. What are normal costs?
3. What are abnormal costs? Give examples.

H. On the basis of Attributability

On the basis of the assignment of costs to the product, they are classified into the following:

(a) ***Period Costs*** These costs are not assigned to the products but are charged as expenses against revenues of the period in which they are incurred. These are the costs which are not included in

inventory valuation. For example, general administration costs, salesmen salary, depreciation of office premises, etc.

(b) ***Product Costs*** These costs are assigned to the product and included in inventory valuation. These are also called as inventoriable costs. For example, cost of raw materials, Direct Wages, depreciation of plant, equipment, etc.

THEORY QUESTIONS

1. What are period costs? Give examples.
2. What are product costs? Give examples.
3. What are period costs? How are they different from product costs?

I. On the basis of Cash Outflow

On the basis of cash outflow involved, costs are classified into the following:

(a) ***Explicit Costs*** These are the costs which involve cash payment and are actually incurred. They are also called *out-of-pocket costs*. Since they are actually incurred, they are easily and objectively measured. They are recorded in the books of accounts and are used for the purpose of accounting, reporting, cost control and decision-making. For example, material costs, labour costs, salaries, rent, advertisement expenses, etc.

(b) ***Implicit Costs*** These costs do not involve cash payment and are not actually incurred. They are also called *economic costs* or *notional costs* or *imputed costs*. They cannot be easily measured and involve subjective estimation. They are not recorded in the books but are used for the purposes of decision making. For example, interest on owner's capital, rent of own premises, proprietor's salary, etc.

THEORY QUESTIONS

1. What are out-of-pocket costs? Give examples.
2. What are notional or imputed costs? Give examples.
3. Distinguish between explicit costs and implicit costs giving examples.

J. On the basis of relevance to Decision-making

On the basis of the usefulness of the costs in making decisions, they are classified into the following:

(a) ***Relevant Costs*** These costs are relevant and useful for decision-making purposes. They include the following:

(i) ***Marginal Cost:*** It refers to the cost of producing one additional unit. It is the total of variable cost, specific fixed cost and opportunity cost.

(ii) ***Differential Cost:*** It refers to the change in costs due to change in the level of activity or pattern or method of production. Where the change results in increase in cost, it is called *incremental costs* and where the change results in decrease in cost, the difference in cost is called *decremental cost*.

(iii) ***Opportunity Cost:*** It refers to the value of benefit forgone by accepting an alternative course of action. For example, if a business enterprise carries out its operations in its own premises, so the rent which could have been earned if the premises was let out is the opportunity cost.

(iv) ***Out-of-pocket Cost:*** It refers to the cost which involves cash outflow. These costs are recorded in the books and they form the basis for all decisions of the enterprise.

(v) ***Replacement Cost:*** It is the costs at which there could be purchase of an asset or material identical to that which is being replaced or revalued.

(vi) ***Imputed Cost:*** These are notional costs which do not involve any cash outflow, but are relevant for making decisions. Examples: depreciation, notional rent, notional salary, notional interest, etc.

(vii) ***Discretionary Cost:*** These are 'escapable' or 'avoidable costs'. These are essential for accomplishment of a managerial objective. They can be avoided if a particular course of action is not chosen. For example, foremen have to be appointed if the enterprise decides to produce a component on its own, instead of outsourcing; then, foremen salary is discretionary in nature.

(b) ***Irrelevant Costs*** These costs are not relevant or useful for decision-making. They include the following:

(i) ***Sunk Cost:*** It is a cost which has already been incurred or sunk in the past. It is not relevant for decision-making. For example, the employees are trained in operation of a particular machine. The expenses for training are sunk costs for decision on whether to buy or lease the machine.

(ii) ***Absorbed fixed Cost:*** It refers to common fixed cost which does not change with any alternative course of action. For example, depreciation on factory building, salary to accountants, etc., will not change irrespective of whether a component is produced in the factory or bought out from the market.

THEORY QUESTIONS

1. What are relevant and irrelevant costs? How are they different from each other?
2. List the different types of relevant costs.
3. List the different types of irrelevant costs.
4. What is marginal cost?
5. Explain the meaning of differential cost.
6. Explain the term opportunity cost with a suitable example.
7. What are out-of-pocket costs?
8. What are imputed costs? Give examples.
9. Explain the meaning of discretionary costs.
10. What is replacement cost?
11. Explain the meaning of the term 'sunk cost' with an example. **[*BU BBM, May (2011)*]**
12. What is cost? Explain the classification of cost on different bases.

Problem 2 (Problem on Identifying the Type of Cost)

Identify the type of the following costs on the basis of (a) element, (b) function, (c) relationship with final product, and (d) behaviour.

S. No.	Item of Cost
1	Raw material
2	Carriage inwards
3	Wages for conversion of raw material into finished goods or productive wages
4	Chargeable expenses
5	Indirect material

S. No.	Item of Cost
6	Indirect wages or unproductive wages
7	Factory rent
8	Factory rates and taxes
9	Factory lighting
10	Power or motive power
11	Haulage (i.e., overhauling expenses)
12	Repairs to machinery
13	Factory cleaning
14	Director's fees (works)
15	Factory stationery
16	Insurance of factory building
17	Insurance of plant and machinery
18	Depreciation of factory buildings, plant and machinery
19	Water supply
20	Consumption of loose tools
21	Works salaries or foremen salary or production manager's salary
22	Production planning expenses
23	Office rent and taxes
24	Office salaries
25	General expenses
26	Audit fees
27	Director's fees (office)
28	Printing and stationery
29	Insurance of office premises and equipment
30	Depreciation of office premises and equipment
31	Legal expenses
32	Office lighting and power
33	Planning, budgeting or estimating expenses
34	Salaries of sales department
35	Salesmen commission
36	Advertising
37	Travelling expenses
38	Rent of warehouse
39	Salary of delivery personnel
40	Depreciation of delivery vans
41	Insurance of delivery vehicles
42	Maintenance of delivery vehicles
43	Carriage outwards

Solution

Item of Cost	Type of Cost on the Basis of			
	Elements	**Function**	**Relationship**	**Behaviour**
Raw material	Material	Production	Direct	Variable
Carriage inwards	Relating to material	Production	Direct	Variable or semi-variable
Wages for conversion of raw material into finished goods or productive wages	Labour	Production	Direct	Variable or semi-variable
Chargeable expenses	Expenses	Production	Direct	Variable
Indirect material	Material	Production	Overhead	Variable or semi-variable
Indirect wages or unproductive wages	Labour	Production	Overhead	Variable or semi-variable
Factory rent	Expenses	Production	Overhead	Fixed
Factory rates and taxes	Expenses	Production	Overhead	Fixed or semi-variable
Factory lighting	Expenses	Production	Overhead	Semi-variable
Power or motive power	Expenses	Production	Overhead	Semi-variable
Haulage (i.e., overhauling expenses)	Expenses	Production	Overhead	Fixed or semi-variable
Repairs to machinery	Expenses	Production	Overhead	Fixed
Factory cleaning	Expenses	Production	Overhead	Fixed
Director's fees (works)	Expenses	Production	Overhead	Fixed or semi-variable
Factory stationery	Expenses	Production	Overhead	Fixed
Insurance of factory building	Expenses	Production	Overhead	Fixed
Insurance of plant and machinery	Expenses	Production	Overhead	Fixed
Depreciation of factory buildings, plant and machinery	Expenses	Production	Overhead	Fixed
Water supply	Expenses	Production	Overhead	Semi-variable
Consumption of loose tools	Expenses	Production	Overhead	Variable or semi-variable
Works salaries or foremen salary or production manager's salary	Expenses	Production	Overhead	Fixed or semi-variable
Production planning expenses	Expenses	Production	Overhead	Fixed
Office rent and taxes	Expenses	Administration	Overhead	Fixed
Office salaries	Expenses	Administration	Overhead	Fixed
General expenses	Expenses	Administration	Overhead	Fixed
Audit fees	Expenses	Administration	Overhead	Fixed
Director's fees (office)	Expenses	Administration	Overhead	Fixed

Item of Cost	Type of Cost on the Basis of			
	Elements	**Function**	**Relationship**	**Behaviour**
Printing and stationery	Expenses	Administration	Overhead	Fixed
Insurance of office premises and equipment	Expenses	Administration	Overhead	Fixed
Depreciation of office premises and equipment	Expenses	Administration	Overhead	Fixed
Legal expenses	Expenses	Administration	Overhead	Fixed
Office lighting and power	Expenses	Administration	Overhead	Semi-variable
Planning, budgeting or estimating expenses	Expenses	Administration	Overhead	Fixed
Salaries of sales department	Expenses	Selling	Overhead	Fixed
Salesmen commission	Expenses	Selling	Overhead	Fixed or semi-variable
Advertising	Expenses	Selling	Overhead	Fixed
Travelling expenses	Expenses	Selling	Overhead	Fixed or semi-variable
Rent of warehouse	Expenses	Distribution	Overhead	Fixed
Salary of delivery personnel	Expenses	Distribution	Overhead	Fixed
Depreciation of delivery vans	Expenses	Distribution	Overhead	Fixed
Insurance of delivery vehicles	Expenses	Distribution	Overhead	Fixed
Maintenance of delivery vehicles	Expenses	Distribution	Overhead	Fixed
Carriage outwards	Expenses	Distribution	Overhead	Fixed or semi-variable

1.9 INSTALLATION OF COST ACCOUNTING SYSTEM

Since the cost accounting system is highly advantageous, it is essential that every business enterprise sets-up a cost accounting system. The following aspects in relation to setting up a cost accounting system must be understood:

A. Features of a good cost accounting system
B. Precautions for installing an effective cost accounting system
C. Practical difficulties or challenges in installing cost accounting system

A detailed discussion of these aspects is made as follows:

1.9.1 Features of a Good Cost Accounting System

A cost accounting system should possess the following features, to be considered successful:

1. The system should be practical, simple and capable of meeting the requirements of a business concern.
2. The data required for the system must be accurate and authentic.
3. The outcome of the system must provide relevant data for managerial decision making.
4. Complete participation from all employees in the process is an essential requirement, failing which the entire system could collapse.

5. The system must be cost-effective, i.e., the benefits must exceed the cost of having the system.
6. The system should enable a smooth and effective implementation.

THEORY QUESTIONS

1. What are the features of a good cost accounting system?
2. When does a cost accounting system serve the purpose of its implementation?

1.9.2 Precautions for Installing an Effective Cost Accounting System

Before setting up a system of cost accounting, the following aspects should be studied:

1. The objective of the system, i.e., whether it is required for fixing selling price or for cost control or for decision making inputs; all this must be clearly established.
2. The scope and extent of coverage of the system should be clearly defined, failing which the system may not be cost-effective.
3. The quality of information required, the degree of accuracy, the authenticity of the inputs and outcome must be clearly defined and established.
4. The structure of the organisation must be supportive for the installation or necessary restructuring must be carried out to accommodate the same.
5. The attitude and behaviour of the people involved in the process must be well studied and the need for installation of cost accounting system must be well oriented to them.
6. The impact of installing cost accounting system on financial accounting must be clearly understood and necessary steps must be taken to integrate the two.

THEORY QUESTION

1. Briefly explain the precautionary measures to be taken in the installation of an effective cost accounting system.

1.9.3 Practical Difficulties or Challenges in Installing Cost Accounting System

Certain difficulties might be encountered while installing a cost accounting system, and they need to be encountered at the earliest. The following are a few such challenges and the remedial measures for the same:

1. ***Lack of Support from Top Management*** Top Management, especially who are not from professional background, might not support a cost accounting system. They view it as an investment and they may not have the ability to perceive the benefits of the system. So, it is essential that the management is appropriately oriented to the need of a costing system and the benefits that can produce. Unless complete support and co-operation of the top management is assured, efforts must not be made to implement a cost accounting system.
2. ***Resistance from Accounting Staff*** On account of perceived loss of their importance and additional work they may have to undertake, the accounting staff might resist implementation of cost accounting system. So, the accounting staff must be well oriented about the need for cost accounting system and the fact that cost accounting and financial accounting are complementary to each other must be appropriately communicated. Eliciting co-operation from the financial accounting staff assures the success of the cost accounting system.
3. ***Lack of Co-operation at Operating Levels*** The operating staff might not support the installation of cost accounting system on account of the extra work they will have to carry out, like recording,

report preparation, etc. So, the installation team must educate the operating staff about the benefits the system would provide them like individual incentives, payment for overtime, etc., which can enable good co-operation from them.

4. ***Shortage of Trained Staff*** A major challenge the enterprise might face is the shortage of staff skilled enough to carry the system when implemented. So, it is essential that adequate training is provided before implementation of the system and further development programs are carried out in frequent intervals to ensure smooth functioning of the system.
5. ***Costs of Operating the System*** The cost of installing a system and operating the same might be huge and can lead to many financial implications. So, it is essential that the benefits of the system are clearly established and unless they are found to exceed the cost, it is not advisable to implement the cost accounting system.

THEORY QUESTIONS

1. Explain the problems or challenges in implementation of cost accounting system.
2. Explain in detail the features of a good cost accounting system and the problem in its installation. What are the precautionary measures to be taken in installation of an effective cost accounting system?

1.10 METHODS OF COSTING

A regular and systematic process or technique of ascertaining the cost of manufacturing a product or providing a service is known as "Costing Method". The following are the different methods of costing and the situation in which they are applicable:

1. ***Unit or Output or Single Costing*** It is a method of costing used to ascertain the cost of manufacturing a standardised product in a single process. Under this method, a cost sheet or a statement of cost is prepared for a definite period and the cost per unit is determined by dividing the total expenses by the number of units produced. This method is suitable for Brick-manufacturing, Cement manufacturing, Colliery, etc.
2. ***Job Costing*** It is a method of costing used to ascertain the cost of making a single unit of customized product. Under this method, a job cost sheet is prepared for each job and all costs related to the specific job are recorded. The total cost of job is determined by aggregating all the expenses related to the specific job. This method is suitable for jobs like making a wooden dinner table, designing a software, painting a house, repairing a car, etc.
3. ***Batch Costing*** It is a method of costing used to ascertain the cost of making a number of similar units of a customised product. This method is similar to job costing. Under this method, a batch cost sheet is prepared for each batch of products and all costs related to the specific batch are recorded. The total cost of each batch is determined by aggregating all the expenses related to the specific batch and the cost per unit is determined by dividing the total cost by the number of units in each batch. This method is suitable for activities like printing of visiting cards, preparation of sweets boxes for a function etc.
4. ***Contract Costing*** It is a method of costing used to ascertain the cost of executing a work involving heavy expenditure and extending over a long period of time. The work is executed according to customer specifications. Under this method, a separate account is opened for each individual contract and the same is debited with expenses and credited with Closing Stock of various items and the value of work completed. This method is suitable for activities like construction of a building, construction of ship, etc.

5. ***Process Costing or Operation Costing*** It is a method of costing used to ascertain the cost of making a number of similar units of a single product through a series of processes. Under this method, a separate account is prepared for each process and all expenses related to such process is debited to it. The cost of output of one process becomes the cost of input of next process and the total expense of the last process is considered as the total cost of manufacturing of the products. Cost per unit is determined by dividing the total expense by the number of units of output. This method is suitable for industries that manufacture fertilizers, chemicals, textiles, processing and bottling of mineral water etc.
6. ***Operating Costing*** It is a method of costing used to ascertain the cost of rendering services. Under this method an "Operating Cost Sheet" is prepared. The various expenses are classified into standing charges and variable charges. This method is suitable for transport undertakings, hospitals, educational institutions, etc.
7. ***Multiple Costing or Composite Costing*** It is a method of costing used when a number of component parts are separately produced and subsequently assembled into a final product. In such a case, the cost of each component is determined separately by adopting a suitable primary method of costing for each component and then the total cost of the final product is arrived. This method is suitable for industries engaged in manufacturing and/or assembling of televisions, motor cars, electronic gadgets, etc.

1.10.1 How to Identify a Suitable Method of Costing?

The following table summarises the factors to be considered in identifying a suitable method of costing.

Enterprise Engaged in	Nature of Output	Method of Costing Applicable
Manufacturing product/ goods	Single unit based on customer specifications	Job costing
	Number of similar units based on customer specifications	Batch costing
	Execution of work based on customer specifications	Contract costing
	Number of similar units of a standardised single product manufactured in a single process	Output costing or unit costing
	Number of similar units of a standardised single product manufactured through a series of processes	Process costing or operation costing
Rendering services	Any service	Operating costing

THEORY QUESTIONS

1. What are 'methods of costing'? List the various methods of costing.
2. What is unit costing?
3. What is job costing? When is it used?
4. What is batch costing?
5. What is contract costing? When is it used?
6. What is process or operation costing? State its features. **[*BU BBM, May (2013) May (2015)*]**
7. What is multiple or composite costing? When is it used?
8. State any four industries where process costing can be applied. **[*BU BBM, May (2011)*]**
9. What is operating costing?
10. Explain the criteria for identifying a suitable method of costing for a business enterprise.

Problem 3 (Problem on Identifying the Method of Costing)

Suggest the most suitable method of costing for the following industry/activity.

S. No.	Industry/Activity
1	Cement manufacturing
2	Paper mills
3	Bicycles
4	Toy making
5	Ship building
6	Brick works
7	Chemical manufacturing
8	Printing works
9	Pharmaceutical manufacturing
10	Textile mills
11	Oil refinery
12	Steel manufacturing
13	Refrigerators
14	Automobile manufacturing
15	Aircraft industry
16	Coal
17	Furniture manufacturing
18	Transport undertaking
19	Advertising
20	Hotels
21	Hospitals
22	Canteens
23	Educational institutions
24	Theaters
25	Water supply

Solution

Industry/Activity	Suitable Method of Costing
Cement manufacturing	Unit or single or output costing
Paper mills	Process costing
Bicycles	Multiple costing
Toy making	Batch costing
Ship building	Contract costing
Brick works	Unit or single or output costing
Chemical manufacturing	Batch costing
Printing works	Unit or single or output costing
Pharmaceutical manufacturing	Batch costing
Textile mills	Process costing
Oil refinery	Process costing

(*Contd.*)

Industry/Activity	Suitable Method of Costing
Steel manufacturing	Process costing
Refrigerators	Batch costing
Automobile manufacturing	Process costing
Aircraft industry	Multiple costing (combination of contract costing and process costing)
Coal	Unit or single or output costing
Furniture manufacturing	Multiple costing (combination of contract costing and output costing)
Transport undertaking	Operating costing
Advertising	Job costing
Hotels	Operating costing
Hospitals	Operating costing
Canteens	Operating costing
Educational institutions	Operating costing
Theaters	Operating costing
Water supply	Operating costing

1.11 TECHNIQUES OF COSTING

Techniques of costing are those which help in cost control and cost reduction. The following are the different techniques of costing:

1. ***Budgetary Control*** It is defined as the establishment of budgets, relating the responsibilities of executives to the requirements of a policy, and the continuous comparison of actual with budgeted results either to secure by individual action the objective of that policy or to provide a base for its revision.
2. ***Standard Costing*** It refers to the preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence.
3. ***Marginal Costing*** It is defined as the ascertainment of marginal cost and the effect on profit of changes in volume or type of output by differentiating between fixed costs and variable costs.
4. ***Life cycle Costing*** Life cycle costing aims at ascertainment of cost of product or project, etc., over its projected life. It is a system that tracks and accumulates the actual costs and revenues attributable to cost object from its inception to its abandonment. It is also called 'cradle-to-grave costing' or 'womb-to-tomb costing'.
5. ***Target Costing*** It is defined as a structured approach to determine the cost at which a proposed product with specified functionality and quality must be produced, to generate a desired level of profitability at its anticipated selling price.
6. ***Activity Based Costing*** Activity based costing refers to the technique of determining the cost of activities and the cost of output that those activities produce. It is a process of identification of the activities that have taken place in the organisation, assigning costs to cost pool for each activity, spreading of support activities across the primary activities, determining cost driver for each activity and managing the costs of activities.

THEORY QUESTIONS

1. What are the techniques of costing? For what purpose are they used?
2. List the various techniques of costing.
3. What is budgetary control?
4. What is standard costing?
5. Explain the meaning of marginal costing.
6. What is life-cycle costing?
7. Explain the meaning of target costing.
8. What is activity-based costing?

SUMMARY

- **Cost:** Cost refers to the expenditure incurred for producing a product or for rendering a service. It is expressed from the viewpoint of producer or service provider.
- **Costing:** Costing refers to the methods and processes of ascertaining cost.
- **Cost Accounting:** Cost accounting refers to the process of accounting for cost which begins with recording of income and expenditure or the bases on which they are calculated, and ends with the preparation of periodical statements and reports for ascertaining and controlling costs.
- **Cost Accountancy:** Cost accountancy refers to the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived therefrom for the purpose of managerial decision making.
- **Cost Unit:** Cost unit refers to the unit of production, service or time or combination of these, in relation to which costs may be ascertained or expressed. It differs from business to business.
- **Responsibility Center:** A responsibility center is an activity center of a business organisation entrusted with a special task. Responsibility center may be of different types, viz., cost center, revenue center, profit center and investment center.
- **Cost Center:** Cost center is defined as a location, a person, an item of equipment or a group of these, for which cost may be ascertained and used for the purpose of cost control. It refers to a section of the business to which costs can be charged. The primary responsibility of a cost center is cost control and reduction. Cost center can be personal cost center, impersonal cost center, production cost center or service cost center.
- **Revenue Center:** Revenue center is a center devoted to raising revenue, but has no responsibility of production. The main responsibility of a revenue center is generation of sales revenue.
- **Profit Center:** Profit center is a center whose performance is measured in terms of income earned and cost incurred (i.e., profit earning). The primary responsibility of a profit center is profit earning.
- **Investment Center:** Investment center is a center responsible for earning profits and also for asset utilisation. The primary responsibility of an investment center is earning return on investment.
- **Bases for classification of Cost:**
  - ✓ Elements of cost – *material, labour and other expenses*
  - ✓ Functions – *production, administration, selling, distribution, research, development, conversion cost and pre-production costs*
  - ✓ Relationship – *direct costs and indirect costs*
  - ✓ Behaviour – *fixed, variable and semi-variable*
  - ✓ Time period – *historical, current and pre-determined*
  - ✓ Controllability – *controllable and non-controllable*
  - ✓ Normality – *normal and abnormal*

- ✓ Attributability – *period costs and product costs*
- ✓ Cash outflow – *explicit cost and implicit cost*
- ✓ Relevance to decision making – *relevant and irrelevant costs*

➢ **Methods of Costing:** Methods of costing are those which are used for *ascertaining costs*. They include, job costing, output costing, contract costing, process costing and operating costing.

➢ **Techniques of Costing:** Techniques of costing are those which help in *cost control and cost reduction*. They include, budgetary control, standard costing, marginal costing, differential costing, target costing, life cycle costing, activity based costing, etc.

CHAPTER 2

Cost Sheet

CHAPTER OUTLINE

2.1 COST SHEET

A Cost Sheet or Statement of Cost is a statement which shows the break-up and build-up of costs. It is a document which provides for the assembly of the detailed cost of a cost center or a cost unit.

It is prepared in timely intervals and shows the various elements of cost of a product produced during the period. It presents the total cost as well as per unit cost of the production during the period. Further, it also shows the results (i.e., profit or loss made) from units sold during the period. Hence, the statement is also called Statement of Cost and Profit.

THEORY QUESTIONS

1. What is a Cost Sheet? **[*BU BBM, May (2015)*]**
2. Why is a Cost Sheet also called Statement of Cost and Profit?

2.2 OBJECTIVES OF A COST SHEET

The following are the objectives (purposes or uses) of a Cost Sheet:

- Cost Sheet enables ascertainment of total cost and per unit cost of output or production during a given period.
- It enables determination of selling price.
- It helps in ascertaining the profitability of the enterprise during a given period.
- It also provides analysis of cost for each product, location and unit.
- It provides the basis for making estimates and thereby helps in preparation of tenders and quotations.
- It is helpful in preparation of budgets.
- It enables intra-firm and inter-firm comparison.
- It forms the basis for measuring operational efficiency and in control of cost.

THEORY QUESTIONS

1. List any four objectives of a Cost Sheet.
2. What is a Cost Sheet? Sate the purposes for preparing a Cost Sheet.
3. List the various uses of preparing a Cost Sheet.

2.3 FORMAT OF A COST SHEET

The following is the format in which a Cost Sheet must be prepared:

2.3.1 Summary Format

Statement of Cost for the period ending _____

(Number of units produced and sold)

Particulars	Total (₹)	Per Unit (₹)
Prime Cost (Total of all elements of Direct Cost)	xxx	xxx
Overheads (Total of all elements of Indirect Cost)	xxx	xxx
Total Cost	xxx	xxx
Profit or Loss (*Balancing Figure*)	xxx	xxx
Sales	xxx	xxx

THEORY QUESTIONS

1. Present a summary format of a Cost Sheet with imaginary figures
2. What is Prime Cost? **[*BU BBM, May (2013)*]**

2.3.2 Brief Format

Statement of Cost for the period ending _____

(Number of units produced and sold)

Particulars	Total (₹)	Per Unit (₹)
Direct Material consumed during the period	xxx	xxx
Direct Labour or Direct Wages or Productive Wages	xxx	xxx
Direct Expenses	xxx	xxx
Prime Cost	xxx	xxx
Add: Factory or Works or Manufacturing Overheads	xxx	xxx
Factory or Works Cost	xxx	xxx
Add: Office and Administration Overheads	xxx	xxx
Cost of Production	xxx	xxx
Add: Selling and Distribution Overheads	xxx	xxx
Cost of Sales or Total Cost	xxx	xxx
Profit or Loss (*Balancing Figure*)	xxx	xxx
Sales	xxx	xxx

THEORY QUESTIONS

1. Present a blank format of a Cost Sheet.
2. What is Prime Cost? **[*BU BBM, May (2013)*]**
3. How is Prime Cost calculated?
4. How to arrive at factory cost in preparation of a Cost Sheet?
5. What is Cost of Production in the context of preparation of a Cost Sheet?

2.3.3 Detailed Format

Statement of Cost for the period ending _____

(Number of units produced and sold)

Particulars		₹	₹
Direct Material consumed during the period:			
Opening Stock of Raw Material		xxx	
Add: Purchases during the period	xxx		
Carriage Inwards	xxx		
	xxx		
Less: Purchase Returns	xxx		
	xxx		
Less: Cost Price of material sold or disposed	xxx	xxx	
		xxx	
Less: Closing Stock of Raw Material		xxx	xxx
Direct Labour or Direct Wages or Productive Wages			xxx
Direct Expenses or Chargeable Expenses			xxx
Prime Cost			xxx

(*Contd.*)

Particulars	₹	₹
Add: Factory or Works or Manufacturing or Production Overheads		xxx
		xxx
Less: Amount realised on Sale of Scrap		xxx
		xxx
Add: Opening Stock of Work in Progress		xxx
		xxx
Less: Closing Stock of Work in Progress		xxx
Factory Cost or Works Cost		xxx
Add: Office and Administration Overheads		xxx
Cost of Production or Office Cost		xxx
Add: Opening Stock of Finished Goods		xxx
		xxx
Less: Closing Stock of Finished Goods		xxx
Cost of Goods Sold		xxx
Add: Selling and Distribution Overheads		xxx
Cost of Sales or Total Cost		xxx
Add/(*Less*): Profit or Loss (*Balancing Figure*)		xxx
Sales		xxx

Notes:

1. Since the statement is prepared to ascertain the cost of output during a given period and the profit for the period, it is essential to ascertain the number of units produced and sold during the period, before the preparation of the statement. While the information may be directly provided for, sometimes it may have to be ascertained. The following formulae must be used to ascertain the missing information, if the details are not completely available.

   Number of units produced = Number of units of Work in Progress at the *beginning* of the period + Number of units of materials consumed during the period – Number of units of Work in Progress at the *end* of the period.

   Number of units sold = Number of units of *Opening Stock* of finished goods + Number of units *produced* during the period – Number of units of *Closing Stock* of finished goods.

2. All expenses incurred during the period must be considered, irrespective of whether they are paid or outstanding. That is, the Statement of Cost must be prepared on 'accrual' basis.
3. Where the value of Closing Stock of raw material is not made available, it must be calculated either under FIFO method or average cost method.
4. Where the value of Closing Stock of Work in Progress is not made available, it must be calculated at 'Prime Cost + Factory Overheads'.
5. At times, the problem may ask for calculation of conversion cost. Conversion cost is the cost of converting raw material into finished goods. Conversion cost can be calculated by using the following formula:

   Conversion cost = Factory cost – Raw material cost

6. Where the value of Closing Stock of finished goods is not made available, it must be calculated at 'Cost of Production'.
7. Selling and distribution overheads must be calculated for units sold and not for units produced.
8. While preparing a Cost Sheet, the following items must not be considered:
   - Capital expenditure like purchase of assets, purchase of investments, etc.
   - Financial expenses like dividends, interest on borrowings, cash discount, interest on capital, expenditure incurred for mobilising capital, underwriting commission, etc.

- Incomes like rent received, cash discount received, interest on investments, etc.
- Abnormal expenses like fines, penalties, etc.
- Losses on account of inefficiency like bad debts, etc.
- Appropriation of profits like dividends, tax, reserves, etc.

THEORY QUESTIONS

1. Outline the detailed format of a Cost Sheet with imaginary figures.
2. How the number of units produced should be ascertained when details of the same are not provided?
3. How to calculate the 'number of units sold' when no information about the same is provided?
4. How can Direct Material consumed during a given period be ascertained?
5. List the methods for valuation of Closing Stock of raw material.
6. What is Prime Cost? How can it be calculated? **[*BU BBM, May (2013)*]**
7. What is factory cost? How should it be ascertained for the purpose of preparing a Cost Sheet?
8. On what basis should the value of Closing Stock of Work in Progress be calculated?
9. What is office cost? How is it calculated?
10. How is cost of goods sold' ascertained while preparing a Cost Sheet?
11. What is conversion cost'? How is it calculated?
12. List any four cost items which must not be considered in preparation of a Cost Sheet.
13. Mention any four items of financial expenses. **[*BU BBM, May (2015)*]**

2.4 CLASSIFICATION OF OVERHEADS

The following table shows the classification of overheads.

Items of Cost Under Factory Overheads	Items of Cost Under Office and Administration Overheads	Items of Cost Under Selling and Distribution Overheads
• Indirect wages • Indirect materials • Consumable stores • Power and fuel • Repairs and maintenance • Cleaning charges • Depreciation on plant and machinery • Depreciation on factory building • Insurance of plant and machinery • Insurance of stock • Research and development expenses • Labour welfare expenses • Loose tools written off • Haulage (charges for internal transport of goods) • Water supply charges • Rectification of defects	• Office salaries • Printing and stationery • Postage and telegrams • General expenses • Directors remuneration • Legal expenses • Audit fees • Depreciation on office furniture • Depreciation on office building • Miscellaneous expenses • Subscription to trade journals • Subscription to trade associations • Drawing office expenses	• Salesmen salary and commission • Advertising • Travelling expenses • Advertising • Cost of free samples and gifts • Cost of after sales services • Demonstration cost • Display cost • Warehouse expenses • Warehouse losses and wastages • Depreciation, repair and maintenance of trucks and vans • Packing expenses • Carriage outwards • Freight outwards • Counting house expenses

THEORY QUESTIONS

1. List any six items of Factory Overheads.
2. Give any six examples for 'office and administration overheads'. **[*BU BBM, May (2015)*]**
3. What are selling and distribution expenses'? Give examples.

2.5 MANUFACTURING OR PRODUCTION ACCOUNT

A manufacturing or production account is an alternative to Cost Sheet or Statement of Cost. It is prepared under double entry system of maintaining books. The format of a manufacturing or production account is given as follows:

Manufacturing Account for the period ending _____

Dr. Cr.

Particulars	₹	Particulars	₹
To Direct Materials	xxx	By Cost of Production c/d	xxx
To Direct Wages	xxx		
To Direct Expenses	xxx		
Prime Cost	xxx		
To Works overheads	xxx		
To Opening Work in Progress	xxx		
	xxx		
Less: Closing Work in Progress	xxx		
Works Cost	xxx		
To Administrative Overheads	xxx		
	xxx		xxx
To Cost of Production b/d	xxx	By Sales A/c	xxx
To Opening Stock of Finished Goods	xxx		
	xxx		
Less: Closing Stock of Finished Goods	xxx		
Cost of Goods Sold	xxx		
To Selling and Distribution Overheads	xxx		
Cost of Sales or Total Cost	xxx		
To Profit and Loss Account (Net Profit – *Balancing figure*)	xxx		
	xxx		xxx

THEORY QUESTIONS

1. What is manufacturing account?
2. Present the format of a manufacturing account with imaginary figures.

2.6 DIFFERENCES BETWEEN MANUFACTURING ACCOUNT AND COST SHEET

Although, the purpose of manufacturing account and Cost Sheet is same, there are some differences between the two which are noteworthy. Such differences have been listed as follows:

Element of Difference	Production Account	Cost Sheet
Basis of preparation	It is prepared on the basis of double-entry system of book-keeping	It is a statement and there are no specific rules for its preparation
Objective or purpose	Reporting	Decision-making
Presentation	It is presented in two parts – first part shows the Cost of Production and the second part shows the other costs and profits	It is presented in a logical order showing in detail the Prime Cost, works cost, Cost of Production, cost of goods sold, total cost and profits
Basis for decision-making	Since the total cost is shown on aggregate basis, it might not be suitable for decision making	Since the cost is shown for each product, location, department, etc., it is highly suitable for decision making
Usefulness in estimation	The data in this account is not helpful for making estimations and hence cannot be used for preparation of tenders and quotations	The data in this statement facilitate estimations and helps in preparation of tenders and quotations

THEORY QUESTIONS

1. What is manufacturing account? Why is it prepared?
2. What is manufacturing account? How is it different from Statement of Cost and Profit?

PROBLEMS

Problem 1 (Problem on Calculation of Number of Units)

A. Find the missing information in the following table:

(Units)

Case	Opening Stock of Finished Goods	Production During the Period	Sales During the Period	Closing Stock of Finished Goods
1	10,000	?	25,000	3000
2	12,000	46,000	?	4000
3	4000	28,000	30,000	?
4	?	55,000	57,000	4000

B. Find the missing information in the following table:

(Units)

Case	Opening Stock of Work in Progress	Material Consumed During the Period	Production During the Period	Closing Stock of Work in Progress
X	2000	10,000	?	3000
Y	?	20,000	18,000	5000
Z	3000	22,000	21,000	?

Solution

A. The following equation gives the relationship between the number of units of stock, production and sales:

Number of units sold = Number of units of Opening Stock of finished goods + Number of units produced during the period – Number of units of Closing Stock of finished goods

The missing information is calculated using this formula:

Case 1:

25,000 = 10,000 + number of units produced – 3000

Therefore, number of units produced = 25,000 – 10,000 + 3000 = 18,000

Case 2:

Number of units sold = 12,000 + 46,000 – 4000

Therefore, number of units sold = 54,000

Case 3:

30,000 = 4000 + 28,000 – number of units of Closing Stock

Therefore, number of units of Closing Stock = 4000 + 28,000 – 30,000 = 2000

Case 4:

57000 = Number of units of Opening Stock + 55,000 – 4000

Therefore, number of units of Opening Stock = 57,000 – 55,000 + 4000 = 6000

B. The following equation gives the relationship between the number of units of stock, material consumption and production.

Number of units produced = Number of units of Work in Progress at the beginning of the period + Number of units of materials consumed during the period – Number of units of Work in Progress at the end of the period

Case X:

Number of units produced = 2000 + 10,000 – 3000

Therefore, number of units produced = 9000

Case Y:

18,000 = Opening Stock of Work in Progress + 20,000 – 5000

Therefore, number of units of Opening Stock of Work in Progress = 18,000 – 20,000 + 5000 = 3000

Case Z:

21,000 = 3000 + 22,000 – Number of units of Closing Stock of Work in Progress

Therefore, number of units of Closing Stock of Work in Progress = 3000 + 22,000 – 21,000 = 4000

Problem 2 (Problem on Calculation of Direct Material Consumed)

Calculate the cost of materials consumed.

	₹
Opening Stock of material	12,000
Materials purchased	60,000
Freight and carriage paid on materials purchased	100
Defective materials returned to supplier	1,200
Closing Stock of materials	40,000
Material sold (Cost price: ₹1,500)	2,000

Solution

Calculation of Cost of Raw Material Consumed

	₹	₹
Opening Stock of Raw Material		12,000
Add: Purchases during the period		
Cost of material purchased	60,000	
Add: Freight and Carriage	100	
	60100	
Less: Defective material returned	1,200	
Net Purchases	58,900	
Less: Cost price of material sold	1,500	
Net purchases used for production		57,400
		69,400
Less: Closing Stock of Raw Material		40,000
Direct Material consumed during the period		29,400

Problem 3 (Problem on Valuation of Closing Stock of Raw Material)

Calculate the value of material consumed and value of Closing Stock of raw material from the following information, under:
(a) FIFO method
(b) Average Cost method
Opening Stock of raw material (4000 units): ₹32,000
Purchases during the period (36,000 units): ₹3,60,000
Units used in production: 35,000

Solution

Value of Closing Stock = Value of Opening Stock of material + Value of purchases during the period – Value of material consumed during the period

Value of Opening Stock of raw material and value of purchases are given. The value of material consumed during the period depends on the method adopted.

(a) **Under FIFO Method**

Under this method, the value of material consumed for production is based on 'first-in, first-out' principle. That is, the initial purchases followed by later purchases are considered to find the value of material consumed.

In this case, the value of material consumed is

4000 units out of Opening Stock	₹32,000
31000 units out of purchases*	₹3,10,000
	₹3,42,000

$$*\left(\frac{₹3,60,000}{36,000 \text{ units}}\right) \times 31,000 \text{ units}$$

So, the value of Closing Stock = ₹32,000 + ₹3,60,000 – ₹3,42,000 = ₹50,000

(b) **Under Average Cost Method**

Under this method, the value of material consumed and value of Closing Stock is calculated at the average cost of all units available for use.

The average cost per unit is calculated as follows:

Total number of units = 4000 (Opening Stock) + 36,000 (purchases) = 40,000

Total cost = ₹32,000 (value of Opening Stock) + ₹3,60,000 (value of purchases) = ₹3,92,000

So, average cost per unit = $\frac{₹3,92,000}{40,000 \text{ units}}$ = ₹9.80 per unit

Therefore, value of material consumed = 35,000 units × ₹9.80 per unit = ₹3,43,000 value of Closing Stock = 5000 units × ₹9.80 per unit = ₹49,000

Alternatively, value of Closing Stock = Value of Opening Stock of material + Value of purchases during the period – Value of material consumed during the period

That is, ₹32,000 + ₹3,60,000 – ₹3,43,000 = ₹49,000

Problem 4 (Problem on Calculation of Prime Cost)

Calculate Prime Cost from the following particulars:

	₹
Opening Stock of raw material	5,000
Opening Stock of Work in Progress	7,500
Purchase of raw material	56,000
Purchase returns	2,000
Carriage inwards	1,000
Carriage outwards	1,500
Productive wages	22,500
Outstanding wages	2,500
Chargeable expenses	4,000
Closing Stock of raw material	10,000

Solution

Calculation of Prime Cost

		₹	₹
Direct Material consumed during the period			
Opening Stock of Raw Material		5,000	
Add: Purchases during the period			
Cost of material purchased	56,000		
Add: Carriage inwards	1,000		
	57,000		
Less: Purchase Returns	2,000		
	Net Purchases	55,000	
		60,000	
Less: Closing Stock of Raw Material		10,000	50,000
Productive wages		22,500	
Add: outstanding wages		2,500	25,000
Chargeable Expenses			4,000
	Prime Cost		79,000

Notes:

1. Opening Work in Progress is relating to production and should be considered after considering Factory Overheads, and not while calculating the Prime Cost.
2. Carriage outwards is a distribution overhead and hence it is not considered in calculating Prime Cost.

Problem 5 (Problem on Classification of Overheads)

A manufacturing concern has shown ₹4,32,000 as establishment charges in its financial books of accounts. It includes the following expenses:

Particulars	₹	Particulars	₹
Interest on debentures	24,000	Office rent	36,000
Agents' commission	13,500	Printing and stationery	2,300
Warehouse expenses	8,600	Motive power	87,900
Office lighting	7,200	Subscription to trade magazines	2,200
Directors' remuneration	12,000	Donations	5,000
Travelling expenses of salesmen	54,000	Bank charges	500
Warehouse rent	68,000	Depreciation on plant and machinery	45,000
Repairs of plant and machinery	18,700	Cash discount on sales	4,300
Drawing office salary	6,800	Bad debts	5,400
Counting house salary	7,500	Depreciation on office furniture	23,100

From the above information, prepare separate statements showing the following:

(a) Factory overheads
(b) Office and administration overheads
(c) Selling and distribution overheads
(d) Items not to be considered as 'cost'

Solution

Factory Overheads	₹
Repairs of plant and machinery	18,700
Drawing office salary	6,800
Motive power	87,900
Depreciation on plant and machinery	45,000
Total	**1,58,400**

Office and Administration Overheads	₹
Office Lighting	7,200
Directors' Remuneration	12,000
Counting House Salary	7,500
Office Rent	36,000
Printing and Stationery	2,300
Depreciation on Office Furniture	23,100
Total	**88,100**

Selling and Distribution Overheads	₹
Agents' commission	13,500
Warehouse expenses	8,600
Travelling expenses of salesmen	54,000
Warehouse rent	68,000
Subscription to trade magazines	2,200
	1,46,300

Non-cost items	₹
Interest on debentures	24,000
Donations	5,000
Bank charges	500
Cash discount on sales	4,300
Bad debts	5,400
Total	**39,200**

Problem 6 (Problem on Calculation of Factory Cost)

Calculate the factory cost from the following information:

	₹
Direct Material	58,800
Direct Wages	21,200
Direct Expenses	4,000
Indirect Material	2,000
Indirect Wages	6,000
Factory Expenses	16,000
Opening Work in Progress	8,000
Closing Work in Progress	6,000
Amount realised on sale of scrap	4,000

Solution

Calculation of Factory Cost

Particulars	₹	₹
Direct Material		58,800
Direct Wages		21,200
Direct Expenses		4,000
Prime Cost		84,000
Factory Overheads		
Indirect Material	2,000	
Indirect Wages	6,000	
Factory Expenses	16,000	24,000
		1,08,000

Particulars	₹	₹
Add: Opening Work in Progress		8,000
		1,16,000
Less: Closing Work in Progress		6,000
		1,10,000
Less: Amount realized on sale of scrap		4,000
Factory Cost or Works Cost		1,06,000

Problem 7 (Problem on Valuation of Work in Progress and Calculation of Factory Cost)

Calculate the total factory cost and factory cost per unit from the following information:

Particulars	Amount
Number of units of raw material consumed	10,000
Cost of material consumed	₹1,00,000
Direct Wages	₹50,000
Direct expenses	₹30,000
Factory overheads	₹1,20,000
Opening Stock of Work in Progress (2000 units)	₹60,000
Closing Stock of Work in Progress (3000 units)	**?**

[*BU B.Com, May (2014)*]

Solution

For calculating the factory cost per unit, it is essential to ascertain the number of units produced.

Number of units produced =	Number of units of Work in Progress at the beginning of the period + Number of units of materials consumed during the period – Number of units of Work in Progress at the end of the period

So, **number of units produced** = 2000 + 10,000 – 3000 = **9000**

Calculation of Factory Cost

(Output: 9000 units)

Particulars	₹
Direct Material	1,00,000
Direct Wages	50,000
Direct Expenses	30,000
Prime Cost	1,80,000
Factory Overheads	1,20,000
	3,00,000
Add: Opening Work in Progress	60,000
	3,60,000
Less: Closing Work in Progress (See Working Note)	90,000
Factory Cost or Works Cost	2,70,000

Factory cost per unit = $\frac{₹2,70,000}{9000 \text{ units}}$ = **₹30**

Working Note:

Total of 'Prime Cost and Factory Overheads' is ₹3,00,000 for 10,000 units of material consumed. Out of that, 3000 units of material are still in progress by the end of the period.

So, the value of Closing Stock of Work in Progress is $\left(\frac{₹3,00,000}{10,000 \text{ units}}\right) \times 3000 \text{ units}$ = **₹90,000.**

Problem 8 (Problem on Calculation of Cost of Production)

Calculate the Cost of Production from the following particulars:

	₹
Direct Material	5,000
Direct Labour	4,000
Factory overhead	3,000
Opening Work in Progress	1,000
Closing Work in Progress	2,500
Office rent	1,500
Office staff salary	3,500
General expenses	2,000
Audit fees	500
Other office expenses	500

Solution

Calculation of Cost of Production

Particulars	₹	₹
Direct Material		5,000
Direct Labour		4,000
Direct expenses		NIL
Prime Cost		9,000
Factory Overheads		3,000
		12,000
Add: Opening Work in Progress		1,000
		13,000
Less: Closing Work in Progress		2,500
Factory Cost		10,500
Office and Administration Overheads		
Office Rent	1,500	
Office Staff Salary	3,500	
General Expenses	2,000	
Audit Fees	500	
Other Office Expenses	500	8,000
Office Cost or Cost of Production		18,500

Problem 9 (Problem on Calculation of Cost of Goods Sold)

Calculate the cost of goods sold.

	₹
Direct Material	60,000
Direct Wages	25,000
Factory overhead	5,000
Opening Stock of Work in Progress	7,000
Closing Stock of Work in Progress	3,000
Office and administration expenses	41,000
Opening Stock of finished goods	20,000
Closing Stock of finished goods	11,800

Solution

Calculation of Cost of Goods Sold

Particulars		₹
Direct Material		60,000
Direct Wages		25,000
Direct Expenses		NIL
	Prime Cost	85,000
Factory Overheads		5,000
		90,000
Add: Opening Work in Progress		7,000
		97,000
Less: Closing Work in Progress		3,000
	Factory Cost	94,000
Office and Administration Expenses		41,000
	Cost of Production	1,35,000
Add: Opening Stock of Finished Goods		20,000
		1,55,000
Less: Closing Stock of Finished Goods		11,800
	Cost of Goods Sold	1,43,200

Problem 10 (Problem on Calculation of Cost of Goods Sold)

The following figures taken from cost accountant of a manufacturer are for the month of March, 2018. You are required to prepare the Statement of Cost showing the details of expenses:

	₹
Opening Stock of Raw Materials	30,480
Closing Stock of Raw Materials	37,050
Purchase of material	27,576
Opening Work in Progress	9,378
Closing Work in Progress	11,326
Opening Stock of finished goods	21,468

Closing Stock of finished goods	12,690
Productive wages	20,982
Unproductive wages	900
Carriage inwards	402
Rent and taxes	660
Lighting and heating	336
Depreciation and maintenance of plant	3,204
Works salaries	2,346
Stores expenses	438
General works expenses	8,400

Solution

Calculation of Cost of Goods Sold for the month ended 31 March 2018

Particulars	₹	₹
Direct Material		
Opening Stock of Raw-material	30,480	
Add: Purchases of Raw-material	27,576	
Carriage inwards	402	27,978
		58,458
Less: Closing Stock of Raw-material		37,050
Productive Wages		21,408
Direct Expenses		20,982
		NIL
Prime Cost		42,390
Factory Overheads		
Unproductive Wages	900	
Lighting and heating	336	
Depreciation and maintenance of Plant	3,204	
Works salaries	2,346	
Stores expenses	438	
General works expenses	8,400	15,624
		58,014
Add: Opening Work in Progress		9,378
		67,392
Less: Closing Work in Progress		11,326
Factory Cost or Works Cost		56,066
Office and Administration Overheads		
Rent and Taxes		660
Office Cost or Cost of Production		56,726
Add: Opening Stock of finished goods		21,468
		78,194
Less: Closing Stock of finished goods		12,690
Cost of Goods Sold		65,504

Problem 11 (Problem on Preparation of Cost Sheet)

The following figures are taken from the books of a company and you are required to prepare the Statement of Cost for the period ended 31 March, 2018.

	₹
Raw materials	33,000
Productive wages	35,000
Unproductive wages	10,500
Factory rates and taxes	7,500
Factory lighting	2,200
Factory heating	1,500
Motive power	4,400
Haulage	3,000
Director's fees (works)	1,000
Director's fees (office)	2,000
Factory cleaning	500
Sundry office expenses	200
Estimating expenses	800
Factory stationery	750
Office stationery	900
Consumption of loose tools	600
Office rent and taxes	500
Water supply	1,200
Factory insurance	1,100
Office insurance	500
Legal expenses	400
Direct expenses	3,000
Rent of warehouse	300
Depreciation of plant and machinery	2,000
Depreciation of office building	1,000
Depreciation of delivery vans	200
Bad debts	100
Advertising	300
Sales department salaries	1,500
Maintenance of delivery vans	700
Bank charges	50
Commission on sales	1,500
Sales	1,42,750

Solution

Statement of Cost for the period ended 31 March 2018

Particulars	₹	₹
Raw Materials		33,000
Productive Wages		35,000
Direct Expenses		3,000
Prime Cost		71,000
Factory Overheads		
Unproductive wages	10,500	
Factory rent and taxes	7,500	
Factory lighting	2,200	
Factory heating	1,500	
Motive power	4,400	
Haulage	3,000	
Director's fees	1,000	
Factory cleaning	500	
Factory stationery	750	
Consumption of loose tools	600	
Water supply	1,200	
Factory insurance	1,100	
Depreciation of plant and machinery	2,000	36,250
Factory Cost or Works Cost		1,07,250
Office and Administration Overheads		
Director's fees	2,000	
Sundry office expenses	200	
Estimating expenses (i.e., planning and budgeting expenses)	800	
Office stationery	900	
Rent and taxes	500	
Office insurance	500	
Legal expenses	400	
Depreciation of office building	1,000	6,300
Office Cost or Cost of Production		1,13,550
Selling and Distribution Overheads		
Advertising	300	
Sales department salaries	1,500	
Commission on sales	1,500	
Rent of warehouse	300	
Depreciation of delivery vans	200	
Maintenance of delivery vans	700	4,500
Cost of Sales or Total Cost		**1,18,050**
Profits (*Balancing Figure*)		**24,700**
Sales		1,42,750

Notes:

1. Bank charges, being financial charges, must not be considered in the preparation of Cost Sheet. It must be considered in costing profit and loss account.
2. Bad debts, being loss on account of ineffective receivables management, must not be considered in the preparation of Cost Sheet. It must be considered in costing profit and loss account.

Problem 12 (Problem on Calculation of Total Cost)

In a factory, 20,000 units of product A were manufactured in the month of March 2018. From the following figures, prepare a Cost Sheet showing cost per unit.

	₹
Opening Stock of Raw Materials	5,000
Raw materials purchased	55,000
Closing Stock of finished goods	1,000
	₹
Closing Stock of Raw Materials	10,000
Direct Wages	25,000
Factory overhead	40,000
Office Overhead	20,000
Materials returned to seller	4,000

[*BU BBM, May (2013)*]

Solution

Cost Sheet for the month of March 2018

(Units produced: 20,000)

		₹	₹	₹ Per Unit
Direct Material consumed during the period				
Opening Stock of Raw Material		5,000		
Add: Purchases during the period				
Cost of material purchased	55,000			
Less: Purchase Returns	4,000	51,000		
Less: Closing Stock of Raw Material		56,000		
		10,000	46,000	2.30
Direct Wages			25,000	1.25
Prime Cost			71,000	3.55
Add: Factory Overheads			40,000	2.00
Factory Cost/Cost of Production			1,11,000	5.55
Add: Office Overheads			20,000	1.00
Total Cost			**1,31,000**	**6.55**

Problem 13 (Problem on Calculation of Total Cost and Profits)

Mr. A furnishes the following data relating to the manufacture of a standard product for the month of January 2018.

	₹
Materials	90,000
Direct Wages	60,000
Depreciation of machinery	11,500
Power and Consumable Stores	12,000
Indirect wages at factory	15,000
Lighting of factory	5,500
Cost of rectification of defective work	3,000
Sale of scrap	2,000
Office and Selling Overheads	39,000
Selling price	3,16,000

Prepare the Cost Sheet.

[*BU BBM, May (2011)*]

Solution

Cost Sheet for the month of January 2018

Particulars	₹	₹
Direct Material		90,000
Direct Wages		60,000
Prime Cost		1,50,000
Factory Overheads		
Depreciation of machinery	11,500	
Power and consumable stores	12,000	
Indirect wages	15,000	
Factory lighting	5,500	
Cost of rectification of defective work	3,000	
	47,000	
Less: Sale of Scrap	2,000	45,000
Factory Cost		1,95,000
Office and Selling Overheads		39,000
Total Cost		2,34,000
Profits (*Balancing figure*)		82,000
Sales		**3,16,000**

Problem 14 (Problem on Calculation of Total Cost and Profits)

From the following particulars taken from the cost records of A Ltd., for the year ending 31/03/2018, prepare a Statement of Cost and Profit.

Particulars	₹	Particulars	₹
Opening Stock of raw materials	50,000	Repairs and renewals (factory)	6,400
Purchase of raw materials	1,60,000	Other expenses (factory)	5,000

Particulars	₹	Particulars	₹
Closing Stock of raw materials	80,000	Management expenses (including Managing	
Productive wages	1,50,000	Director's remuneration)	24,000
General wages (factory)	20,000	Travelling expenses	2,200
Chargeable expenses	40,000	Showroom expenses and samples	2,000
Rent, rates and taxes (factory)	10,000	Carriage and freight outwards	2,000
Rent, rates and taxes (office)	1,000	Carriage and freight inwards	9,000
Depreciation on P&M	3,000	Entry tax on purchase of raw materials	1,000
Salary (office)	5,000	Advertisement	4,000
Salary (travelling)	4,000	Advance Income Tax	30,000
Printing and Stationery	1,000	Sales	4,60,000
Office cleaning and lighting	800		

Additional information:
Management expenses should be allocated in the ratio of 2:1:3 on factory, office and sales division.

Solution

Cost Sheet for the period ending 31 March 2018

Particulars	₹	₹
Raw materials consumed		
Opening Stock of Raw Materials	50,000	
Add: Purchases	1,60,000	
Add: Carriage and Freight incurred	9,000	
Add: Entry tax on purchases	1,000	
	2,20,000	
Less: Closing Stock of Raw Materials	80,000	1,40,000
Productive wages		1,50,000
Chargeable Expenses		40,000
Prime Cost		3,30,000
Factory Overheads		
General wages	20,000	
Rent, Rates and Taxes	10,000	
Depreciation on Plant and Machinery	3,000	
Repairs and Renewals	6,400	
Other expenses	5,000	
Management expenses (24,000 × 2/6)	8,000	5 2,400
Factory/Works Cost		3,82,400
Office and Administration Overheads		
Rent, Rates and Taxes	1,000	
Salary	5,000	
Printing and Stationery	1,000	
Office cleaning and lighting	800	
Management expenses (24,000 × 1/6)	4,000	1 1,800
Cost of Production		3,94,200

(*Contd.*)

Particulars	₹	₹
Selling and Distribution Overheads		
Salary	4,000	
Management expenses (24,000 × 3/6)	12,000	
Travelling expenses	2,200	
Showroom expenses and samples	2,000	
Carriage and freight outwards	2,000	
Advertisement	4,000	26,200
Total Cost		4,20,400
Profits (*Balancing Figure*)		39,600
Sales		4,60,000

Note: Advance income tax is a non-cost item and hence, excluded in the Cost Sheet.

Problem 15 (Problem on Calculation of Total Cost and Profit)

From the following particulars taken from the cost records of D Ltd., for the year ending 31/03/2018, prepare a Statement of Cost and Profit.

Particulars	₹	Particulars	₹
Opening Stock of Raw Materials	25,000	Salesmen salary	2,000
Purchase of Raw Materials	85,000	Other factory expenses	5,700
Closing Stock of Raw Materials	40,000	Other office expenses	900
Carriage inwards	5,000	Remuneration to manager	13,000
Direct Wages	75,000	Bad debts written off	1,000
Indirect wages	10,000	Advertisement	2,000
Other Direct Charges	15,000	Traveling expenses of salesmen	1,100
Factory rent and rates	5,000	Carriage and freight outwards	1,000
Office rent and rates	500	Advance income tax paid	15,000
Indirect consumption of materials	500	Cash discount	5,000
Depreciation of plant and machinery	1,500	Bank Charges	350
Depreciation of office furniture	100	Sales	2,50,000
Office salary	2,500		

Additional information:

The manager has the overall charge of the company and his remuneration is to be allocated at ₹4,000 for factory, ₹2,000 for office and the balance for selling operations.

Solution

Cost Sheet for the period ending 31 March 2018

Particulars	₹	₹
Raw materials consumed		
Opening Stock of Raw Materials	25,000	
Add: Materials Purchased	85,000	
Add: Carriage inward	5,000	
	1,15,000	

Particulars	₹	₹
Less: Closing Stock of Raw Materials	40,000	75,000
Direct Wages		75,000
Other Direct Charges		15,000
Prime Cost		1,65,000
Factory Overheads		
Other factory expenses	5,700	
Indirect wages	10,000	
Factory rent and rates	5,000	
Indirect consumption of materials	500	
Depreciation on Plant and Machinery	1,500	
Remuneration to Manager	4,000	26,700
Factory/Works Cost		1,91,700
Office and Administration Overheads		
Other office expenses	900	
Office rent and rates	500	
Depreciation of office furniture	100	
Office salary	2,500	
Remuneration to Manager	2,000	6,000
Cost of Production		1,97,700
Selling and Distribution Overheads		
Salesman salary	2,000	
Remuneration to manager	7,000	
Advertisement	2,000	
Travelling expenses	1,100	
Carriage outwards	1,000	13,100
Total Cost		2,10,800
Profits (*Balancing Figure*)		39,200
Sales		2,50,000

Note: Bad debts, advance income tax, cash discount and bank charges are non-cost items and hence are not considered in the preparation of Cost Sheet.

Problem 16 (Problem on Calculation of Total Cost and Profits, when Information on Stocks are Available)

F Ltd. requests you to prepare a Statement of Cost and Profit for the month of December 2017 from the following information.

Particulars	01/12/17 (₹)	31/12/17 (₹)
Raw materials	40,000	50,000
Work in Progress	10,000	14,000
Finished goods	1,00,000	50,000

Transactions for the month are as follows:

	₹
Indirect labour	50,000
Lubricants	10,000
Insurance on plant	3,000
Purchase of Raw Materials	4,00,000

Selling commission	60,000
Salesmen salary	1,00,000
Administrative expenses	1,00,000
Carriage outward	20,000
Motive power	30,000
Direct Labour	3,00,000
Depreciation on plant	50,000
Factory rent	60,000
Sales	12,00,000

Solution

Cost Sheet for the month ending 31 December 2017

Particulars	₹	₹
Raw materials consumed		
Opening Stock of Raw Materials	40,000	
Add: Materials Purchased	4,00,000	
	4,40,000	
Less: Closing Stock of Raw Materials	50,000	3,90,000
Direct Labour		3,00,000
Prime Cost		6,90,000
Factory Overheads		
Indirect labour	50,000	
Lubricants	10,000	
Insurance on plant	3,000	
Motive power	30,000	
Depreciation on plant	50,000	
Factory rent	60,000	
	2,03,000	
Add: Opening Stock of Work in Progress	10,000	
	2,13,000	
Less: Closing Stock of Work in Progress	14,000	1,99,000
Factory/Works Cost		8,89,000
Office and Administration Overheads		
Administrative expenses		1,00,000
Cost of Production		9,89,000
Add: Opening Stock of finished goods		1,00,000
		10,89,000
Less: Closing Stock of finished goods		50,000
Cost of Goods Sold		10,39,000
Selling and Distribution Overheads		
Selling commission	60,000	
Salesmen salary	1,00,000	
Carriage outwards	20,000	1,80,000
Total Cost		12,19,000
Loss (*Balancing Figure*)		19,000
Sales		12,00,000

Problem 17 (Problem on Preparation of Cost Sheet and Calculation of Cost Per Unit)

The following data is extracted from the books of a TV manufacturing company for the year 2017.

	₹
Purchase of material	35,00,000
Direct Labour employed	42,00,000
Direct expenses	8,00,000
Factory rent	2,50,000
Foremen salary	3,50,000
Production manager's salary	8,40,000
Other factory expenses	1,60,000
Factory lighting	70,000
Supervisory expenses	2,30,000
Opening Stock of raw material	15,00,000
Opening Stock of Work in Progress	9,00,000
Closing Stock of raw material	10,00,000
Closing Stock of Work in Progress	12,00,000
Director's fees	5,00,000
Legal expenses	1,20,000
Office rent	2,30,000
Office expenses	1,00,000
Printing and stationery	50,000

The number of televisions produced during the year is 500 units. Find the cost per television by preparing a Cost Sheet.

Solution

Statement of Cost for the year 2017

Particulars	₹	₹
Direct Material		
Opening Stock of Raw-material	15,00,000	
Add: Purchases of Raw-material	35,00,000	
	50,00,000	
Less: Closing Stock of Raw-material	10,00,000	40,00,000
Direct Labour employed		42,00,000
Direct Expenses		8,00,000
Prime Cost		90,00,000
Factory Overheads		
Factory Rent	2,50,000	
Foremen's Salary	3,50,000	
Production Manager's Salary	8,40,000	
Other Factory expenses	1,60,000	
Factory Lighting	70,000	
Supervising expenses	2,30,000	19,00,000
		1,09,00,000
Add: Opening Work in Progress		9,00,000
		1,18,00,000
Less: Closing Work in Progress		12,00,000
Factory Cost or Works Cost		1,06,00,000

Particulars	₹	₹
Office and Administration Overheads		
Director's fees	5,00,000	
Legal expenses	1,20,000	
Office rent	2,30,000	
Office expenses	1,00,000	
Printing and Stationery	50,000	10,00,000
Cost of Production and Total Cost		1,16,00,000

Note: Since no details of selling and distribution expenses and stock of finished goods have been provided, Cost of Production itself would amount to total cost.

Total cost of producing 500 units of TV is ₹1,16,00,000.

Therefore, **cost per television** = $\frac{₹1,16,00,000}{500 \text{ units}}$ = **₹23,200.**

Problem 18 (Problem on Preparation of Cost Sheet and Calculation of Cost Per Unit)

From the following particulars taken from the cost records of B Ltd., for the year ending 31 March 2018, prepare a Statement of Cost and also ascertain cost per ton.

Particulars	₹	Particulars	₹
Raw materials	33,000	Loose tools written off	600
Productive wages	35,000	Rent and taxes (office)	500
Direct expenses	3,000	Water supply (works)	1,200
General wages	10,500	Factory insurance	1,100
Factory rent and taxes	7,500	Office insurance	500
Factory lighting	2,200	Legal expenses	450
Factory heating	1,500	Warehouse rent	300
Motive power	4,400	Depreciation on plant and machinery	2,000
Haulage	3,000	Depreciation on office building	1,000
Director's fees (works)	1,000	Depreciation on delivery van	300
Director's fees (office)	2,000	Bad debts	100
Factory cleaning	500	Advertising	300
Sundry expenses (office)	200	Sales department salary	1,500
Estimating expenses (works)	800	Upkeep of delivery van	700
Factory stationery	750	Bank charges	50
Office stationery	900	Commission on sales	1,500

Additional information:

Production during the year is 14,775 tons.

Solution

Cost Sheet for the period ending 31 March 2018

Particulars	₹	₹
Raw materials consumed		33,000
Productive wages		35,000
Direct Expenses		3,000
Prime Cost		71,000

Particulars	₹	₹
Factory Overheads		
General wages	10,500	
Factory Rent and Taxes	7,500	
Factory lighting	2,200	
Factory heating	1,500	
Motive power	4,400	
Haulage	3,000	
Director's fees	1,000	
Factory cleaning	500	
Estimating expenses	800	
Factory stationery	750	
Loose tools written off	600	
Water supply	1,200	
Factory insurance	1,100	
Depreciation on plant and machinery	2,000	37,050
Factory/Works Cost		1,08,050
Add: Office and Administration Overheads/Office on cost		
Director's fees	2,000	
Sundry expenses	200	
Office stationery	900	
Rent and taxes	500	
Office insurance	500	
Depreciation of office building	1,000	
Legal expenses	450	5,550
Cost of Production		1,13,600
Add: Selling and Distribution Overheads/Selling on cost		
Warehouse rent	300	
Depreciation on delivery van	300	
Advertising	300	
Sales department salary	1,500	
Upkeep of delivery van	700	
Commission on sales	1,500	4,600
Total Cost		1,18,200

$$\text{Cost per ton} = \frac{\text{Total cost}}{\text{Number of tons produced}} = \frac{1,18,200}{14,775} = \textbf{₹8}$$

Notes:

1. Bank charges, being financial charges, must not be considered in the preparation of Cost Sheet. It must be considered in costing profit and loss account.
2. Bad debts, being loss on account of ineffective receivables management, must not be considered in the preparation of Cost Sheet. It must be considered in costing profit and loss account.

Problem 19 (Problem on Preparation of Cost Sheet and Calculation of Standard Percentages)

The accounts of Z manufacturing company for the year ended December 2017 gives the following particulars.

	₹
Office salaries	6,500
Counting house salaries	12,600
Carriage outwards	4,300
Carriage inwards	7,150
Bad debts	6,500
Repairs of plant, machinery and tools	4,450
Rent, rates, taxes and insurance of factory	8,500
Rent, rates, taxes and insurance of office	2,000
Sales	4,61,100
Opening Stock of material	62,800
Closing Stock of material	48,000
Materials purchased	1,85,000
Travelling expenses	2,100
Traveller's salaries and commission	7,700
Productive wages	1,26,000
Depreciation of plant, machinery and tools	6,500
Depreciation of furniture	300
Director's fees	6,000
Gas and water of factory	1,200
Gas and water of office	400
Manager's salary ($3/4^{th}$ to be charged to factory and $1/4^{th}$ to office)	10,000
General expenses	3,400

Prepare the Statement of Cost and calculate the necessary percentages.

Solution

Statement of Cost for the period ended 31 December 2017

Particulars		₹	₹
Direct Material			
Opening Stock of Raw-material		62,800	
Add: Purchases of Raw-material	1,85,000		
Carriage inwards	7,150	1,92,150	
		2,54,950	
Less: Closing Stock of Raw-material		48,000	2,06,950
Productive Wages			1,26,000
Direct Expenses			NIL
Prime Cost			3,32,950
Factory Overheads			
Repairs of Plant, Machinery and Tools		4,450	
Factory Rent, rates and Insurance		8,500	
Depreciation of Plant, Machinery and Tools		6,500	
Factory Gas and Water		1,200	
Manager's Salary (3/4 × ₹10,000)		7,500	28,150
Factory Cost or Works Cost			3,61,100

Particulars	₹	₹
Office and Administration Overheads		
Office Salaries	6,500	
Office Rent, rates and Insurance	2,000	
Depreciation of Furniture	300	
Director's Fees	6,000	
Office Gas and Water	400	
Manager's Salary (1/4 × ₹10,000)	2,500	
General Expenses	3,400	21,100
Office Cost or Cost of Production Or Cost of Goods Sold		3,82,200
Selling and Distribution Overheads		
Counting House Salaries	12,600	
Carriage outwards	4,300	
Travelling expenses	2,100	
Traveler's services and commission	7,700	26,700
Cost of Sales or Total Cost		4,08,900
Profits (*Balancing Figure*)		**52,200**
Sales		4,61,100

Notes:

1. Drawing office salaries are office salaries and hence are considered under Office Overheads.
2. Counting house salaries refers to salaries relating to packing and hence is considered under selling and distribution overheads.
3. Bad debts, being loss on account of inefficient receivables management, are not considered in preparation of Cost Sheet.
4. **Standard percentages:**
   Based on Cost Sheet, certain percentages are calculated to establish relationship between different cost components. Such percentages are relevant for preparation of tenders and quotations (a detailed discussion of the percentages are made in the chapter titled 'Tenders and Quotations'). The following are some of the standard percentages usually calculated:

   A. **Percentage of Factory Overheads to direct cost:**

   $$\left(\frac{\text{Total factory overheads}}{\text{Direct wages}}\right) \times 100$$

   That is, $\left(\frac{₹28,150}{₹1,26,000}\right) \times 100 =$ **22.34%**

   B. **Percentage of Office Overheads to factory cost:**

   $$\left(\frac{\text{Total office and administration overheads}}{\text{Factory cost}}\right) \times 100$$

   That is, $\left(\frac{₹21,100}{₹3,61,100}\right) \times 100 =$ **5.84%**

   C. **Percentage of selling and distribution overheads to factory cost:**

   $$\left(\frac{\text{Total selling and distribution overheads}}{\text{Factory cost}}\right) \times 100$$

   That is, $\left(\frac{₹26,700}{₹3,61,100}\right) \times 100 =$ **7.39%**

D. **Percentage of profit on total cost:**

$$\left(\frac{\text{Profits}}{\text{Total cost}}\right) \times 100$$

That is, $\left(\frac{₹52,200}{₹4,08,900}\right) \times 100 = \mathbf{12.77\%}$

Problem 20 (Problem on Calculation of Percentages from Cost Sheet)

From the following particulars, prepare a Statement of Cost.

	₹
Stock of Raw Materials on 1/01/2017	37,500
Purchase of Raw Materials	1,25,000
Productive wages	60,000
Stock of finished goods on 1/01/2017	1,07,500
Works expenses	45,000
Administration expenses	67,500
Selling expenses	62,500
Sales during the year	3,75,000
Stock of Raw Materials on 31/12/2017	42,500
Stock of finished goods on 31/12/2017	1,50,000

Also, calculate the percentage of works overhead to productive wages and the percentage of administration expenses to works cost. **[*BU BBM, May (2014)*]**

Solution

Cost Sheet for the period ending 31 December 2017

Particulars	₹	₹
Raw materials consumed		
Opening Stock of Raw Materials	37,500	
Add: Materials Purchased	1,25,000	
	1,62,500	
Less: Closing Stock of Raw Materials	42,500	1,20,000
Productive wages		60,000
Prime Cost		1,80,000
Factory Overheads		
Works expenses		45,000
Factory/Works Cost		2,25,000
Office and Administration Overheads		
Administration expenses		67,500
Cost of Production		2,92,500
Add: Opening Stock of finished goods		1,07,500
		4,00,000
Less: Closing Stock of finished goods		1,50,000
Cost of Goods Sold		2,50,000
Selling and Distribution Overheads		
Selling expenses		62,500
Total Cost		3,12,500
Profits (*Balancing Figure*)		**62,500**
Sales		3,75,000

Percentage of works overheads to productive wages

$$\left(\frac{\text{Works overhead}}{\text{Productive wages}}\right) \times 100$$

$$\left(\frac{₹45,000}{₹60,000}\right) \times 100 = \mathbf{75\%}$$

Percentage of administration expenses to works cost

$$\left(\frac{\text{Administration expenses}}{\text{Works cost}}\right) \times 100$$

$$\left(\frac{₹67,500}{₹2,25,000}\right) \times 100 = \mathbf{30\%}$$

Problem 21 (Problem on Calculation of Percentages from Cost Sheet)

From the following particulars taken from the cost records of G Ltd., for the year ending 31/03/2018, prepare a Statement of Cost and Profit showing the following:

(a) Cost of materials used
(b) Works cost
(c) Cost of production
(d) Percentage of works overheads to productive wages
(e) Percentage of general overheads to works cost

	₹
Cost of materials on 01/04/2017	40,000
Purchase of raw materials	11,00,000
Stock of finished goods on 01/04/2017	50,000
Productive wages	5,00,000
Finished goods sold	24,00,000
Works overhead charges	1,50,000
Office expenses	1,00,000
Stock of materials on 31/03/2018	1,40,000
Stock of finished goods on 31/03/2018	60,000

Solution

Cost Sheet for the period ending 31 March 2018

Particulars	Amount (₹)	Amount (₹)
Raw materials consumed		
Opening Stock of Raw Materials	40,000	
Add: Materials Purchased	11,00,000	
	11,40,000	
Less: Closing Stock of Raw Materials	1,40,000	10,00,000
Productive wages		5,00,000
Prime Cost		15,00,000

(*Contd.*)

Particulars	Amount (₹)	Amount (₹)
Factory Overheads		
Works overhead charges		1,50,000
Factory/Works Cost		16,50,000
Office and Administration Overheads		
Office expenses		1,00,000
Cost of Production		17,50,000
Add: Opening Stock of finished goods		50,000
		18,00,000
Less: Closing Stock of finished goods		60,000
Cost of Goods Sold		17,40,000
Add: Selling and Distribution Overheads/Selling on cost		NIL
Total Cost		17,40,000
Profits (*Balancing Figure*)		6,60,000
Sales		24,00,000

Percentage of works overheads to productive wages

$$\left(\frac{\text{Works overhead}}{\text{Productive wages}}\right) \times 100$$

$$\left(\frac{₹1,50,000}{₹5,00,000}\right) \times 100 = \mathbf{30\%}$$

Percentage of general overheads to works cost

$$\left(\frac{\text{General overhead}}{\text{Works cost}}\right) \times 100$$

$$\left(\frac{₹1,00,000}{₹16,50,000}\right) \times 100 = \mathbf{6.06\%}$$

Problem 22 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

The costing data of Zen Ltd. shows the following:

Materials used	₹14,00,000
Direct Wages	₹10,80,000
Factory overhead	₹3,24,000
Establishment and General Expenses	₹2,24,320

Prepare a statement showing:

(a) Factory cost

(b) Total cost

(c) Percentage of Factory Overhead that bears to the Direct Wages

(d) Percentage of establishment and general expenses is related to factory cost

[*BU B.Com, May (2011)*]

Solution

Cost Sheet for the period ending _____

Particulars	₹
Material used	14,00,000
Direct Wages	10,80,000
Prime Cost	24,80,000
Factory Overheads	3,24,000
Factory/Works Cost	**28,04,000**
Office and Administration Overheads	
Establishment and General Expenses	2,24,320
Cost of Production/Total Cost	**30,28,320**

Percentage of Factory Overheads to Direct Wages

$$\left(\frac{\text{Factory overheads}}{\text{Direct wages}}\right) \times 100$$

$$\left(\frac{₹3,24,000}{₹10,80,000}\right) \times 100 = \mathbf{30\%}$$

Percentage of establishment and general expenses to factory cost

$$\left(\frac{\text{Establishment and general expenses}}{\text{Factory cost}}\right) \times 100$$

$$\left(\frac{₹2,24,320}{₹28,04,000}\right) \times 100 = \mathbf{8\%}$$

Problem 23 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

The costing data of MK Ltd. shows the following material used ₹20,00,000: Direct Wages ₹10,00,000; Factory Overhead ₹6,00,000; establishment and general expenses ₹5,40,000.

Prepare a Cost Sheet showing the factory cost, total cost and also calculate the percentage of Factory Overhead to Prime Cost and percentage of establishment and general expenses to factory cost.

[*BU B.Com, May (2015)*]

Solution

Cost Sheet for the period ending _____

Particulars	₹
Material used	20,00,000
Direct Wages	10,00,000
Prime Cost	30,00,000
Factory Overheads	6,00,000
Factory/Works Cost	36,00,000
Office and Administration Overheads	
Establishment and General Expenses	5,40,000
Cost of Production/Total Cost	**41,40,000**

Percentage of Factory Overheads to prime cost

$$\left(\frac{\text{Factory overheads}}{\text{Prime Cost}}\right) \times 100$$

$$\left(\frac{₹6,00,000}{₹30,00,000}\right) \times 100 = \mathbf{20\%}$$

Percentage of establishment and general expenses to factory cost

$$\left(\frac{\text{Establishment and general expenses}}{\text{Factory cost}}\right) \times 100$$

$$\left(\frac{₹5,40,000}{₹36,00,000}\right) \times 100 = \mathbf{15\%}$$

Problem 24 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

M/s Usha Co. manufactured and sold 2,000 sewing machines in the year 2017.

	₹
Raw materials	2,00,000
Direct Wages	1,60,000
Manufacturing wages (indirect)	1,00,000
Factory overheads	50% of wages
Office Overheads	10% of factory cost
Selling Overheads	₹20 per unit sold

All machines were sold for ₹7,00,000.

Prepare the Cost Sheet. **[*BU B.Com, May (2013)*]**

Solution

Statement of Cost for 2017

(Number of units produced and sold: 2000)

Particulars	₹
Raw Materials Consumed	2,00,000
Direct Wages	1,60,000
Prime Cost	3,60,000
Factory Overheads	
Manufacturing Wages	1,00,000
Other Factory overheads (50% of wages – 50% of ₹1,60,000)	80,000
Factory/Works Cost	5,40,000
Office Overheads (10% of Factory Cost – 10% of ₹5,40,000)	54,000
Cost of Production/Cost of Goods Sold	5,94,000
Selling and Distribution Overheads (₹20 per unit – 2000 Units × ₹20)	40,000
Total Cost	6,34,000
Profits (*Balancing figure*)	66,000
Sales	**7,00,000**

Note: Problem states that 'other Factory Overheads' is '50% of wages'. It is assumed that it is 50% of 'Direct Wages'.

Problem 25 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

M/s Leela Co. manufactured and sold 2,000 iron boxes in the year 2017.

Raw materials	₹3,50,000
Direct Wages	₹2,50,000
Factory overheads	50% of Direct Wages
Office Overheads	15% of factory cost
Selling Overheads	₹25 per unit sold
All machines were sold for	₹10,00,000

Prepare the Cost Sheet. **[*BU B.Com, May (2017)*]**

Solution

Statement of Cost for 2017

(Number of units produced and sold: 2000)

Particulars	₹
Raw Materials Consumed	3,50,000
Direct Wages	2,50,000
Prime Cost	6,00,000
Factory Overheads	
(50% of Direct Wages – 50% of ₹2,50,000)	1,25,000
Factory/Works Cost	7,25,000
Office Overheads (15% of Factory Cost – 15% of ₹7,25,000)	1,08,750
Cost of Production/Cost of Goods Sold	8,33,750
Selling and Distribution Overheads (₹25 per unit – 2000 Units × ₹25)	50,000
Total Cost	8,83,750
Profits (*Balancing figure*)	1,16,250
Sales	**10,00,000**

Problem 26 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

Mr. A furnishes the following data relating to the manufacture of a standard product for the month of January 2018.

Raw material consumed	₹30,000
Direct Labour	₹18,000
Machine hours worked	900
Machine hour rate	₹2 per hour
Office Overhead	20% of works cost
Selling Overheads	₹0.50 per unit
Units produced	17,100
Units sold	16,000 @ ₹8 per unit

Prepare the Cost Sheet. **[*BU BBM, May (2013)*]**

Solution

Cost Sheet for the month of January 2018

(Units produced: 17,100; Units sold: 16,000)

Particulars	₹
Direct Material	30,000
Direct Wages	18,000
Prime Cost	48,000
Factory Overheads	
On the basis of machine hours (900 hours @ ₹2 per hour)	1,800
Factory Cost or Works Cost	49,800
Office Overheads	
20% of Works Cost = (20% of ₹49,800)	9,960
Office Cost/Cost of Production	59,760
Less: Value of Closing Stock of finished goods (₹59,760/17,100 units) × 1,100 units	3,844
Cost of Goods Sold	55,916
Selling Overheads	
₹0.50 per unit for units sold (16,000 units × ₹0.50 per unit)	8,000
Total Cost	63,916
Profits (*Balancing figure*)	64,084
Sales (16,000 Units × ₹8 per Unit)	**1,28,000**

Notes:

1. Closing Stock of finished goods is 1,100 units, (i.e., units produced 17,100 – units sold 16,000) and is valued at 'Cost of Production'.
2. Selling Overheads must be calculated only for units sold, and not for units produced.

Problem 27 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

From the following particulars, prepare a Statement of Cost and Profit.

Raw materials consumed	₹80,000
Direct Wages	₹50,000
Machine hours worked	10,000 hours
Machine hour rate	₹2 per hour
Office Overheads	20% on works cost
Selling Overheads	₹2 per unit sold
Units produced	10,000 units
Units sold	9,000 units at ₹25 per unit **[*BU B.Com, May (2015)*]**

Solution

Statement of Cost and Profit

(Units produced: 10,000; Units sold: 9,000)

Particulars	₹
Direct Material	80,000
Direct Wages	50,000
Prime Cost	1,30,000

Particulars	₹
Factory Overheads	
On the basis of machine hours (10,000 hours @ ₹2 per hour)	20,000
Factory Cost or Works Cost	1,50,000
Office Overheads	
20% of Works Cost = (20% of ₹1,50,000)	30,000
Office Cost/Cost of Production	1,80,000
Less: Value of Closing Stock of finished goods (₹1,80,000/10,000 Units) × 1000 Units	18,000
Cost of Goods Sold	1,62,000
Selling Overheads	
₹2 per unit for units sold (9,000 units × ₹2 per unit)	18,000
Total Cost	1,80,000
Profits (*Balancing figure*)	45,000
Sales (9000 units × ₹25 per unit)	**2,25,000**

Notes:

1. Closing Stock of finished goods is 1,000 units, (i.e., units produced 10,000 – units sold 9,000) and is valued at 'Cost of Production'.
2. Selling Overheads must be calculated only for units sold, and not for units produced.

Problem 28 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

From the following figures, prepare a Cost Sheet showing the cost per unit and profit for the period.

Raw materials consumed	₹40,000
Direct Wages	₹24,000
Machine hours worked	4,000
Machine hour rate	₹2
Office Overheads	10% of factory cost
Selling Overhead	₹1.50 per unit
Units produced	2,000
Units sold	1,800 at ₹50 each

[*BU B.Com, May (2016)*]

Solution

Statement of Cost and Profit

(Units produced: 2,000; Units sold: 1,800)

Particulars	₹
Direct Material	40,000
Direct Wages	24,000
Prime Cost	64,000
Factory Overheads	
On the basis of machine hours (4,000 hours @ ₹2 per hour)	8,000
Factory Cost or Works Cost	72,000

(*Contd.*)

Particulars	₹
Office Overheads	
10% of Factory Cost = (10% of ₹72,000)	7,200
Office Cost/Cost of Production	79,200
Less: Value of Closing Stock of finished goods	
(₹79,200/2,000 Units) × 200 Units	7,920
Cost of Goods Sold	71,280
Selling Overheads	
₹1.50 per unit for units sold (1,800 units × ₹1.50 per unit)	2,700
Total Cost	73,980
Profits (*Balancing figure*)	16,020
Sales (1,800 units × ₹50 per unit)	**90,000**

Notes:

1. Closing Stock of finished goods is 200 units, (i.e., units produced 2,000 – units sold 1,800) and is valued at 'Cost of Production'.
2. Selling Overheads must be calculated only for units sold, and not for units produced.

Problem 29 (Problem on Preparation of Cost Sheet when Cost Relationships are Given)

From the following figures, prepare a Cost Sheet showing the cost and profit per unit.

Raw materials consumed	₹4,00,000
Direct Wages	₹2,40,000
Factory overhead	25% of Prime Cost
Office Overheads	15% of factory cost
Selling Overhead	₹30 per unit sold
Units produced	2,000
Units sold	1,800 at ₹600 each

[*BU B.Com, May (2017)*]

Solution

Statement of Cost and Profit

(Units produced: 2,000; Units sold: 1,800)

Particulars	(₹) Per unit	₹
Direct Material	200	4,00,000
Direct Wages	120	2,40,000
Prime Cost	320	6,40,000
Factory Overheads		
(25% of Prime Cost – 25% of ₹6,40,000)	80	1,60,000
Factory Cost or Works Cost	400	8,00,000
Office Overheads		
15 % of Factory Cost = (15% of ₹8,00,000)	60	1,20,000
Office Cost/Cost of Production	460	9,20,000
Less: Value of Closing Stock of finished goods		
(₹9,20,000/2,000 Units) × 200 Units	--	92,000
Cost of Goods Sold	460	8,28,000

Particulars	(₹) Per unit	₹
Selling Overheads		
₹30 per unit for units sold (1,800 units × ₹30 per unit)	30	54,000
Total Cost	490	8,82,000
Profits (*Balancing figure*)	**110**	**1,98,000**
Sales (1,800 units × ₹600 per unit)	600	10,80,000

Notes:

1. Closing Stock of finished goods is 200 units, (i.e., units produced 2,000 – units sold 1,800) and is valued at 'Cost of Production'.
2. Selling Overheads must be calculated only for units sold, and not for units produced.

Problem 30 (Problem on Preparation of Cost Sheet with Adjustment of Calculation of Profits)

The following data of costing information related to a company for the month of March 2018.

Direct Material	₹1,80,000
Direct Wages	₹1,50,000
Selling and distribution overheads	₹1,05,000
Administration overheads	₹ 4,000
Factory overheads	₹ 0,000
Profit 20% on sales	

Prepare the Cost Sheet. **[*BU B.Com, May (2016)*]**

Solution

Statement of Cost and Profit for the month of March 2018

Particulars	₹
Direct Material	1,80,000
Direct Wages	1,50,000
Prime Cost	3,30,000
Factory Overheads	90,000
Factory Cost or Works Cost	4,20,000
Office and Administration Overheads	84,000
Office Cost /Cost of Goods Sold	5,04,000
Selling and Distribution Overheads	1,05,000
Total Cost	6,09,000
Profits (See Note below) -25% on Cost	**1,52,250**
Sales	**7,61,250**

Note:

Problem states that 'profit is 20% on sales'. However, problem does not specify the sales figures. Hence, the same should be calculated on the basis of cost.

Total Cost + Profit = Sales

If sales is 100, then profit is 2% of ₹100 – ₹20.

Then, total cost = Sales – Profit = ₹100 – ₹20 = ₹80.

When profits are calculated as a percentage of cost, it will be $\left(\frac{₹20}{₹80}\right) \times 100 = 25\%$.

Hence, profit – '20% on sales' is same as '25% on total cost'.

Hence, the profit is taken as 25% of ₹6,09,000 = **₹1,52,250.**

Problem 31 (Problem on Preparation of Cost Sheet with Adjustment of Valuation of Closing Stock of Finished Goods and Calculation of Profits)

From the following information, prepare a Cost Sheet.

Cost of production	₹10,00,000
Opening Stock of finished goods (at ₹50 per unit)	2,500 units
Closing Stock of finished goods	5,000 units
Selling expenses	₹10 per unit sold
Profit	20% on sales
Units sold	7,500

[*BU B.Com, May (2016)*]

Solution

Number of units sold = Opening Stock of finished goods + production during the period – Closing Stock of finished goods

In this problem, number of units produced is not given. It can be ascertained using the above formula.

Accordingly, 7500 units = 2500 units + units produced – 5000 units

Hence, units produced = 10,000.

Statement of Cost and Profit

(Units produced: 10,000, Units sold: 7500)

Particulars	₹
Cost of Production (given)	10,00,000
Add: Value of Opening Stock of Finished Goods (2500 Units @ ₹50 per Unit)	1,25,000
	11,25,000
Less: Value of Closing Stock of Finished Goods (₹10,00,000/10,000 units) × 5000 Units	5,00,000
Cost of Goods Sold	6,25,000
Add: Selling Expenses (₹10 per unit – 7500 units × ₹10)	75,000
Total Cost	7,00,000
Add: Profits (25% of Total Cost – 25% of ₹7,00,000) – See Note	1,75,000
Sales	**8,75,000**

Notes:

1. Closing Stock of finished goods is valued at 'Cost of Production'. 10,000 units are produced and Cost of Production is ₹10,00,000. So, Cost of Production per unit is ₹100. 5000 units of finished goods are in stock at the end of the period. Value of Closing Stock of finished goods is ₹5,00,000 (i.e., 5000 units × ₹100 per unit).
2. Selling expenses are considered only for units sold.
3. Problem states that 'profit is 20% on sales'. However, problem does not specify the sales figure. Hence, the same should be calculated on the basis of cost.
   Total Cost + Profit = Sales
   If sales is 100, then profit is 20% of ₹100 = ₹20.
   Then, total cost = Sales – Profit = ₹100 – ₹20 = ₹80.
   When profits are calculated as a percentage of cost, it will be $\left(\frac{₹20}{₹80}\right) \times 100 = 25\%$
   Hence, profit – '20% on sales' is same as '25% on total cost'.
   Hence, the profit is taken as 25% of ₹7,00,000 = **₹1,75,000.**

Problem 32 (Problem on Preparation of Cost Sheet Involving Valuation of Closing Stock of Finished Goods)

The following particulars of cost relates to commodity X manufactured by L Ltd. for half year ending 31 December 2017.

Purchase of Raw Materials	₹1,20,000
Works overhead	₹48,000
Direct Wages	₹1,00,000
Carriage on purchases	₹1,440
Stock of Raw Materials on 01/07/2017	₹20,000
Stock of Raw Materials on 31/12/2017	₹22,240
Stock of finished goods on 01/07/2017	1,000 tons (₹16,000)
Stock of finished goods on 31/12/2017	2,000 tons
Work in Progress on 01/07/2017	₹4,800
Work in Progress on 31/12/2017	₹16,000
Office Overheads	₹25,600
Selling and distribution overhead	₹1 per ton sold
Sales	₹3,00,000
Production	16,000 tons

Solution

Cost Sheet for half year ending 31 December 2017

Particulars	Units	₹	₹
Raw materials consumed:			
Opening Stock of Raw Materials		20,000	
Add: Materials Purchased		1,20,000	
Add: Carriage on purchase		1,400	
		1,41,400	
Less: Closing Stock of Raw Materials		22,240	1,19,200
Direct Wages			1,00,000
Prime Cost			2,19,200
Factory Overheads			48,000
Add: Opening Work in Progress			4,800
			2,72,000
Less: Closing Work in Progress			16,000
Factory/Works Cost			2,56,000
Office and Administration Overheads			25,600
Cost of Production	16,000		2,81,600
Add: Opening Stock of finished goods	1,000		16,000
	17,000		2,97,600
Less: Closing Stock of finished goods (See Note below)	2,000		35,200
Cost of Goods Sold	15,000		2,62,400
Selling and Distribution Overheads (15,000 × ₹1.00)			15,000
Total Cost			2,77,400
Profits (*Balancing Figure*)			22,600
Sales	15,000		3,00,000

Note:
The value of Closing Stock of finished goods is not given. It must be valued at 'Cost of Production'.

$$\text{Value of Closing Stock of finished goods} = \left(\frac{\text{Cost of production}}{\text{Units produced}}\right) \times \text{Closing Stock of finished goods}$$

$$= \left(\frac{2,81,600}{16,000}\right) \times 2,000$$

$$= \textbf{₹35,200}$$

Problem 33 (Problem on Preparation of Cost Sheet with Information on Work in Progress)

The directors of a manufacturing business require a statement showing the production results of the business for the month of March 2018. The accounts reveal the following information:

Stock in hand on 1 March

Raw materials	₹25,000
Finished goods	₹17,360

Stock in hand on 31 March

	₹
Raw materials	26,250
Finished goods	15,750
Purchase of Raw Materials	21,900
Work in Progress on 1 March	8,220
Work in Progress on 31 March	9,100
Sale of finished goods	72,310
Direct Wages	17,150
Non-productive wages	830
Works expenses	8,340
Office and administrative expenses	3,160
Selling and distribution expenses	4,210

Prepare the Cost Sheet.

[*BU BBM, May (2014)*]

Solution

Statement of Cost for the month of March 2018

Particulars	₹	₹
Direct Material		
Opening Stock of raw material	25,000	
Add: Purchase of raw material	21,900	
	46,900	
Less: Closing Stock of raw material	26,250	
Direct Material Consumed		20,650
Direct Wages		17,150
Prime Cost		37,800

Particulars	₹	₹
Factory Overheads		
Non-productive wages	830	
Works expenses	8,340	9,170
		46,970
Add: Opening Stock of Work in Progress		8,220
		55,190
Less: Closing Stock of Work in Progress		9,100
Factory Cost		46,090
Office and Administrative Overheads		3,160
Office Cost or Cost of Production		49,250
Add: Opening Stock of finished goods		17,360
		66,610
Less: Closing Stock of finished goods		15,750
Cost of Goods Sold		50,860
Add: Selling and Distribution Overheads		4,210
Total Cost		55,070
Net Profits (*Balancing figure*)		**17,240**
Sales		72,310

Problem 34 (Problem on Preparation of Cost Sheet with Information on Work in Progress)

Following is the information for the month of January 2018 of Mr. Kumar Ltd.

Stock on 1/1/2018

	₹
Raw materials	2,00,000
Finished goods	1,00,000

Stock on 31/1/2018

	₹
Raw materials	1,50,000
Finished goods	50,000
Purchase of raw materials	4,00,000
Work in Progress on 1/1/2018	30,000
Work in Progress on 31/1/2018	40,000
Sales	8,00,000
Direct Wages	90,000
Factory expenses	48,000
Office expenses	16,000
Selling expenses	8,000
Dividend	10,000
Interest on loan	15,000

Prepare the Cost Sheet.

[*BU B.Com, May 2015 and May 2016 (modified)*]

Solution

Statement of Cost for the month of March 2018

Particulars	₹	₹
Direct Material		
Opening Stock of raw material	2,00,000	
Add: Purchase of raw material	4,00,000	
	6,00,000	
Less: Closing Stock of raw material	1,50,000	
Direct Material Consumed		4,50,000
Direct Wages		90,000
Prime Cost		5,40,000
Factory Expenses		48,000
		5,88,000
Add: Opening Stock of Work in Progress		30,000
		6,18,000
Less: Closing Stock of Work in Progress		40,000
Factory Cost		5,78,000
Office Expenses		16,000
Office Cost or Cost of Production		5,94,000
Add: Opening Stock of finished goods		1,00,000
		6,94,000
Less: Closing Stock of finished goods		50,000
Cost of Goods Sold		6,44,000
Add: Selling Expenses		8,000
Total Cost		6,52,000
Net Profits (*Balancing figure*)		1,48,000
Sales		**8,00,000**

Note: Dividends and interest on loan are financial expenses. Hence, they are not considered in the Cost Sheet.

Problem 35 (Problem on Preparation of Cost Sheet and Calculating Total Cost and Cost Per Unit)

The following extract of costing information relates to commodity 'A' for the year ending 31 December, 2017.

	₹
Purchase of raw material	60,000
Direct Wages	50,000
Rent, rates and other works on cost	20,000
Carriage inwards (for factory use)	1,000

Stock on 01/01/2017

- Raw materials 10,000
- Finished products (2000 tons) 8,000
- Work in Progress 2,400

Stock on 31/12/2017

- Raw materials 11,000
- Finished products (4000 tons) ?
- Work in Progress 8,000

Cost of factory supervision 4,000
Sales 1,50,000
Advertising, discount allowed and other selling costs amounted to ₹0.40 per ton sold. 32,000 tons of commodity were produced during the year.
Ascertain the cost of output and the cost and profit per ton of commodity.

Solution

Number of units sold = Number of units of Opening Stock of finished goods + Number of units produced during the period – Number of units of Closing Stock of finished goods

In this problem, the details of stock of finished goods and units produced are given, but the number of units sold is not made available. Hence, the above formula must be used to ascertain the same.
Therefore**,** number of units sold = 2000 + 32,000 – 4000 = **30,000**.

Statement of Cost for the year ending 31 December 2017

(Units produced: 32,000; Units sold: 30,000)

Particulars	Units	₹	₹
Direct Material			
Opening Stock of raw material		10,000	
Add: Purchase of raw material		60,000	
		70,000	
Less: Closing Stock of raw material		11,000	
Direct Material Consumed			59,000
Direct Wages			50,000
Direct Expenses			NIL
Prime Cost			1,09,000
Factory Overheads			
Rent, rates and other works-on-cost		20,000	
Carriage inwards (for factory use)		1,000	
Factory supervision cost		4,000	25,000
			1,34,000
Add: Opening Stock of Work in Progress			2,400
			1,36,400
Less: Closing Stock of Work in Progress			8,000
Factory Cost or Cost of Production	32000		1,28,400
Add: Opening Stock of finished goods	2,000		8,000
	34,000		1,36,400
Less: Closing Stock of finished goods – See Note Number 2	4,000		16,050
Cost of Goods Sold	30,000		1,20,350

(*Contd.*)

Particulars	Units	₹	₹
Add: Selling and Distribution Overheads (30,000 units @ ₹0.40 per unit)			1 2,000
Total Cost			1,32,350
Net Profits (*Balancing figure*)			17,650
Sales	30,000		1,50,000

Summary of Cost and Profit (Total and Per Unit)

Particulars	Number of Units	Total (₹)	Per Unit (₹)
Cost of Production	32,000	1,28,400	4.0125
Cost of Goods Sold	30,000	1,20,350	4.012
Total Cost	30,000	1,32,350	4.412
Sales	30,000	1,50,000	5.000
Profits	30,000	17,650	0.588

Notes:

1. Since there were no office and administration overheads, factory cost and Cost of Production are same.
2. The value of Closing Stock of finished goods must be calculated on the basis of Cost of Production. The valuation has been made as follows:
   The Cost of Production for 32,000 units is ₹1,28,400.
   Hence, the cost of producing 4000 units (i.e., the number of units of finished goods in stock) is $\left(\frac{₹1,28,400 \; ₹4000 \text{ units}}{32,000 \text{ units}}\right)$ = **₹16,050.**
3. Selling and distribution overheads must be calculated for number of units sold, and not for number of units produced. Hence, the selling and distribution overheads have been calculated for 30,000 units.

Problem 36 (Problem on Preparation of Cost Sheet with Adjustment on Scrap)

The following particulars relate to the year 2017.

Particulars	Units in Kg	₹
Opening Stock		
• Raw materials	2,000	2,000
• Finished mixture	500	1,750
• Factory stores		7,250
Purchases		
• Raw materials	1,60,000	1,80,000
• Factory stores		24,250
Sales		
• Finished mixture	1,53,050	9,18,000
• Factory scrap		8,170
Factory wages		1,78,650
Power		30,400
Depreciation on machinery		18,000

Particulars	Units in Kg	₹
Salaries		
• Factory		72,220
• Office		37,220
• Selling		41,500
Expenses		
• Direct		18,500
• Office		18,200
• Selling		18.000
Closing Stock		
• Raw materials	1,200	
• Finished mixture	450	
• Factory stores		5,500

The stock of finished mixture at the end of 2017 is to be valued at the factory cost of the mixture for that year. The purchase price of the raw material remained unchanged throughout the year. Prepare a Statement of Cost and Profit.

Solution

Number of units sold = Number of units of Opening Stock of finished goods + Number of units produced during the period – Number of units of Closing Stock of finished goods

That is, 1,53,050 = 500 + Number of units produced – 450
Therefore, number of units produced = 1,53,050 – 500 + 450 = **1,53,000**.

Statement of Cost for the year ended 31 December 2017
(Number of units produced: 1,53,000 kg; Number of units sold: 1,53,050 kg)

Particulars	Kgs	₹	₹
Direct Material			
Opening Stock of raw material	2,000	2,000	
Add: Purchase of raw material	1,60,000	1,80,000	
	1,62,000	1,82,000	
Less: Closing Stock of raw material (See Note. Number 1)	1,200	1,350	
Direct Material consumed	1,60,800		1,80,650
Factory Wages			1,78,650
Direct Expenses			18,500
Prime Cost			3,77,800
Factory Overheads			
Factory Stores (Opening Stock ₹7,250 + Purchases ₹24,250 – Closing Stock ₹5,550)			25,950
Power			30,400
Depreciation on Machinery			18,000
Salaries			72,220
			5,24,370
Less: Amount realized on sale of scrap (See Note. Number 2)	7,800		8,170
Factory Cost	1,53,000		5,16,200

(*Contd.*)

Particulars	Kgs	₹	₹
Office and Administration Overheads			
Salaries		37,220	
Expenses		18,200	55,420
Cost of Production			5,71,620
Add: Opening Stock of finished mixture	500		1,750
	1,53,500		5,73,370
Less: Closing Stock of finished mixture (See Note Number 3)	450		1,518
Cost of Goods Sold	1,53,050		5,71,852
Selling and Distribution Overheads			
Salaries		41,500	
Expenses		18,000	59,500
Total Cost	1,53,050		6,31,352
Profits (*Balancing figure*)			2,86,648
Sales	1,53,050		9,18,000

Summary of Cost and Profit (per unit)

Particulars	Number of Kg	Total (₹)	Per unit (₹)
Direct Material consumed	1,60,800	1,80,650	1.123
Prime cost	1,60,800	3,77,800	2.350
Factory cost	1,53,000	5,16,200	3.374
Cost of production	1,53,000	5,71,620	3.736
Cost of goods sold	1,53,050	5,71,852	3.736
Total cost	1,53,050	6.31.352	4.125
Sales	1,53,050	9,18,000	5.998
Profits	1,53,050	2,86,648	1.873

Notes:

1. The Closing Stock of raw material is valued under FIFO method. Accordingly, the raw material in stock represents units purchased during the year. So, the value of Closing Stock of raw material is calculated at purchase price (which remains unchanged throughout the year), as shown:
   The purchase price of 1,60,000 kg of raw material is ₹1,80,000.
   Hence, the value of 1,200 kg of raw material in stock is $\left(\frac{₹1,80,000 \; ₹1200 \text{ kg}}{1,60,000 \text{ kg}}\right)$ = **₹1,350**.
2. The number of units of raw material consumed is 1,60,800 kg, while the number of units produced is 1,53,000 kg. The difference represents number of units of scrap sold, the amount realised on which has been given as ₹8,170. Therefore, the number of units of scrap sold = 1,60,800 kg – 1,53,000 kg = **7,800 kg**.
3. It is a conventional practice to value the stock of finished goods at 'Cost of Production'. However, in this problem, it is clearly specified that the value of Closing Stock of finished mixture must be calculated at factory cost. Accordingly, the value of Closing Stock of finished mixture is calculated as follows:
   The factory cost for 1,53,000 kg of finished mixture is ₹5,16,200.

Hence, the value of 450 kg of Closing Stock of finished mixture is:

$$\left(\frac{₹5,16,200 \; ₹450 \text{ kg}}{1,53,000 \text{ kg}}\right) = ₹\mathbf{1518} \text{ (rounded off).}$$

Problem 37 (Problem on Preparation of Cost Sheet for Two Products)

A pen manufacturing company has two types of pens: Deluxe and Popular. The manufacturing cost for the year ended 31 March 2018, was as follows:

	₹
Direct Material	2,00,000
Direct Wages	1,12,000
Production overhead	48,000

It is ascertained that Direct Material in Deluxe type costs twice as much as that of Popular type. Direct Wages of Popular type were 60% of those for Deluxe type. Production overhead was 30 paisa per pen for both the types. Administration overhead for each type was 200% of Direct Wages. Selling cost was 25 paisa per pen for both the types. The production during the year of Deluxe type was 40,000 pens of which 36,000 were sold and Popular type was 1,20,000 pens of which 1,00,000 were sold. The selling price was ₹7 per pen for Deluxe type and ₹5 per pen for Popular type.

Prepare Statement of Cost and ascertain the profit.

Solution

Number of units sold = Number of units of Opening Stock of finished goods + Number of units produced during the period – Number of units of Closing Stock of finished goods

(Units)

Product	Sales	Opening Stock	Production	Closing Stock
Deluxe	36,000	Nil	40,000	?
Popular	1,00,000	Nil	1,20,000	?

Using the mentioned formula, the number of units of Closing Stock is calculated as follows:

Number of units of Closing Stock = Opening Stock + Number of units produced – Number of units sold

Deluxe: Nil + 40,000 – 36,000 = 4000 units

Popular: Nil + 1,20,000 – 1,00,000 = 20,000 units

Statement of Cost for the period ending 31 March 2018

Particulars	Deluxe (Units produced = 40,000 Units sold = 36,000)		Popular (Units produced = 1,20,000 Units sold = 1,00,000)		TOTAL (₹)
	Total (₹)	P.U (₹)	Total (₹)	P.U (₹)	
Direct Material (Note 1)	80,000	2.00	1,20,000	1,00	2,00,000
Direct Wages (Note 2)	40,000	1.00	72,000	0.60	1,12,000
Prime Cost	1,20,000	3.00	1,92,000	1.60	3,12,000

(*Contd.*)

Particulars	Deluxe (Units produced = 40,000 Units sold = 36,000)		Popular (Units produced = 1,20,000 Units sold = 1,00,000)		TOTAL (₹)
	Total (₹)	P.U (₹)	Total (₹)	P.U (₹)	
Production Overheads (Note 3)	12,000	0.30	36,000	0.30	48,000
Factory Cost	1,32,000	3.30	2,28,000	1.90	3,60,000
Administration Overheads (Note 4)	80,000	2.00	1,44,000	1.20	2,24,000
Cost of Production	2,12,000	5.30	3,72,000	3.10	5,84,000
Less: Closing Stock of finished goods (Note 5)	21,200	----	62,000	---	83,200
Cost of Goods Sold	1,90,800	5.30	3,10,000	3.10	5,00,800
Selling Overheads (Note 6)	9,000	0.25	25,000	0.25	34,000
Total Cost	1,99,800	5.55	3,35,000	3.35	5,34,800
Profit (*Balancing figure*)	52,200	1.45	1,65,000	1.65	2,17,200
Sales	2,52,000	7.00	5,00,000	5.00	7,52,000

Notes:

1. Calculation of Direct Material cost

   The problem states that the Direct Material in Deluxe type costs twice as much as that of Popular type. That is, the ratio of Direct Material consumption for Deluxe and Popular is in the ratio of 2:1. However, the ratio is applicable when the units produced of both products are same. The number of units produced of both products being different; the material consumption by each product is calculated in the following manner:

Particulars	Deluxe	Popular
Production ratio	1	3
Material consumption ratio	2	1
Compound ratio	$1 \times 2 = 2$	$3 \times 1 = 3$
Apportionment of material cost (Total = ₹2,00,000)	$= 2/5 \times$ ₹2,00,000 = **₹80,000**	$= 3/5 \times$ ₹2,00,000 = **₹1,20,000**
Per unit material cost	₹80,000/40,000 units = **₹2 per unit**	₹1,20,000/1,20,000 units = **₹1 per unit**

2. Calculation of Direct Wages

   The problem states that the Direct Wages of Popular type were 60% of those for Deluxe type. That is, the ratio of Direct Wages for Deluxe and Popular is in the ratio of 10:6 or 1:0.6.

   However, the ratio is applicable when the units produced of both products are same. The number of units produced of both products being different; the wages of each product is calculated in the following manner:

Particulars	Deluxe	Popular
Production ratio	1	3
Labour cost ratio	10	6
Compound ratio	10	18

Particulars	Deluxe	Popular
Apportionment of labour cost (Total = ₹1,12,000)	= ₹1,12,000 × 10/28 = **₹40,000**	= ₹1,12,000 × 18/28 = **₹72,000**
Per unit labour cost	= ₹40,000/40,000 units = **₹1 per unit**	= ₹72,000/1,20,000 units = **₹0.60 per unit**

3. Calculation of production overheads
   The problem states that the production overhead was 30 paisa per pen for both the types.
   Hence, the production overheads are calculated as follows:
   Deluxe: (40,000 units × 30 paisa per unit) = **₹12,000**
   Popular: (1,20,000 units × 30 paisa per unit) = **₹36,000**
4. Calculation of administration overheads
   The problem states that the administration overhead for each type was 200% of Direct Wages.
   Accordingly, the administration overheads are calculated as follows:
   Deluxe: 200% of ₹40,000 = ₹80,000
   Popular: 200% of ₹72,000 = ₹1,44,000
5. Valuation of Closing Stock of finished goods
   Closing Stock of finished goods is valued at 'Cost of Production'. Accordingly, the value of Closing Stock of finished goods is calculated as follows:

	Deluxe	Popular
Cost of production per unit	₹5.30	₹3.10
Number of units of Closing Stock	4000	20000
Value of Closing Stock of finished goods	= (4000 × ₹5.30) = ₹21,200	= (20,000 × ₹3.10) = ₹62,000

6. Calculation of Selling Overheads
   The problem states that the Selling Overhead was 25 paisa per pen for both the types. Selling Overheads must be calculated only for units sold.
   Hence, the Selling Overheads are calculated as follows:
   Deluxe: (36,000 units × 25 paisa per unit) = **₹9,000**
   Popular: (1,00,000 units × 25 paisa per unit) = **₹25,000**

SUMMARY

- A *Cost Sheet* or *Statement of Cost* is a statement which shows the break-up and build-up of costs. It is a document which provides for the assembly of the detailed cost of a cost center or a cost unit.
- A manufacturing or production account is an alternative to Cost Sheet or Statement of Cost. It is prepared under double entry system of maintaining books.

Important Formulae and Points to Remember

- Number of units produced = Number of units of Work in Progress at the *beginning* of the period + Number of units of materials consumed during the period – Number of units of Work in Progress at the *end* of the period.
- Number of units sold = Number of units of *Opening Stock* of finished goods + Number of units *produced* during the period – Number of units of *Closing Stock* of finished goods
- Prime cost = Direct Material cost + Direct Labour cost + Other direct expenses
- Works cost or factory cost = Prime cost + Factory overheads
- Conversion cost = Factory cost – Direct Material cost
- Office cost or Cost of Production = Factory cost + Office and administration overheads
- Cost of goods sold = Office cost + Value of Opening Stock of finished goods – Value of Closing Stock of finished goods.
- Total cost = Cost of goods sold + Selling and distribution overheads
- Profit = Sales – Total cost
- All expenses incurred during the period must be considered, irrespective of whether they are paid or outstanding. That is, the Statement of Cost must be prepared on accrual basis.
- Where the value of Closing Stock of raw material is not made available, it must be calculated either under FIFO method or average cost method.
- Where the value of Closing Stock of Work in Progress is not made available, it must be calculated at 'Prime Cost + Factory Overheads'.
- While preparing Cost Sheet, the following items must not be considered:
  - Capital expenditure like purchase of assets, purchase of investments, etc.
  - Financial expenses like dividends, interest, cash discount, etc.
  - Incomes like rent received, cash discount received, interest on investments, etc.
  - Abnormal expenses like fines, penalties, etc.
  - Losses on account of inefficiency like bad debts, etc.
  - Appropriation of profits like dividends, tax, reserves, etc.

EXERCISES

Section B Type Problems

Problem 1

From the following particulars, prepare a Statement of Cost and Profit

- Raw materials consumed ₹80,000
- Direct Wages ₹50,000
- Machine hours worked 10,000 hours
- Machine hour rate ₹2 per hour
- Office Overheads 20% on works cost
- Selling Overheads ₹2 per unit sold
- Units produced 10,000 units
- Units sold 9,000 units at ₹25 per unit **(Ans: Profit ₹45,000)**

Problem 2

The costing data of MK Ltd. shows that the following material used ₹20,00,000: Direct Wages ₹10,00,000; Factory overhead ₹6,00,000; Establishment and General Expenses ₹5,40,000.

Prepare a Cost Sheet showing (a) factory cost, (b) total cost, and also calculate the (c) percentage of Factory Overhead to Prime Cost, and (d) percentage of establishment and general expenses to factory cost.

[Ans: (a) ₹36,00,000; (b) ₹41,40,000; (c) 20% and (d) 15%]

Problem 3

From the following particulars, prepare a Statement of Cost.

- Stock of Raw Materials on 1/1/2017 ₹37,500
- Productive wages ₹60,000
- Works expenses ₹45,000
- Selling expenses ₹62,500
- Stock of Raw Materials on 31/12/2017 ₹42,500
- Purchase of Raw Materials ₹1,25,000
- Stock of finished goods on 1/1/2017 ₹1,07,500
- Administration expenses ₹67,500
- Sales during the year ₹3,75,000
- Stock of finished goods on 31/12/2017 ₹1,50,000

Also, calculate the percentage of works overhead to productive wages and the percentage of administration expenses to works cost. **(Ans: Profit ₹62,500; 75% and 30%)**

Problem 4

M/s Usha Co. manufactured and sold 2,000 sewing machines in the year 2011.

- Raw materials ₹2,00,000
- Manufacturing wages ₹1,00,000
- Office Overheads 10% of factory cost
- All machines were sold for ₹7,00,000.
- Direct Wages ₹1,60,000
- Factory overheads 50% of wages
- Selling Overheads ₹20 per unit sold

Prepare the Cost Sheet. **(Ans: Profit ₹66,000)**

Problem 5

In a factory, 20,000 units of product 'A' were manufactured in the month of March 2013. From the following figures obtained from the costing records, prepare a Cost Sheet showing cost per unit.

- Opening Stock of Raw Materials ₹5,000
- Closing Stock of finished goods ₹1,000
- Direct Wages ₹25,000
- Office Overhead ₹20,000
- Raw materials purchased ₹55,000
- Closing Stock of Raw Materials ₹10,000
- Factory overhead ₹40,000
- Materials returned to seller ₹4,000

(Ans: Cost of production ₹1,31,000 at ₹6.55 per unit)

Problem 6

Mr. A furnishes the following data relating to the manufacture of a standard product for the month of January 2013.

- Raw materials consumed ₹30,000
- Machine hours worked 900
- Office Overhead 20% of works cost
- Units produced 17,100
- Direct Labour ₹18,000
- Machine hour rate ₹2
- Selling Overhead ₹0.50 per unit sold
- Units sold 16,000 at ₹8 per unit

Prepare the Cost Sheet. **(Ans: Profit ₹56,396)**

Problem 7

The costing data of Zen Ltd. shows the following:

- Materials used ₹14,00,000
- Factory overhead ₹3,24,000
- Direct Wages ₹10,80,000
- Establishment and General Expenses ₹2,24,320

Prepare a statement showing the following:

(i) Factory cost
(ii) Total cost
(iii) Percentage of Factory Overhead that bears to the Direct Wages
(iv) Percentage of establishment and general expenses related to factory cost

[Ans: (a) 28,04,000 (b) ₹30,28,320 (c) 30% and (d) 8%]

Problem 8

Mr. A furnishes the following data relating to the manufacture of a standard product for the month of January 2018.

- Materials ₹90,000
- Depreciation of machinery ₹11,500
- Indirect wages at factory ₹15,000
- Cost of rectification of defective work ₹3,000
- Office and selling overhead ₹39,000
- Direct Wages ₹60,000
- Power and consumable stores ₹12,000
- Lighting of factory ₹5,500
- Sale of scrap ₹2,000
- Selling price ₹3,16,000

Prepare the Cost Sheet. **(Ans: Selling price ₹3,16,000)**

Problem 9

Calculate Cost of Production from the following:

- Direct Materials ₹5,000
- Factory overheads ₹3,000
- Audit fees ₹500
- Closing Stock of Work in Progress ₹2,500
- General expenses ₹2,000
- Direct Labour ₹4,000
- Office staff salary ₹3,500
- Opening Stock of Work in Progress ₹1,000
- Office rent ₹1,500
- Other office expenses ₹500 **(Ans: ₹18,500)**

Section C Type Problems

Problem 1

From the following information for the month of January 2018 of Mr. Kumar Ltd., prepare the Cost Sheet.

- Stock on 1 January 2018
  - Raw materials ₹2,50,000
  - Finished goods ₹1,52,500
- Purchase of Raw Materials ₹6,50,000
- Work in Progress on 31/1/2018 ₹57,000
- Direct Wages ₹1,20,000
- Office expenses ₹47,500
- Dividend ₹20,000
- Stock on 31 January 2018
  - Raw materials ₹1,50,000
  - Finished goods ₹1,50,000
- Work in Progress on 1/1/2018 ₹50,000
- Sales ₹12,00,000
- Factory expenses ₹87,000
- Selling and distribution expenses ₹25,000
- Interest on loan ₹45,000

(Ans: Profit ₹1,75,000)

Problem 2

Following is the information for the month of January 2018 of Mr. Kumar Ltd.,

- Stock on 1/1/2018:
  - Raw materials ₹2,00,000
  - Finished goods ₹1,00,000
- Purchase of Raw Materials ₹4,00,000
- Work in Progress on 31/1/2018 ₹40,000
- Direct Wages ₹90,000
- Office expenses ₹16,000
- Dividend ₹10,000
- Stock on 31/1/2018
  - Raw materials ₹1,50,000
  - Finished goods ₹50,000
- Work in Progress on 1/1/2018 ₹30,000
- Sales ₹8,00,000
- Factory expenses ₹48,000
- Selling expenses ₹8,000
- Interest on loan ₹15,000

Prepare the Cost Sheet. **(Ans: Profit ₹1,48,000)**

Problem 3

The directors of a manufacturing business require a statement showing the production results of the business for the month of March. The accounts reveal the following information

- Stock on hand on 1 March
  - Raw materials ₹25,000
  - Finished goods ₹17,360
- Purchase of Raw Materials ₹21,900
- Work in Progress on 31 March ₹9,100
- Direct Wages ₹17,150
- Works expenses ₹8,340
- Selling and distribution expenses ₹4,210
- Stock on hand on 31 March
  - Raw materials ₹26,250
  - Finished goods ₹15,750
- Work in Progress on 1 March ₹8,220
- Sale of finished goods ₹72,310
- Non-productive wages ₹830
- Office and administrative expenses ₹3,160

Prepare the Cost Sheet. **(Ans: Profit ₹17,240)**

Problem 4

Prepare a Statement of Cost from the following information.

Raw materials consumed ₹40,000
Wages traceable to jobs ₹15,000
Lubricant oil ₹3,750
Repairs to plant and machinery ₹5,100
Postage ₹1,200
Directors' fees ₹6,400
General expenses ₹1,250
Advertising ₹4,900
Manager's salary ₹12,000
Travelling expenses of salesmen ₹1,000
Sales ₹1,60,000
Indirect material ₹9,000
Wages paid to maintenance workers ₹7,500
Consumable stores ₹4,250
Repairs to office building ₹1,500
Audit fees ₹2,800
Legal expenses ₹3,600
Gas, Electricity and Water ₹750
Packing charges ₹2,200
Interest received ₹2,100
Salesmen commission ₹1,500

Note: Manager devotes 2/3 of his time in factory and 1/3 of his time in office. **(Ans: Profit ₹36,300)**

Problem 5

From the following details, prepare a Statement of Cost showing the maximum possible information.

Raw materials at the beginning ₹16,000 and at the end ₹12,000
Raw materials purchased during the year ₹34,000
Factory expenses ₹3,750
Selling expenses ₹4,500
General Manager salary ₹57,000
Factory lighting ₹6,500
Warehouse lighting ₹4,400
Office building insurance ₹2,400
Carriage outwards ₹1,750
Bad debts ₹1,000
Goodwill written off ₹5,000
Dividend paid ₹5,500
Sales ₹3,50,000
Finished goods at the beginning ₹10,500 and at the end ₹7,000
Direct expenses ₹6,250
Office expenses ₹5,500
Works manager salary ₹62,250
Sales manager salary ₹50,000
Office lighting ₹5,600
Factory building insurance ₹3,200
Carriage inwards ₹1,250
Productive wages ₹10,000
Discount allowed ₹3,000
Transfer fee received ₹450
Dividend received ₹575

(Ans: Profit ₹83,150)

CHAPTER 3

Preparation of Tenders and Quotations

CHAPTER OUTLINE

3.1 INTRODUCTION

The cost of making and selling a product and the profit made on the same can be ascertained by adopting a suitable method of costing. However, ascertaining past performance might not be sufficient for making all business decisions. One of the advantages of cost accounting, as compared to financial accounting, is its ability to estimate and forecast for the future.

When customers approach with specific orders and ask for the price at which they can buy the product, the business enterprise must be able to calculate the possible selling price and quote the same to the customer. When contracts are announced for supply of products, the business enterprise must submit a tender quoting the price at which it could supply such products. The price so to be quoted can be calculated by preparing a 'Statement of Tender or Quotation'.

3.2 STATEMENT OF TENDER OR QUOTATION

Statement of Tender is a statement prepared for ascertaining the cost and price of proposed or future production. The price so ascertained by preparing a statement of tender is called Quotation. This is the price

at which the business enterprise can consider selling its products, after taking care of the changes in costs and profit requirements or expectations of the enterprise.

THEORY QUESTIONS

1. What is 'Statement of Tender'?
2. What is a 'Quotation'?

3.3 BASES FOR PREPARATION OF STATEMENT OF TENDER

A statement of tender can be prepared on different bases. The following are the different bases on which statement of tender or quotation can be prepared:
(i) Behaviour of costs
(ii) Relationship of costs
(iii)Policy regarding cost and profits

THEORY QUESTIONS

1. State the different bases on which a statement of tender can be prepared.
2. What is 'Statement of Tender'? List the different bases for its preparation.

3.4 PREPARATION OF STATEMENT OF TENDER ON THE BASIS OF BEHAVIOUR OF COSTS

Cost estimation for proposed production can be made on the basis of behaviour of costs. On the basis of behaviour, costs can be classified into the following categories:
(i) Fixed cost
(ii) Variable cost
(iii)Semi-variable cost
Fixed cost: refers to the cost which remains the same in total, irrespective of production, but per unit varies *inversely* with production.
Variable cost: refers to the cost which remains same per unit irrespective of production, but the total varies *proportionately* with production.
Semi-variable cost: refers to the cost in which one portion is fixed and the remaining is variable in nature.

THEORY QUESTIONS

1. What is cost? State the different types of cost on the basis of its behaviour.
2. What is fixed cost? What are its features?
3. What is variable cost? What are its features?
4. What is a semi-variable cost? What are its features?
5. Write a short note on different types of cost on the basis of its behaviour.

3.4.1 How to Estimate cost on the Basis of Behaviour?

- **Fixed cost** remains the same as present, although there is change in production. For example, for the present production of 10,000 units, if the fixed administration overhead is ₹1,00,000 and if the proposed production is 20,000 units, the administration overhead remains to be ₹1,00,000.

- **Variable cost** varies proportionately with production. For example, for the present production of 10,000 units, if the Direct Material cost is ₹2,00,000, then for the proposed production of 15,000 units, the material cost will be ₹3,00,000 $\left[\text{i.e.,}\frac{₹2,00,000 \times 15000 \text{ units}}{10000 \text{ units}}\right]$
- **Semi-variable cost** must be split into fixed and variable. The fixed part of semi-variable cost remains same with change in production and the variable part of semi-variable cost varies proportionately with production.

THEORY QUESTIONS

1. Write a short note on estimation of cost of producing certain number of units on the basis of the behaviour of cost.
2. What is fixed cost? How can fixed cost for a projected future production be estimated?
3. What is variable cost? How to estimate the variable cost for a projected future production?
4. What is semi-variable cost? How to estimate the semi-variable cost for projected production?

3.4.2 How to Ascertain the Nature of Cost?

For estimating cost and profit on the basis of behaviour, it is essential to ascertain the type of cost on the basis of its behaviour. It can be ascertained with the help of cost structure for at least two different levels of production.

- When the **total cost** remains same at different levels of production, it represents **fixed cost**.
- When **per unit cost** remains same at different levels of production, it represents **variable cost**.
- When **neither the total cost nor per unit cost** is same at different levels of production, it represents **semi-variable cost**.

Notes:

(a) In the absence of clear information, all elements of **direct cost** can be considered as **variable** in nature.
(b) In the absence of clear information, **office and administration overheads** can be considered as **fixed** in nature.

THEORY QUESTIONS

1. State the principle for identifying the nature of cost on the basis of its behaviour.
2. How to identify whether a cost item is fixed or variable in nature?
3. How can one identify whether a cost item is semi-variable in nature?

Problem 1 (Problem on Identifying Nature of Cost)

Ascertain the type of cost on the basis of behaviour from the following information.

Element of Cost	Cost for 10,000 Units	Cost for 20,000 Units
Direct Material	2,00,000	4,00,000
Direct Wages	1,50,000	3,00,000
Factory overhead	3,00,000	4,00,000
Administration overhead	4,00,000	4,00,000
Selling Overhead	50,000	90,000
Distribution overhead	50,000	50,000

Solution

For the purpose of ascertaining the type of cost on the basis of behaviour, the total cost and per unit cost at different levels of production must be ascertained. The calculation is shown as follows:

Element of Cost	For 10,000 Units		For 20,000 Units	
	Total (₹)	Per Unit (₹)	Total (₹)	Per Unit (₹)
Direct Material	2,00,000	20.00	4,00,000	20.00
Direct Wages	1,50,000	15.00	3,00,000	15.00
Factory overhead	3,00,000	30.00	4,00,000	20.00
Administration overhead	4,00,000	40.00	4,00,000	20.00
Selling Overhead	50,000	5.00	90,000	4.50
Distribution overhead	50,000	5.00	50,000	2.50

(a) The Direct Material cost is **variable** in nature, since the cost per unit is same at different levels of production.
(b) The Direct Wages are **variable** in nature, since the cost per unit is same at different levels of production.
(c) The Factory Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.
(d) The administration overhead is **fixed** in nature, since the total cost is same at different levels of production.
(e) The Selling Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.
(f) The distribution overhead is **fixed** in nature, since the total cost is same at different levels of production.

Problem 2 (Problem on Identifying Nature of Cost)

From the following information, ascertain the type of cost on the basis of behaviour.

Element of Cost	Cost for 15,000 Units	Cost for 25,000 Units
Direct Material	1,50,000	2,50,000
Direct Wages	1,80,000	3,00,000
Factory overhead	2,00,000	3,00,000
Administration overhead	5,00.000	5,00,000
Selling Overhead	1,75,000	2,25,000
Distribution overhead	1,00,000	1,00,000

Solution

For the purpose of ascertaining the type of cost on the basis of behaviour, the total cost and per unit cost at different levels of production must be ascertained. The calculation is shown as follows:

Element of Cost	For 15,000 Units		For 25,000 Units	
	Total (₹)	Per Unit (₹)	Total (₹)	Per Unit (₹)
Direct Material	1,50,000	10.00	2,50,000	10.00
Direct Wages	1,80,000	12.00	3,00,000	12.00
Factory overhead	2,00,000	13.33	3,00,000	12.00
Administration overhead	5,00,000	33.33	5,00,000	20.00
Selling Overhead	1,75,000	11.67	2,25,000	9.00
Distribution overhead	90,000	6.00	1,00,000	4.00

(a) The Direct Material cost is **variable** in nature, since the cost per unit is same at different levels of production.
(b) The Direct Wages are **variable** in nature, since the cost per unit is same at different levels of production.
(c) The Factory Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.
(d) The administration overhead is **fixed** in nature, since the total cost is same at different levels of production.
(e) The Selling Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.
(f) The distribution overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.

3.4.3 How to Segregate Semi-variable Cost into Fixed and Variable?

Semi-variable cost can be classified into fixed and variable using any of the following methods:

1. Simultaneous equation method
2. Analytical method

Simultaneous Equation Method Under this method, a semi-variable cost can be split into fixed and variable by making two equations of total cost at different levels of production.

Analytical Method Under this method, the fixed and variable portion included in semi-variable cost is ascertained by analysing the cost behaviour.

THEORY QUESTIONS

1. List the methods for segregating semi-variable cost into fixed and variable portions.
2. What are semi-variable costs? Explain the different methods for segregating semi-variable cost into fixed and variable.

Problem 3 (Problem on Classification of Semi-variable Cost Under Simultaneous Equation Method)

The Factory Overheads is ₹3,00,000 for manufacturing 10,000 units and ₹4,00,000 for making 20,000 units. What is the nature of Factory Overheads? Identify the extent of fixed and variable portion.

Solution

For 10,000 units, the Factory Overhead is ₹3,00,000.
For 20,000 units, the Factory Overhead is ₹4,00,000.
The per unit Factory Overhead is ₹30 for making 10,000 units and ₹20 for making 20,000 units. Since, neither the total cost nor per unit cost is same at different levels of production, it is **semi-variable** in nature.
For identifying the extent of fixed and semi-variable portion, the following working is required.
Let the fixed portion be F and variable portion per unit be V.
Then,

$$3,00,000 = F + 10000\ V \quad (1)$$
$$4,00,000 = F + 20000\ V \quad (2)$$

Subtracting Eq. (1) from Eq. (2),

$$10000\ V = 1,00,000$$

So, V = 10
Substituting, V in Eq. (1),

$$3,00,000 = F + 10000(10)$$
$$F = 3,00,000 - 1,00,000$$

Therefore, F (i.e., fixed Factory Overhead) = ₹2,00,000
V (i.e., variable Factory Overhead per unit) = ₹10

Problem 4 (Problem on Classification of Semi-variable Cost *U*nder Simultaneous Equation Method)

The Factory Overheads for manufacturing 8000 units are ₹36,000 and for making 12000 units, it is ₹44,000. Ascertain the fixed and variable component under simultaneous equation method.

Solution

For 8,000 units, the Factory Overhead is ₹36,000.
For 12,000 units, the Factory Overhead is ₹44,000.
Let the fixed portion be F and variable portion per unit be V.
Then,

$$36{,}000 = F + 8000\ V \quad (1)$$
$$44{,}000 = F + 12000\ V \quad (2)$$

Subtracting Eq. (1) from Eq. (2),

$$4000V = 8{,}000$$

So, V = 2
Substituting, V in Eq. (1),

$$36{,}000 = F + 8000(2)$$
$$F = 36{,}000 - 16{,}000$$

Therefore, F (i.e., fixed Factory Overhead) = ₹20,000
V (i.e., variable Factory Overhead per unit) = ₹2

Problem 5 (Problem on classification of semi-variable cost under analytical method)

The Selling Overheads are ₹50,000 for manufacturing 10,000 units and ₹90,000 for manufacturing 20,000 units. What is the nature of Selling Overheads? Ascertain the extent of fixed and variable portion under analytical method

Solution

For 10,000 units, the Selling Overhead is ₹50,000.
For 20,000 units, the Selling Overhead is ₹90,000.
The per unit Selling Overhead is ₹5 for making 10,000 units and ₹4.50 for making 20,000 units. Since, neither the total cost nor per unit cost is same at different levels of production, it is **semi-variable** in nature.
For identifying the extent of fixed and semi-variable portion, the following working is required.
For increase in production by 10,000 units, the increase in Selling Overhead is ₹40,000.
That is, with variation in production by 10,000 units, the Selling Overhead varies by ₹40,000

$$\frac{\text{Difference in total cost}}{\text{Difference in total production}} = \text{Variable cost per unit}$$

Hence, the **variable Selling Overhead per unit is ₹4** $\left[\text{i.e.,} \frac{₹40{,}000}{10{,}000 \text{ units}}\right]$

	10,000 Units	**20,000 Units**
Total Selling Overhead	50,000	90,000
Less: Variable Selling Overhead @ ₹4.00 per unit	40,000	80,000
Fixed Selling Overhead	10,000	10,000

Problem 6 (Problem on Classification of Semi-Variable Cost Under Analytical Method)

The cost of production for 20,000 units is ₹1,60,000 and the cost of producing 35,000 units are ₹2,20,000. Ascertain the fixed and variable portion of the cost under analytical method.

Solution

For 20,000 units, the cost is ₹1,60,000.
For 35,000 units, the cost is ₹2,20,000.
For increase in production by 15,000 units, the increase in Selling Overhead is ₹60,000.
That is, with variation in production by 15,000 units, the Selling Overhead varies by ₹60,000

$$\frac{\text{Difference in total cost}}{\text{Difference in total production}} = \text{Variable cost per unit}$$

Hence, the **variable cost per unit is ₹4** $\left[\text{i.e.,} \frac{₹60,000}{15,000 \text{ units}}\right]$.

	20,000 units	**35,000 units**
Total cost	1,60,000	2,20,000
Less: Variable cost @ ₹4.00 per unit	80,000	1,40,000
Fixed cost	80,000	80,000

Problem 7 (Problem on preparation of statement of tender)

From the information given in the following table, estimate the cost of manufacturing 15,000 units.

Element of Cost	**Cost for 10,000 units**	**Cost for 20,000 units**
Direct Material	2,00,000	4,00,000
Direct Wages	1,50,000	3,00,000
Factory overhead	3,00,000	4,00,000
Administration overhead	4,00.000	4,00,000
Selling Overhead	50,000	90,000
Distribution overhead	50,000	50,000

Solution

For the purpose of ascertaining the type of cost on the basis of behaviour, the total cost and per unit cost at different levels of production must be ascertained.
The calculation is shown as follows:

Element of Cost	**For 10,000 Units**		**For 20,000 Units**	
	Total (₹)	**Per Unit (₹)**	**Total (₹)**	**Per Unit (₹)**
Direct Material	2,00,000	20.00	4,00,000	20.00
Direct Wages	1,50,000	15.00	3,00,000	15.00
Factory overhead	3,00,000	30.00	4,00,000	20.00
Administration overhead	4,00,000	40.00	4,00,000	20.00
Selling Overhead	50,000	5.00	90,000	4.50
Distribution overhead	50,000	5.00	50,000	2.50

(a) The Direct Material cost is **variable** in nature, since the cost per unit is same at different levels of production.
(b) The Direct Wages are **variable** in nature, since the cost per unit is same at different levels of production.
(c) The Factory Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.

(d) The administration overhead is **fixed** in nature, since the total cost is same at different levels of production.

(e) The Selling Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.

(f) The distribution overhead is **fixed** in nature, since the total cost is same at different levels of production.

For estimating the cost for manufacturing 15,000 units, the following principles must be followed:

1. Where the element of cost is **fixed**, total cost must be considered for estimation.
2. Where the element of cost is **variable**, per unit cost must be considered for estimation.
3. Where the element of cost is **semi-variable**, the fixed potion of the cost + variable cost portion per unit must be considered.

Factory overheads and Selling Overheads are semi-variable in nature.

The fixed portion of Factory Overheads is ₹2,00,000 and the variable Factory Overhead per unit is ₹10. (Refer Problem 3).

The fixed portion of Selling Overheads is ₹10,000 and the variable Selling Overhead per unit is ₹4. (Refer Problem 5).

Statement of Tender for 15000 Units

Particulars	₹	₹
Direct Material (variable) – ₹20 per unit		3,00,000
Direct Wages (variable) – ₹15 per unit		2,25,000
Prime Cost		5,25,000
Factory Overheads		
Fixed portion	2,00,000	
Variable portion (₹10 per unit)	1,50,000	3,50,000
Factory Cost		8,75,000
Administration Overheads (Fixed)		4,00,000
Cost of Production/Cost of Goods Sold		12,75,000
Selling Overheads		
Fixed portion	10,000	
Variable portion (₹4.00 per unit)	60,000	70,000
Distribution Overheads (Fixed)		50,000
Total Cost		13,95,000

Problem 8 (Problem on Estimation of Cost and Profit on the Basis of Behaviour)

The following particulars relate to a manufacturing company for a period of three years.

	2015	2016	2017
Production (units)	15000	10000	20000
	(₹)	(₹)	(₹)
Direct Material	75,000	50,000	1,00,000
Direct Labour	50,000	40,000	60,000
Factory overhead	35,000	30,000	40,000
Administrative overhead	20,000	20,000	20,000
Selling Overhead	17,500	15,000	20,000

The company intends to produce 40,000 units during 2018. If it intends to make a profit of 25% on selling price, ascertain the estimated cost and price of 40,000 units.

Solution

Step 1: Identifying the Nature of Cost

Element of Cost	For 15000 Units		For 10000 Units		For 20000 Units	
	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)
Direct Material	75,000	5.00	50,000	5.00	1,00,000	5.00
Direct Labour	50,000	3.33	40,000	4.00	60,000	3.00
Factory overhead	35,000	2.33	30,000	3.00	40,000	2.00
Administrative overhead	20,000	1.33	20,000	2.00	20,000	1.00
Selling Overhead	17,500	1.17	15,000	1.50	20,000	1.00

(a) The Direct Material cost is **variable** in nature, since the cost per unit is same at different levels of production.

(b) The Direct Wages are **semi-variable** in nature, since neither the total cost nor per unit cost are same at different levels of production.

(c) The Factory Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.

(d) The administration overhead is **fixed** in nature, since the total cost is same at different levels of production.

(e) The Selling Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.

Step 2: Classification of Semi-variable Costs into Fixed and Variable

(a) Calculation of variable cost per unit

	Direct Labour	Factory overheads	Selling Overheads
Cost for 10000 units	40,000	30,000	15,000
Cost for 20000 units	60,000	40,000	20,000
Variable cost per unit = Difference in cost/Difference in production	(₹20,000/10000 units) = **₹2.00**	(₹10,000/10000 units) = **₹1.00**	(₹5,000/10000 units) = **₹0.50**

(b) Calculation of fixed cost

(₹)

	Direct Labour	Factory overheads	Selling Overheads
Total cost for 20000 units	60,000	40,000	20,000
Less: Variable cost at respective per unit cost	40,000	20,000	10,000
Fixed portion	20,000	20,000	10,000

Step 3: Preparation of Statement of Tender

Statement of Tender for 40,000 Units

Particulars	₹	₹
Direct Material (Variable) – ₹5 per unit		2,00,000
Direct Labour		
Fixed portion	20,000	
Variable portion (₹2 per unit)	80,000	1,00,000
Prime Cost		3,00,000

(*Contd.*)

Particulars	₹	₹
Factory Overheads		
Fixed portion	20,000	
Variable Portion (₹1 per unit)	40,000	60,000
Factory Cost		3,60,000
Administration Overheads (Fixed)		20,000
Cost of Production or Cost of Goods Sold		3,80,000
Selling Overheads		
Fixed portion	10,000	
Variable Portion (₹0.50 per unit)	20,000	30,000
Total Cost		4,10,000
Add: Profits (Refer Note below)		1,36,667
Sales		5,46,667

Therefore, the company must quote a selling price of ₹13.57 per unit $\left[\text{i.e.,} \frac{₹5,46,667}{40000 \text{ units}}\right]$

Note:

The company wants to make a profit of 25% on selling price.

While preparing the statement of tender, we arrive at total cost and not sales. So, for calculating the profit required, the percentage must be calculated on cost, not on sales.

The calculation is shown as follows:

If sales are ₹100, the profit must be ₹25.

So, the total cost will be ₹100 – ₹25 = ₹75.

Percentage of profit on total cost = $\left(\frac{₹25}{₹75}\right) \times 100 = 33.33\%$ or $\frac{1}{3}$ of total cost.

So, **profits** = $\frac{1}{3}$ of total cost = $\frac{1}{3} \times ₹4,10,000 =$ **₹1,36,667**

Problem 9 (Problem on Estimation of Cost and Profit on the Basis of Behaviour)

The following particulars relate to a manufacturing company for a period of three years.

	2015	2016	2017
Production (units)	5000	10000	15000
	(₹)	(₹)	(₹)
Direct Material	50,000	1,00,000	1,50,000
Direct Labour	35,000	50,000	65,000
Factory overhead	35,000	40,000	45,000
Administrative overhead	30,000	30,000	30,000
Selling Overhead	15,000	20,000	25,000

The company intends to produce 20,000 units during 2018. If it intends to make a profit of 25% on selling price, ascertain the estimated cost and price of 20,000 units.

Solution

Step 1: Identifying the Nature of Cost

Element of Cost	For 5000 Units		For 10000 Units		For 15000 Units	
	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)
Direct Material	50,000	10.00	1,00,000	10.00	1,50,000	10.00
Direct Labour	35,000	7.00	50,000	5.00	65,000	4.33
Factory overhead	35,000	7.00	40,000	4.00	45,000	3.00
Administrative overhead	30,000	6.00	30,000	3.00	30,000	2.00
Selling Overhead	15,000	3.00	20,000	2.00	25,000	1.67

(a) The Direct Material cost is **variable** in nature, since the cost per unit is same at different levels of production.

(b) The Direct Wages are **semi-variable** in nature, since neither the total cost nor per unit cost are same at different levels of production.

(c) The Factory Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.

(d) The administration overhead is **fixed** in nature, since the total cost is same at different levels of production.

(e) The Selling Overhead is **semi-variable** in nature, since neither the total cost nor per unit cost is same at different levels of production.

Step 2: Classification of Semi-variable Costs into Fixed and Variable

(a) Calculation of variable cost per unit

	Direct Labour	Factory Overheads	Selling Overheads
Cost for 5000 units	35,000	35,000	15,000
Cost for 10000 units	50,000	40,000	20,000
Variable cost per unit = Difference in cost/Difference in production	(₹15,000/5000 units) = **₹3.00**	(₹5,000/5000 units) = **₹1.00**	(₹5,000/5000 units) = **₹1.00**

(b) Calculation of fixed cost

(₹)

	Direct Labour	Factory Overheads	Selling Overheads
Total cost for 15000 units	65,000	45,000	25,000
Less: Variable cost at respective per unit cost	45,000	15,000	15,000
Fixed portion	20,000	30,000	10,000

Step 3: Preparation of Statement of Tender

Statement of Tender for 20,000 Units

Particulars	₹	₹
Direct Material (Variable) – ₹10 per unit		2,00,000
Direct Labour		
Fixed portion	20,000	
Variable portion (₹3 per unit)	60,000	180,000
Prime Cost		2,80,000

(*Contd.*)

Particulars	₹	₹
Factory Overheads		
Fixed portion	30,000	
Variable Portion (₹1 per unit)	20,000	50,000
Factory Cost		3,30,000
Administration Overheads (Fixed)		30,000
Cost of Production or Cost of Goods Sold		3,60,000
Selling Overheads		
Fixed portion	10,000	
Variable Portion (₹1 per unit)	20,000	30,000
Total Cost		3,90,000
Add: Profits (Refer Note below)		1,30,000
Sales		5,20,000

Therefore, the company must quote a selling price of ₹26.00 $\left[\text{i.e.,} \frac{₹5,20,000}{20000 \text{ units}}\right]$

Note:

The company wants to make a profit of 25% on selling price.

While preparing the statement of tender, we arrive at the total cost and not sales. So, for calculating the profit required, the percentage must be calculated on cost, not on sales.

The calculation is shown as follows:

If Sales are ₹100, the profit must be ₹25.

So, the total cost will be ₹100 – ₹25 = ₹75.

Percentage of profit on total cost = $\left(\frac{₹25}{₹75}\right) \times 100 = 33.33\%$ or $\frac{1}{3}$ of total cost.

So, **profits** = $\frac{1}{3}$ of total cost = $\frac{1}{3} \times ₹3,90,000 =$ **₹1,30,000.**

Problem 10 (Problem on Preparation of Statement of Tender on the Basis of Behaviour of Cost)

The managing director of a small manufacturing concern consults you for the minimum price at which he can sell the output. The company records show the following particulars relating to last year:

Number of Units Produced and Sold	100
	₹
Direct Material	13,000
Direct Labour	7,000
Direct Charges	1,000
Factory overhead	7,000
Office Overhead	2,800
Selling Overhead	3,200
Profit	5,000
Total	39,000

You are informed that 40% of the works overhead fluctuates directly with the production and 70% of Selling Overheads fluctuate with sales. It is anticipated that the department would produce 500 units per annum next

year and Direct Labour charges per unit will be reduced by 20%, while fixed Factory Overhead charges will increase by ₹3,000. Office Overheads and fixed Selling Overheads are anticipated to show an increase of 25%.

Prepare a statement for submission to your client.

Solution

Step 1: Ascertainment of Nature of each element of Cost

Element of Cost	Nature	Total For 100 Units ₹	Cost per Unit ₹
Direct Material	Variable	13,000	130.00
Direct Labour	Variable	7,000	70.00
Direct Charges	Variable	1,000	10.00
Factory overhead	Semi-variable	Fixed-60% = 4200 Variable-40% = 2800	42.00 28.00
Office Overhead	Fixed (assumed)	2,800	28.00
Selling Overhead	Semi-variable	Fixed-30% = 960 Variable-70% = 2240	9.60 22.40

Step 2: Preparation of Statement of Tender

Statement of Tender for 500 Units

Particulars	₹	₹
Direct Material (Variable)-₹130 per unit		65,000
Direct Labour (Variable)-(₹70 minus 20% of ₹70) – ₹56 per unit (Refer Note No. 1)		28,000
Direct Chargers (Variable)-₹10 per unit		5,000
Prime Cost		98,000
Factory Overheads (Refer Note No. 2)		
Fixed portion	7,200	
Variable Portion (₹28 per unit)	14,000	21,200
Factory Cost		1,19,200
Office Overheads (Refer Note No. 3)		3,500
Cost of Production or Cost of Goods Sold		1,22,700
Selling Overheads (Refer Note No. 4)		
Fixed portion	1,200	
Variable Portion (₹22.40 per unit)	11,200	12,400
Total Cost		1,35,100
Add: Profits (Refer Note No. 5)		19,873
Sales		1,54,973

Therefore, selling price per unit to be quoted to the client = ₹309.95 $\left[\text{i.e., } \frac{₹1,54,973}{500 \text{ units}}\right]$

Notes:

1. **Direct Labour** The problem states that the Direct Labour charges are reduced by 20% per unit. The Direct Labour cost per unit was ₹70. When reduced by 20%, it is ₹56 per unit. Hence, for 500 units, the Direct Labour charges are (₹56 × 500 units) = ₹28,000.

2. **Factory Overheads** For 100 units, the total Factory Overheads were ₹7,000, of which ₹4,200 (60%) was fixed and ₹2,800(40%) was variable.
   For 500 units, the fixed Factory Overheads would increase by ₹3,000. Hence, the fixed Factory Overheads = ₹7,200 (₹4,200 + ₹3,000).
   For 500 units, the variable Factory Overheads is ₹14,000 $\left[\text{i.e.,}\frac{₹2{,}800 \times 500 \text{ units}}{100 \text{ units}}\right]$
3. **Office Overheads** Since no clear information is provided about the nature of Office Overheads, it has been assumed as fixed cost.
   For 100 units, the Office Overheads were ₹2,800.
   The problem states that Office Overheads increases by 25%.
   Hence, the Office Overhead for 500 units is ₹, 3,500 (i.e., ₹2,800 + 25% of ₹2,800).
4. **Selling Overheads** For 100 units, the total Selling Overheads were ₹3,200, of which ₹960 (30%) was fixed and ₹2,240 (70%) was variable.
   For 500 units, the fixed Selling Overheads would increase by 25%. Hence, the fixed Selling Overheads = ₹1,200 (i.e., ₹960 + 25% of ₹960).
   For 500 units, the variable Selling Overheads is ₹11,200 $\left[\text{i.e.,}\frac{₹2{,}240 \times 500 \text{ units}}{100 \text{ units}}\right]$.
5. **Profits** The problem does not specify the profits required or expected. Hence, it is assumed that the company expects the same percentage of profits as made earlier.
   For 100 units, the profits were ₹5,000 on a total cost of ₹34,000 (i.e., sales – ₹39,000 (–) profit – ₹5,000).
   So, percentage of profit on total cost for 100 units was **14.71%.**
   For 500 units, the total cost is ₹1,35,100.
   Expected profits = 14.71% of ₹1,35,100 = **₹19,873** (rounded off).

Problem 11 (Problem on Preparation of Statement of Tender on the Basis of Behaviour of Cost)

The managing director of a small manufacturing concern consults you for the minimum price at which he can sell the output. The company records show the following particulars relating to last year.

Number of units produced and sold	100
	₹
Direct Material	3,900
Direct Labour	2,100
Direct Charges	300
Works on-cost	2.100
Office on-cost	840
Selling on-cost	960
Profit	1,500
Total	11,700

It is ascertained from the records that 40% of the works on-cost fluctuates directly with the production and 70% of selling on-cost fluctuate with sales. It is anticipated that the department would produce 1,000 units per annum next year and Direct Labour charges per unit will be reduced by 20%.

The fixed works-on-cost will increase by ₹900. The office on-cost and fixed selling on-cost are anticipated to show an increase of 25%. Prepare a statement for submission to your client. **[*BU B.Com, May (2014)*]**

Solution

Step 1: Ascertainment of Nature of each Element of Cost

Element of Cost	Nature	Total For 100 Units ₹	Cost Per Unit ₹
Direct Material	Variable	3,900	39.00
Direct Labour	Variable	2,100	21.00
Direct Charges	Variable	300	03.00
Factory on-cost	Semi-variable	Fixed-60% = 1260 Variable-40% = 840	12.60 08.40
Office on-cost	Fixed (assumed)	840	08.40
Selling on-cost	Semi-variable	Fixed-30% = 288 Variable-70% = 672	02.88 06.72

Step 2: Preparation of Statement of Tender

Statement of Tender for 1000 Units

Particulars	₹	₹
Direct Material (Variable) – ₹39 per unit		39,000
Direct Labour (Variable) – (₹21 minus 20% of ₹21) – ₹16.80 per unit (Refer Note No. 1)		16,800
Direct Chargers (Variable) – ₹3 per unit		3,000
Prime Cost		58,800
Factory Overheads (Refer Note No. 2)		
Fixed portion	2,160	
Variable Portion (₹8.40 per unit)	8,400	10,560
Factory Cost		69,360
Office Overheads (Refer Note No. 3)		1,050
Cost of Production or Cost of Goods Sold		70,410
Selling Overheads (Refer Note No. 4)		
Fixed portion	360	
Variable Portion (₹6.72 per unit)	6,720	7,080
Total Cost		77,490
Add: Profits (Refer Note No. 5)		11,396
Sales		88,886

Therefore, selling price per unit to be quoted to the client = ₹88.89 $\left[\text{i.e.,} \frac{₹88,886}{1000 \text{ units}}\right]$

Notes:

1. **Direct Labour** The problem states that the Direct Labour charges are reduced by 20% per unit. The Direct Labour cost per unit was ₹21. When reduced by 20%, it is ₹16.80 per unit. Hence, for 1000 units, the Direct Labour charges are (₹16.80 × 1000 units) = ₹16,800.
2. **Factory Overheads** For 100 units, the total Factory Overheads were ₹2,100, of which ₹1,260 (60%) was fixed and ₹840 (40%) was variable.
   For 1000 units, the fixed Factory Overheads would increase by ₹900. Hence, the fixed Factory Overheads = ₹2,160 (₹1,260 + ₹900).
   For 1000 units, the variable Factory Overheads is ₹8,400 $\left[\text{i.e.,} \frac{₹840 \times 1000 \text{ units}}{100 \text{ units}}\right]$.

3. **Office Overheads** Since no clear information is provided about the nature of Office Overheads, it has been assumed as fixed cost.
   For 100 units, the Office Overheads were ₹840. The problem states that Office Overheads increases by 25%.
   Hence, the Office Overhead for 1000 units is ₹1,050 (i.e., ₹840 + 25% of ₹840).
4. **Selling Overheads** For 100 units, the total Selling Overheads were ₹960, of which ₹288 (30%) was fixed and ₹672 (70%) was variable.
   For 1000 units, the fixed Selling Overheads would increase by 25%. Hence, the fixed Selling Overheads = ₹360 (i.e., ₹288 + 25% of ₹288).
   For 1000 units, the variable Selling Overheads is ₹6,720 $\left[\text{i.e.,}\frac{₹672 \times 1000 \text{ units}}{100 \text{ units}}\right]$
5. **Profits** The problem does not specify the profits required or expected. Hence, it is assumed that the company expects the same percentage of profits as made earlier.
   For 100 units, the profits were ₹1,500 on a total cost of ₹10,200 (i.e., sales – ₹11,700 (–) profit – ₹1,500).
   So, percentage of profit on total cost for 100 units was **14.71%.**
   For 1000 units, the total cost is ₹77,490.
   Expected profits = 14.71% of ₹77,490 = **₹11,396** (rounded off).

Problem 12 (Problem on Preparation of Statement of Tender on the Basis of Behaviour of Cost)

The International Furniture Ltd. has received an enquiry for supply of 10,000 steel folding chairs. The costs are estimated as follows:
Raw materials: 1,00,000 kg at ₹1 per kg
Direct Wages: 10,000 hours at ₹4 per hour

Variable Overheads
Factory: ₹2.40 per labour hour
Selling and distribution: ₹16,000

Fixed Overheads
Factory: ₹6,000
Selling and distribution: ₹14,000

Prepare a statement showing the price to be fixed which will result in profit of 20 per cent on selling price.

Solution

Statement of Tender for 10,000 Chairs

Particulars	₹	₹
Direct Material (1,00,000 Kgs @ ₹1 per kg)		1,00,000
Direct Labour (10,000 Hours @ ₹4 per hour)		40,000
Prime Cost		1,40,000
Factory Overheads		
Fixed portion	6,000	
Variable Portion (10,000 Hours @ ₹2.40 per hour)	24,000	30,000
Factory Cost		1,70,000
Administration Overheads (Fixed)		Nil
Cost of Production or Cost of Goods Sold		1,70,000
Selling Overheads		
Fixed portion	14,000	
Variable Portion (given)	16,000	30,000
Total Cost		2,00,000
Add: Profits (Refer Note below)		50,000
Sales		2,50,000

Therefore, selling price per unit to be quoted is ₹25 per chair $\left(\frac{₹2,50,000}{10,000 \text{ units}}\right)$

Note:
The company wants to make a profit of 20% on selling price.
While preparing the statement of tender, we arrive at the total cost and not sales.
So, for calculating the profit required, the percentage must be calculated on cost, not on sales.
The calculation is shown as follows:
If sales are ₹100, the profit must be ₹20.
So, the total cost will be ₹100 – ₹20 = ₹80.

Percentage of profit on total cost = $\left(\frac{₹20}{₹80}\right) \times 100 = 25\%$ on total cost.

So, **profits** = 25% of total cost = $\frac{25}{100} \times ₹2,00,000 =$ **₹50,000.**

Problem 13 (Problem on Preparation of Statement of Tender Based on Behaviour of Cost)

A factory can produce 60,000 articles per annum at its optimum capacity (100%). The estimated cost of production is as follows:
Direct Material: ₹3 per unit
Direct Labour: ₹2 per unit (subject to a minimum of ₹6,000 per month)
Factory Overhead
Fixed: ₹1,00,000 per annum
Variable: ₹2 per unit
Semi-variable: ₹40,000 per annum up to 50% capacity and an additional ₹10,000 for every 20% increase in capacity or part thereof.
Each unit of raw material yields a scrap which is sold at ₹0.20 per unit.
In 2018, the factory worked at 50% capacity for the first three months and it was expected that it would work at 80% capacity for the remaining nine months.
During the first three months, the selling price per unit was ₹12. What should be the price for the remaining nine months to produce a total profit of ₹1,00,000?

Solution

Calculation of number of units of production

Production per month at 100% capacity = $\frac{60,000 \text{ units}}{12} = 5,000$ units

First three months: 5000 units × 3 months × 50% capacity = 7500 units
Next nine months: 5000 Units × 9 months × 80% capacity = 36000 units

Statement of Cost for three months ended 31 March 2018 and statement of tender for nine months ended 31 December 2018

Particulars	First Three Months (Units produced = 7500)		Next Nine Months (Units to be produced = 36000)		Total (₹)
	Total (₹)	P.U (₹)	Total (₹)	P.U (₹)	
Direct Material (after adjustment of scrap –Note No. 1)	21,000	2.80	1,00,800	2.80	1,21,800
Direct Labour (Note No. 2)	18,000	2,40	72,000	2.00	90,000
Prime Cost	39,000	5.20	1,72,800	4.80	2,11,800

(*Contd.*)

Particulars	First Three Months (Units produced = 7500)		Next Nine Months (Units to be produced = 36000)		Total (₹)
	Total (₹)	P.U (₹)	Total (₹)	P.U (₹)	
Overheads:					
Fixed (Note No. 3)	25,000	3.33	75,000	2.08	1,00,000
Variable	15,000	2.00	72,000	2.00	87,000
Semi-variable (Note No. 4)	10,000	1.33	45,000	1.25	55,000
Total Cost	89,000	11.86	3,64,800	10.13	4,53,800
Profits (Note No. 5)	1,000	0.14	99,000	2.75	1,00,000
Sales	90,000	12.00	4,63,800	12.88	5,53,800

The selling price for the remaining nine months must be ₹12.88 per unit, to earn the expected profits for the year.

Notes:

1. **Direct Material** Each unit of raw material yields a scrap which is sold at 20 paisa per unit. Hence, the effective material cost per unit is ₹2.80 (i.e., ₹3.00 – ₹0.20).
2. **Direct Labour** Direct Labour charges are ₹2 per unit, subject to a minimum of ₹6,000 per month.
   So, the Direct Labour cost was:

   For first three months:
   (7500 units × ₹2 per unit) = **₹15,000**
   Or
   (₹6,000 per month × 3 months) = **₹, 18,000**; whichever is higher.
   Hence, the Direct Labour charge for first three months is **₹18,000**.
   For next nine months:
   (36000 units × ₹2 per unit) = **₹72,000**
   Or
   (₹6,000 per month × 9 months) = **₹54,000;** whichever is higher.
   Hence, the Direct Labour charge for next nine months is **₹72,000**.
3. **Fixed Overheads** Fixed overheads are ₹1,00,000 per annum. Fixed costs, being period costs, have been apportioned on the basis of time.

   Hence, for first three months, the fixed overheads are = ₹1,00,000 × $\frac{3}{12}$ = ₹25,000.

   For next nine months, the fixed overheads are = ₹1,00,000 × $\frac{9}{12}$ = ₹75,000.

4. **Semi-variable overheads** Semi-variable overheads are ₹40,000 per annum up to 50% capacity and an additional ₹10,000 for every 20% increase in capacity or part thereof.

   For first three months:
   Capacity utilisation: 50%
   Semi-variable overhead p.a. = ₹40,000
   So, semi-variable overhead for first three months = ₹40,000 × $\frac{3}{12}$ = **₹10,000**.

   For next nine months:
   Capacity utilisation: 80%
   Semi-variable overhead p.a. = ₹60,000 (₹40,000 + ₹10,000 + ₹10,000)
   So, semi-variable overhead for next nine months = ₹60,000 × $\frac{9}{12}$ = **₹45,000**.

5. **Profits** Total profit required for the year is ₹1,00,000.
   Profit earned during first three months at a selling price of ₹12 per unit is ₹1,000.
   So, the expected profits for the next nine months = **₹99,000** (i.e., ₹1,00,000 – ₹1,000).

Problem 14 (Problem on Preparation of Statement of Tender Based on the Behaviour of Cost)

The following are the costing records for the year 2017 of a manufacturer:

Production	1000 units
	₹
Cost of raw materials	20,000
Labour costs	12,000
Factory overhead	8,000
Office Overhead	4,000
Selling expenses	1,000

Rate of profit 25% on selling price.

The manufacturer decides to produce 1500 units during 2018. It is estimated that the cost of raw material 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 statement of cost for 2018 showing the total profit and the selling price per unit.

Solution

For the purpose of getting the relevant set of information required for preparation of statement of tender, the statement of cost for 2017 has been prepared, as shown below:

Statement of Cost for the year ended 31 December 2017

(Production: 1000 units)

Particulars	Total (₹)	Per unit (₹)
Direct Material	20,000	20.00
Direct Labour	12,000	12.00
Prime Cost	32,000	32.00
Factory overheads		
Fixed (50%)	4,000	4.00
Variable (50%)	4,000	4.00
Factory Cost	40,000	40.00
Office Overheads		
Fixed (50%)	2,000	2.00
Variable (50%)	2,000	2.00
Cost of Production or Cost of Goods Sold	44,000	44.00
Selling Expenses	1,000	1.00
Total Cost	45,000	45.00
Profits (Refer Note No. 4)	15,000	15.00
Sales	60,000	60.00

Notes:

1. The elements of direct cost (i.e., Direct Material and Direct Labour) are variable in nature.
2. The problem specifies that the overhead charges are 50% fixed and 50% variable. Hence, factory and Office Overheads are shown accordingly.
3. Since the problem states that selling expenses per unit decreases by a specified percentage per unit, it cannot be fixed cost, and has to be variable in nature.

4. Profits are 25% of selling price, i.e., 1/3rd of total cost. Hence, the profits are ₹15,000 ($\frac{1}{3}$ × ₹45,000). The profit of ₹15,000 is 25% of sales $\left[\text{i.e.,}\frac{₹15,000}{₹60,000} \times 100\right]$

Statement of Tender for 1500 Units

(Proposed production: 1500 units)

Particulars	Total (₹)	Per Unit (₹)
Direct Material (Refer Note No. 1)	36,000	24.00
Direct Labour (Refer Note No. 2)	19,800	13.20
Prime Cost	55,800	37.20
Factory overheads (Refer Note No. 3)		
Fixed (50%)	4,000	2.67
Variable (50%)	6,000	4.00
Factory Cost	65,800	43.87
Office Overheads (Refer Note No. 4)		
Fixed (50%)	2,000	1.33
Variable (50%)	3,000	2.00
Cost of Production or Cost of Goods Sold	70,800	47.20
Selling Expenses (Refer Note No. 5)	1,200	0.80
Total Cost	72,000	48.00
Profits (Refer Note No. 6)	24,000	16.00
Sales	96,000	64.00

The selling price per unit to be quoted = ₹64.00.

Notes:

1. **Direct Material** The problem specifies that the cost of raw material will increase by 20%.
   Material cost being variable in nature, remain same per unit with change in volume production.
   Since there is an increase in material cost by 20%, the per unit material cost for 1500 units will be ₹24 (i.e., ₹20 + 20% of ₹20).
   Hence, the material cost is ₹36,000 (i.e., ₹24 × 1500 units).
2. **Direct Labour** The problem specifies that the labour cost will increase by 10%.
   Labour cost, being variable in nature, remains same per unit with change in volume of production.
   Since there is an increase in labour cost by 10%, the per unit labour cost for 1500 units will be ₹13.20 (i.e., ₹12 + 10% of ₹12).
   Hence, the labour cost is ₹19,800 (i.e., ₹13.20 × 1500 units).
3. **Factory Overheads** 50% of Factory Overheads are fixed in nature, which remains same irrespective of the volume of production. Hence, the fixed Factory Overhead for 1500 units is ₹4,000.
   The balance 50% of Factory Overheads is variable in nature, per unit cost of which remains the same irrespective of the volume of production. Hence, the variable Factory Overhead for 1500 units is ₹4.00 and the total variable Factory Overhead is ₹6,000 (i.e., ₹4 × 1500 units).
4. **Office Overheads** 50% of Office Overheads are fixed in nature, which remains same irrespective of the volume of production. Hence, the fixed Office Overhead for 1500 units is ₹2,000.
   The balance 50% of Office Overheads is variable in nature, per unit cost of which remains the same irrespective of the volume of production. Hence, the variable Office Overhead for 1500 units is ₹2.00 and the total variable Factory Overhead is ₹3,000 (i.e., ₹2 × 1500 units).
5. **Selling Expenses** The problem specifies that the selling expenses per unit will be reduced by 20%.
   Selling expenses, in this case, being variable in nature, remain same per unit with change in volume of production.

Since there is a decrease in selling expenses by 20%, the per unit selling expense for 1500 units is ₹0.80 (i.e., ₹1.00 – 20% of ₹1).
Hence, the material cost is ₹1,200 (i.e., ₹0.80 × 1500 units).
Profits The problem states that the rate of profit remains the same. During the last period, the profits were 25% of sales. While preparing statement of tender, total cost is ascertained first, and not sales.
Hence, it is necessary to convert 'percentage of profit on sales' to 'percentage of profit on cost'.
If selling price is ₹100, profit is ₹25 (i.e., 25% on selling price).
Therefore, total cost is ₹75 (i.e., ₹100 – ₹25).

Percentage of profit on total cost = $\left(\frac{₹25}{₹75 \times 100}\right)$ = 33.33% or $\frac{1}{3}$.

Hence, profits for proposed production of 1500 units = ₹16,000 (i.e., $\frac{1}{3}$ of total cost of ₹48,000).

3.5 PREPARATION OF STATEMENT OF TENDER ON THE BASIS OF RELATIONSHIP OF COSTS

Where the behaviour of costs is not known or not ascertainable, the statement of tender is prepared by establishing relationships between costs. The following steps must be followed for preparing statement of tender under this method:

Step 1: Prepare statement of cost for the prior period

For the period prior to the period for which the statement of tender must be presented, a cost sheet or statement of cost must be prepared for the purpose of identifying the different costs involved in production and the categories under which they fall.

Step 2: Estimate the elements of cost

With the help of the cost sheet of the prior period, estimates for the proposed production must be made in the following manner:

A. ***Elements of direct cost or prime cost*** **(i.e., Direct Material, Direct Labour and direct expenses)** All elements of direct cost are variable in nature, unless otherwise specified. They must be estimated on 'proportionate basis' after incorporating any changes specified.

For example, if the production for last period was 1000 units, the cost of raw material was ₹1,00,000 and the proposed production is 2500 units, then the cost of raw material to be included in the statement of tender would be ₹2,50,000 (i.e., ₹2,50,000 × $\frac{2500 \text{ units}}{1000 \text{ units}}$).

However, let us say that the material cost has increased by 10%, then the per unit material cost for the statement of tender will be ₹11.00 (i.e., ₹10 per unit + 10% of ₹10 per unit). The cost of raw material to be included in the statement of tender would be ₹2,75,000 (i.e., ₹11 × 2500 units).

Note: Where the elements of prime cost for the proposed production have been provided for, they must be accordingly considered while preparing statement of tender.

B. ***Factory Overheads*** Where the nature of Factory Overhead is not known or not ascertainable, it must be estimated on the basis of its relationship with Direct Wages.
So, based on the information in the prior period cost sheet, the following percentage (which establishes the relationship between Factory Overhead and Direct Wages) must be calculated:

$$\left(\frac{\text{Total factory overhead}}{\text{Total direct wages}}\right) \times 100$$

While preparing statement of tender, the Factory Overheads must be considered on the basis of this relationship, that is, the Factory Overheads must be calculated as a percentage of Direct Wages.
For example, if the Direct Wages for the prior period was ₹10,00,000 and the total Factory Overheads for the same period was ₹4,00,000. Then Factory Overheads are 40% of Direct Wages. (i.e., $\left(\frac{₹4,00,000}{₹10,00,000} \times 100\right)$.

For the proposed production, let us say that the Direct Wages are ₹18,00,000, then the Factory Overheads must be taken as ₹7,20,000 (i.e., 40% of ₹, 18,00,000).

Note: Calculating Factory Overheads as a percentage of Direct Wages is a standard practice. However, where the problem specifies any other relationship for Factory Overheads, the same must be considered. For example, if the problem states that Factory Overheads vary with prime cost, the percentages must be accordingly calculated and estimates must be made using that relationship.

C. ***Office and Administration Overheads*** Where the nature of office and administration overheads is not known or not ascertainable, it must be estimated on the basis of its relationship with factory cost.

So, based on the information in the prior period cost sheet, the following percentage (which establishes the relationship between office and administration overhead and factory cost) must be calculated:

$$\left(\frac{\text{Total office overhead}}{\text{Factory cost}}\right) \times 100$$

While preparing statement of tender, the Office Overheads must be considered on the basis of this relationship, that is, the Office Overheads must be calculated as a percentage of factory cost.

For example, if the factory cost for the prior period was ₹15,00,000 and the total office and administration overheads for the same period were ₹2,70,000, then, Office Overheads are 18% of factory cost. (i.e., $\frac{₹2,70,000}{₹15,00,000} \times 100$).

For the proposed production, let us say that the factory cost is ₹35,00,000, then the office and administration overheads must be taken as ₹6,30,000 (i.e., 18% of ₹, 35,00,000).

Note: Calculating the Office Overheads as a percentage of factory cost is a standard practice. However, where the problem specifies any other relationship for Office Overheads, the same must be considered. For example, if the problem states that Office Overheads remain unchanged with change in production, they must be accordingly considered and included in the statement of tender.

D. ***Selling and Distribution Overheads*** Where the nature of selling and distribution overheads is not known or not ascertainable, it must be estimated on the basis of its relationship with factory cost.
So, based on the information in the prior period cost sheet, the following percentage (which establishes the relationship between selling and distribution overhead and factory cost) must be calculated:

$$\left(\frac{\text{Total selling and distribution overheads}}{\text{Factory cost}}\right) \times 100$$

While preparing statement of tender, the selling and distribution overheads must be considered on the basis of this relationship. That is, the selling and distribution overheads must be calculated as a percentage of factory costs

For example, if the factory cost for the prior period was ₹25,00,000 and the total selling and distribution overheads for the same period were ₹3,00,000, then, selling and distribution overheads are 12% of factory cost (i.e., $\frac{₹3,00,000}{₹25,00,000} \times 100$).

For the proposed production, let us say that the factory cost is ₹12,00,000, then the selling and distribution overheads must be taken as ₹1,44,000 (i.e., 12% of ₹, 12,00,000).

Note: Calculating the selling and distribution overheads as a percentage of factory cost is a standard practice. However, where the problem specifies any other relationship for selling and distribution, the same must be considered.

E. ***Profits*** Although, there is no standard practice for calculating profits for the proposed production, usually the business enterprise expects the same rate of profit as it made during the last period. In such case, the profits for proposed production must be calculated based on its relationship with total cost. So, based on the information in the cost sheet, the following percentage must be calculated:

$$\left(\frac{\text{Profits of the prior period}}{\text{Total cost of the period}}\right) \times 100$$

While preparing statement of tender, the profits must be calculated based on this relationship.
For example, if the total cost for the prior period is ₹35,00,000 and the profit for the same period was ₹10,50,000, then, profits as a percentage of total cost is 30% (i.e., ₹ $\frac{₹10,50,000}{₹35,00,000} \times 100$).

For the proposed production, let us say the total cost is estimated at ₹48,00,000, then the profits must be taken as ₹14,40,000 (i.e., 30% of ₹48,00,000).

Note: Where the problem specified any other method or manner of estimating profits, it must be calculated and considered accordingly. For example, where the problem specifies that the profits must be taken as 25% of selling price, then the profits must be accordingly calculated, and not on the basis of its relationship with total cost during the prior period.

THEORY QUESTIONS

1. Write a short note on estimation of cost for projected future production on the basis of relationship of costs.
2. What is Factory Overhead? In preparing statement of tender, what is the standard practice for estimating Factory Overhead?
3. What is the formula for establishing relationship between 'Factory Overheads' and 'Direct Wages'?
4. What is Office Overhead? In preparing statement of tender, what is the standard practice for estimating Office Overhead?
5. What is the formula for establishing relationship between 'Office Overheads' and 'factory cost'?
6. What are selling and distribution overheads? In preparing statement of tender, what is the standard practice for estimating selling and distribution overheads?
7. What is the formula for establishing relationship between 'selling and distribution overheads' and 'factory cost'?
8. How are profits estimated for budgeted production?
9. When profits are given as a percentage of profits, how to estimate profits for budgeted production?
10. Explain the steps in preparing statement of tender on the basis of cost relationships.

Problem 15 (Preparation of Statement of Tender Based on Relationships)

The following expenses were incurred for a job during the year ending 31 December 2017.

	₹
Direct Materials	1,20,000
Direct Wages	1,60,000
Chargeable expenses	40,000
Factory overhead	80,000
Administrative overhead	1,20,000
Selling and distribution overheads	80,000
Selling price for the above job	7,20,000

You are required to prepare a statement showing the profit earned for the year 2017 from the job and an estimated price of a job which is to be executed in the year 2018. Materials, wages and chargeable expenses would cost ₹20,000, ₹28,000 and ₹8,000, respectively, for the job.

The various overheads to be recovered on the following basis while calculating the price:

(a) Factory overheads as a percentage of Direct Wages

(b) Administration and selling and distribution overheads as on percentage of factory cost

(c) Rate of profit on cost of 2017 is to be applied

[*BU B.Com, May (2013) and May (2017), BBM May (2013) (modified)*]

Solution

Step 1: Preparation of statement of cost for prior period

Statement of Cost for the year ended 31 December 2017

Particulars	₹
Direct Material	1,20,000
Direct Wages	1,60,000
Chargeable Expenses	40,000
Prime Cost	3,20,000
Factory Overheads	80,000
Factory Cost	4,00,000
Administration Overheads	1,20,000
Office Cost or Cost of Production	5,20,000
Selling and Distribution Overheads	80,000
Cost of Goods Sold or Total Cost	6,00,000
Profits (*Balancing figure*)	1,20,000
Sales	7,20,000

Step 2: Calculation of percentages establishing relationships

A. Percentage of Factory Overheads to Direct Wages:

$$= \left(\frac{₹80,000}{₹1,60,000}\right) \times 100 = \mathbf{50\%}$$

B. Percentage of administration overheads to factory cost:

$$= \left(\frac{₹1,20,000}{₹4,00,000}\right) \times 100 = \mathbf{30\%}$$

C. Percentage of selling and distribution overheads to factory cost:

$$= \left(\frac{₹80,000}{₹4,00,000} \right) \times 100 = \mathbf{20\%}$$

D. Percentage of profits on total cost:
This percentage is calculated since the company requires same percentage of net profit as was realised during the prior period.

$$= \left(\frac{₹1,20,000}{₹6,00,000} \right) \times 100 = \mathbf{20\%}$$

Step 3: Preparation of statement of tender

Statement of Tender for 2018

Particulars	₹
Direct Material	20,000
Direct Wages	28,000
Chargeable Expenses	8,000
Prime Cost	56,000
Factory Overheads (50% of Direct Wages)	14,000
Factory Cost	70,000
Administration Overheads (30% of Factory Cost)	21,000
Office Cost or Cost of Production	91,000
Selling and Distribution Overheads (20% of Factory Cost)	14,000
Cost of Goods Sold or Total Cost	1,05,000
Profits (20% of Total Cost)	21,000
Sales	**1,26,000**

Estimated Price for the job in 2018 is ₹1,26,000.

Problem 16 (Preparation of Statement of Tender Based on Relationships)

In respect of a factory, the following particulars have been extracted for the year 2017

	₹
Cost of materials	6,00,000
Wages	5,00,000
Factory overheads	3,00,000
Administration charges	3,36,000
Selling charges	2,24,000
Distribution charges	1,40,000
Profit	4,20,000

A work order has to be executed in 2018 and the estimated expenses are: materials – ₹8,000 and wages – ₹5,000.

Assuming that in 2018, the rate of Factory Overheads have gone up by 20%, distribution charges have gone down by 10% and selling and administration charges have gone each up by 15%, at what price should the product be sold so as to earn the same rate of profit on the selling price as in 2017? Factory overheads are based on wages and administration, selling and distribution overheads on factory cost.

[*BU BBM, May (2013) and B.Com, May (2015)*]

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year ended 31 December 2017

Particulars	₹	₹
Direct Material		6,00,000
Direct Wages		5,00,000
Prime Cost		11,00,000
Factory Overheads		3,00,000
Factory Cost		14,00,000
Administration Overheads		3,36,000
Office Cost or Cost of Production		17,36,000
Selling Overheads	2,24,000	
Distribution Overheads	1,40,000	3,64,000
Cost of Goods Sold or Total Cost		21,00,000
Profits (given)		4,20,000
Sales		25,20,000

Step 2: Calculation of percentages establishing relationships

A. Percentage of Factory Overheads to Direct Wages

$$= \left(\frac{₹3,00,000}{₹5,00,000}\right) \times 100 = \mathbf{60\%}$$

B. Percentage of administration overheads to factory cost

$$= \left(\frac{₹3,36,000}{₹14,00,000}\right) \times 100 = \mathbf{24\%}$$

C. Percentage of Selling Overheads to factory cost

$$= \left(\frac{₹2,24,000}{₹14,00,000}\right) \times 100 = \mathbf{16\%}$$

D. Percentage of distribution overheads to factory cost

$$= \left(\frac{₹1,40,000}{₹14,00,000}\right) \times 100 = \mathbf{10\%}$$

E. Percentage of profits on total cost

The company requires same percentage of profit on sales as was realised during the prior period. However, while preparing a tender first, total cost is arrived and not sales. Hence, profits are calculated as a percentage of total cost.

$$= \left(\frac{₹4,20,000}{₹21,00,000}\right) \times 100 = \mathbf{20\%}$$

Step 3: Preparation of Statement of Tender

Statement of Tender for 2018

Particulars	₹	₹
Direct Material		8,000.00
Direct Wages		5,000.00
Prime Cost		13,000.00

Particulars	₹	₹
Factory Overheads		
60% of Direct Wages	3,000.00	
Add: 20% increase	600.00	3,600.00
Factory Cost		16,600.00
Administration Overheads		
24% of Factory Cost	3,984.00	
Add: 15% increase	597.60	4581.60
Office Cost or Cost of Production		21,181.60
Selling Overheads		
16% of Factory Cost	2,656.00	
Add: 15% increase	398.40	3,054.40
Distribution Overheads		
10% of Factory Cost	1,660.00	
*Less:*10% decrease	166.00	1,494.00
Cost of Goods Sold or Total Cost		25,730.00
Profits (20% of Total Cost)		5,146.00
Sales		**30,876.00**

Estimated Price for the job in 2018 is ₹30,876

Problem 17 (Preparation of Statement of Tender Based on Relationships)

The following particulars are obtained from the books of PQR Co. Ltd., for the year 2017–18

Stock on 1/4/2017	₹
Raw materials	75,000
Finished goods	60,000
Stock on 31/3/2018	₹
Raw materials	78,600
Finished goods	76,800
Purchase of raw materials	3,40,400
Direct Wages	2,50,000
Factory on cost	1,50,000
Office Overhead	2,75,000
Selling on cost	75,000
Sales	15,00,000

During the year 2018–19, the company has to submit a quotation for an order. It is estimated that the Direct Materials, Direct Wages and selling expenses required would cost ₹5,00,000 ₹3,50,000, and ₹5,000, respectively. You are required to:

(a) Prepare a cost sheet for 2017–18.
(b) Calculate the percentage of works on cost against productive wages and Office Overhead to works cost for the year 2017–18.
(c) Prepare a quotation for 2018–19 based on previous year's percentages on the assumption that 20% profit is expected on cost. **[*BU B.Com, May (2016)*]**

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year 2017–18

Particulars		Total (₹)
Direct Material		
Opening Stock of Raw Material	75,000	
Add: Purchase or Raw Material	3,40,400	
	4,15,400	
Less: Closing Stock of Raw Material	78,600	3,36,800
Direct Wages		2,50,000
Prime Cost		5,86,800
Factory On Cost		1,50,000
Factory Cost or Works Cost		7,36,800
Office Overheads		2,75,000
Cost of Production		10,11,800
Add: Opening Stock of Finished goods		60,000
		10,71,800
Less: Closing Stock of Finished goods (value given)		76,800
Cost of Goods Sold		9,95,000
Selling On Cost		75,000
Total Cost		10,70,000
Profits (*Balancing figure*)		4,30,000
Sales		**15,00,000**

Step 2: Calculation of percentages establishing relationships

A. Percentage of works on cost to Direct Wages:

$$= \left(\frac{₹1,50,000}{₹2,50,000}\right) \times 100 = \mathbf{60\%}$$

B. Percentage of Office Overheads to works cost:

$$= \left(\frac{₹2,75,000}{₹7,36,800}\right) \times 100 = \mathbf{37.32\%}$$

Step 3: Preparation of Statement of Tender

Statement of Tender for 2018–19

Particulars	₹	₹
Direct Material		5,00,000
Direct Wages		3,50,000
Prime Cost		8,50,000
Factory Overheads		
60% of Direct Wages (60% of ₹3,50,000)		2,10,000
Factory Cost		10,60,000
Office Overheads		
37.32% of Factory Cost (37.32% of ₹10,60,000) – rounded off		3,95,600
Office Cost or Cost of Production		14,55,600

Particulars	₹	₹
Selling Overheads (given)		5,000
Cost of Goods Sold or Total Cost		14,60,600
Profits (20% of Total Cost) – given (20% of ₹14,60,592)		2,92,120
Sales		**17,52,720**

Problem 18 (Preparation of Statement of Tender Based on Relationships)

The following data is furnished by a company for the year 2017:

	₹
Stock of material on 1/1/2017	35,000
Stock of material on 31/12/2017	5,000
Purchases of materials	50,000
Wages	1,00,000
Factory overheads	20,000
Administration overheads	20,000
Closing Stock of finished goods	20,000
Sales	2,50,000
Production during the year	5,000 units

The company wants to quote for a contract for the supply of 1,000 units during the year 2018. The cost of material is expected to increase by 15% and wages by 10%.

Prepare a statement of cost for the year 2017 and a tender statement for 2018 showing the price to be quoted per unit, if the same percentage of profit is maintained as in the previous year.

[*BU B.Com, May (2017), May (2016) (modified), May (2011) (modified)*]

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year ended 31 December 2017

(Production: 5000 units)

Particulars		Total (₹)	Per Unit (₹)
Direct Material			
Opening Stock of Raw Material	35,000		
Add: Purchase or Raw Material	50,000		
	85,000		
Less: Closing Stock of Raw Material	5,000	80,000	16.00
Direct Wages		1,00,000	20.00
Prime Cost		1,80,000	36.00
Factory Overheads		20,000	4.00
Factory Cost		2,00,000	40.00
Administration Overheads		20,000	4.00
Cost of Production		2,20,000	44.00
Less: Closing Stock of Finished goods (value given)		20,000	-------
Cost of Goods Sold or Total Cost		2,00,000	44.00
Profits (*Balancing figure*) – Refer Note		50,000	11.00
Sales		2,50,000	55.00

Notes:

1. The value of Closing Stock of finished goods is given as ₹20,000. Since, the Closing Stock of finished goods is valued at cost of production, which is ₹44.00 per unit, the number of units of Closing Stock = 455 (rounded off), that is, $\left(\frac{₹20,000}{₹44 \text{ per unit}}\right)$.
2. Number of units sold = Units produced (5000) – Units in Closing Stock (455) = 4545 units. Sales revenue is ₹2,50,000. Hence, selling price per unit is ₹55.00 (i.e., $\frac{₹2,50,000}{4545 \text{ units}}$)
3. The profit of ₹50,000 is for 4545 units sold. Hence, profit per unit is $\frac{₹50,000}{4545 \text{ units}}$ = ₹11.00 (rounded off).

Step 2: Calculation of percentages establishing relationships

A. Percentage of Factory Overheads to Direct Wages

$$= \left(\frac{₹20,000}{₹1,00,000}\right) \times 100 = \mathbf{20\%}$$

B. Percentage of administration overheads to factory cost

$$= \left(\frac{₹20,000}{₹2,00,000}\right) \times 100 = \mathbf{10\%}$$

C. Percentage of profits on total cost

This percentage is calculated since the company requires same percentage of net profit as was realised during the prior period.

$$= \left(\frac{₹50,000}{₹2,00,000}\right) \times 100 = \mathbf{25\%}$$

Step 3: Preparation of Statement of Tender

Statement of Tender for 2018

(Proposed Production: 1000 units)

Particulars	Total (₹)	Per Unit (₹)
Direct Material (Refer Note No. 1)	18,400	18.40
Direct Wages (Refer Note No. 2)	22,000	22.00
Prime Cost	40,400	40.40
Factory Overheads (Refer Note No. 3)	4,400	4.40
Factory Cost	44,800	44.80
Office Overheads (Refer Note No. 4)	4,480	4.48
Cost of Goods Sold or Total Cost	49,280	49.28
Profits (Refer Note No. 5)	12,320	12.32
Sales	61,600	61.60

Price to be quoted per unit = ₹61.60

Notes:

1. **Direct Material** The problem specifies that the cost of raw material will increase by 15%.
   Material cost being variable in nature, remains same per unit with change in volume production. Since there is an increase in material cost by 15%, the per unit material cost for 1000 units will be ₹18.40 (i.e., ₹16.00 + 15% of ₹16.00).
   Hence, the material cost is **₹18,400** (i.e., ₹18.40 × 1000 units).

2. **Direct Labour** The problem specifies that the labour cost will increase by 10%.
   Labour cost being variable in nature, remains same per unit with change in volume of production. Since there is an increase in labour cost by 10%, the per unit labour cost for 1000 units will be ₹22.00 (i.e., ₹20.00 + 10% of ₹20.00). Hence, the labour cost is **₹22,000** (i.e., ₹22.00 × 1000 units).
3. **Factory Overheads** During the prior period, Factory Overheads were 20% of Direct Wages.
   Hence, for the proposed production, the Factory Overheads are 20% of estimated Direct Labour cost. That is, 20% of ₹22,000 = **₹4,400**.
4. **Office and Administration Overheads** During the prior period, Office Overheads were 10% of factory cost. Hence, for the proposed production, the Factory Overheads are 10% of estimated factory cost.
   That is, 10% of ₹44,800 = **₹4,480**.
5. **Profits** During the prior period, profits were 25% of total cost. Since same percentage of profit as last year is expected for the proposed production, the estimated profit is: 25% × ₹49,280 = **₹12,320**.

Problem 19 (Preparation of Statement of Tender Based on Relationships)

On 30 April 2018, a manufacturer was required to quote for a contract to supply 1000 electric stoves. From the following data, prepare a statement showing the price to be quoted to give the same percentage of net profit as was realised during the year ended 31 March, 2018.

Particulars	₹
Opening Stock of raw materials	35,000
Closing Stock of raw materials	4,900
Purchase of raw material	52,500
Factory wages	95,000
Factory expenses	17,500
Establishment expenses	10,000
Completed stock at the beginning	-
Completed tock at the end of the year	35,000
Sales	1,89,000

All the above figures reflect the data relating to the previous year ending 31 March 2018. The company wants to manufacture the same type of product during next year. It was ascertained that from 1 April 2018, the cost of labour will increase by 10% and the material cost by 15%.
The number of stoves manufactured during last year was 4,000. Prepare a statement of cost and tender price.
[*BU BBM, May (2015)*]

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year ended 31 March 2018

(Production: 4000 units)

Particulars		Total (₹)	Per Unit (₹)
Direct Material			
Opening Stock of Raw Material	35,000		
Add: Purchase or Raw Material	52,500		
	87,500		
Less: Closing Stock of Raw Material	4,900	82,600	20.650
Direct Wages		95,000	23.750
	Prime Cost	1,77,600	44.400
Factory Overheads		17,500	4.375
	Factory Cost	1,95,100	48.775

(*Contd.*)

Particulars	Total (₹)	Per Unit (₹)
Office Overheads (Establishment Expenses)	10,000	2.500
Cost of Production	2,05,100	51.275
Less: Closing Stock of Finished goods (value given)	35,000	--------
Cost of Goods Sold or Total Cost	1,70,100	51.275
Profits (*Balancing figure*) – Refer Note	18,900	5.700
Sales	1,89,000	56.975

Notes:

1. The value of Closing Stock of finished goods is given as ₹35,000. Since, the Closing Stock of finished goods is valued at cost of production, which is ₹51.275 per unit, the number of units of Closing Stock = 683 (rounded off), that is, $\left(\frac{₹35,000}{₹51.275 \text{ per unit}}\right)$.
2. Number of units sold = Units produced (4000) – Units in Closing Stock (683) = 3317 units.
3. The profit of ₹18,900 is for 3317 units sold. Hence, profit per unit is $\frac{₹18,900}{3317 \text{ units}}$ = ₹5.70 (rounded off).

Step 2: Calculation of percentages establishing relationships

A. Percentage of Factory Overheads to Direct Wages

$$= \left(\frac{₹17,500}{₹95,000}\right) \times 100 = \mathbf{18.42\%}$$

B. Percentage of Office Overheads to factory cost:

$$= \left(\frac{₹10,000}{₹1,95,100}\right) \times 100 = \mathbf{5.13\%}$$

C. Percentage of profits on total cost:

This percentage is calculated since the company requires same percentage of net profit as was realised during the prior period.

$$= \left(\frac{₹18,900}{₹1,70,100}\right) \times 100 = \mathbf{11.11\% \text{ or } 1/9}$$

Step 3: Preparation of Statement of Tender

Statement of Tender for the period ending 30 April 2018

(Proposed Production: 1000 units)

Particulars	Total (₹)	Per Unit (₹)
Direct Material (Refer Note No. 1)	23,747.50	23.7475
Direct Labour (Refer Note No. 2)	26,125.00	26.1250
Prime Cost	49,872.50	49.8725
Factory Overheads (Refer Note No. 3)	4,812.50	4.8125
Factory Cost	54,685.00	54.6850
Office Overheads (Refer Note No. 4)	2,802.92	2.8029
Cost of Goods Sold or Total Cost	57,487.92	57.4879
Profits (Refer Note No. 5)	6,387.55	6.3876
Sales	63,875.47	63.8755

Price to be quoted per electric stove = ₹63.88

Notes:

1. **Direct Material** The problem specifies that the cost of raw material will increase by 15%. Material cost being variable in nature, remains same per unit with change in volume production. Since there is an increase in material cost by 15%, the per unit material cost for 1000 units will be ₹23.7475 (i.e., ₹20.65 + 15% of ₹20.65).
   Hence, the material cost is **₹23,747.50** (i.e., ₹23.7475 × 1000 units).
2. **Direct Labour** The problem specifies that the labour cost will increase by 10%. Labour cost being variable in nature, remains same per unit with change in volume of production. Since there is an increase in labour cost by 10%, the per unit labour cost for 1000 units will be ₹26.125 (i.e., ₹23.75 + 10% of ₹23.75).
   Hence, the labour cost is **₹26,125** (i.e., ₹26.15 × 1000 units).
3. **Factory Overheads** During the prior period, Factory Overheads were 18.43% of Direct Wages. Hence for the proposed production, the Factory Overheads are 18.43% of estimated Direct Labour Cost, that is, 18.43% of ₹26,125 = **₹4,812.50.**
4. **Office and Administration Overheads** During the prior period, Office Overheads were 5.13% of factory cost. Hence, for the proposed production, the Factory Overheads are 5.13% of estimated factory cost, that is, 5.13% of ₹54,685 = **₹2,802.92**.
5. **Profits** During the prior period, profits were 11.11% or $1/9^{th}$ of total cost. Since same percentage of profit as last year is expected for the proposed production, the estimated profit is: 11.11% (or $1/9^{th}$) × ₹57,487.92 = **₹6,387.55**.

Problem 20 (Problem on Preparation of Statement of Tender on the Basis of Relationships)

The following information is extracted from the books of a blanket manufacturer who intends to quote for the supply of 5000 blankets. Prepare a statement showing what price he should quote so that he may get the same percentage of profit which he got last year. The details of last year figures are as follows:

	₹
Opening Stock of raw materials	1,00,000
Materials purchased during the year	1,50,000
Factory wages	3,00,000
Indirect expenses	50,000
Sales	5,40,000
Opening Stock of finished goods	-
Closing Stock of finished goods	1,00,000
Closing Stock of raw material	14,000

Number of blankets manufactured during the year was 12,000.
The management has ignored administration expenses and selling expenses in ascertaining the cost since the expenses were negligible. It is expected that the material cost would go up by 5% and the labour cost by 10%. Prepare the statement of cost and tender price from the relevant data.

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year ended ----------

(Production: 12000 units)

Particulars		Total (₹)	Per Unit (₹)
Direct Material			
Opening Stock of Raw Material	1,00,000		
Add: Purchase or Raw Material	1,50,000		
	2,50,000		

(*Contd.*)

Particulars		Total (₹)	Per Unit (₹)
Less: Closing Stock of Raw Material	14,000	2,36,000	19,67
Factory Wages		3,00,000	25.00
Prime Cost		5,36,000	44.67
Factory Overheads		50,000	4.17
Factory Cost		5,86,000	48.84
Office Overheads (Establishment Expenses)		NIL	0.00
Cost of Production		5,86,000	48.84
Less: Closing Stock of Finished goods (value given)		1,00,000	------
Cost of Goods Sold or Total Cost		4,86,000	48.84
Profits (*Balancing figure*) – Refer Note		54,000	5.43
Sales		5,40,000	54.27

Notes:

1. The value of Closing Stock of finished goods is given as ₹1,00,000. Since, the Closing Stock of finished goods is valued at cost of production, which is ₹48.84 per unit, the number of units of Closing Stock = 2048 (rounded off), that is, $\left(\frac{₹1,00,000}{₹48.84 \text{ per unit}}\right)$.
2. Number of units sold = Units produced (12000) – Units in Closing Stock (2048) = 9952 units.
3. The profit of ₹54,000 is for 9952 units sold. Hence, profit per unit is $\left(\frac{₹54,000}{9952 \text{ units}}\right)$ = ₹5.43 (rounded off).

Step 2: Calculation of percentages establishing relationships:

A. Percentage of Factory Overheads to Direct Wages

$$= \left(\frac{₹50,000}{₹3,00,000}\right) \times 100 = \textbf{16.67\% or 1/6}^{\textbf{th}}$$

B. Percentage of profits on total cost

This percentage is calculated since the company requires same percentage of net profit as was realised during the prior period.

$$= \left(\frac{₹54,000}{₹4,86,000}\right) \times 100 = \textbf{11.11\% or 1/9}$$

Step 3: Preparation of Statement of Tender

Statement of Tender for the period ending ----------

(Proposed production: 5000 units)

Particulars		Total (₹)	Per Unit (₹)
Direct Material (Refer Note No. 1)		1,03,250.00	20.65
Direct Labour (Refer Note No. 2)		1,37,500.00	27.50
Prime Cost		2,40,750.00	48.15
Factory Overheads (Refer Note No. 3)		22,916.67	4.58
Factory Cost		2,63,666.67	52.73
Office and Selling Overheads		NIL	NIL
Cost of Goods Sold or Total Cost		2,63,666.67	52.73
Profits (Refer Note No. 4)		29,296.30	5.86
Sales		2,92,962.97	58.59

Price to be quoted per blanket = ₹58.59

Notes:

1. **Direct Material** The problem specifies that the cost of raw material will increase by 5%.
   Material cost being variable in nature, remain same per unit with change in volume production. Since there is an increase in material cost by 5%, the per unit material cost for 5000 units will be ₹20.65 (i.e., ₹19,67 + 15% of ₹19,67).
   Hence, the material cost is **₹1,03,250** (i.e., ₹20.65 × 5000 units).
2. **Direct Labour** The problem specifies that the labour cost will increase by 10%.
   Labour cost being variable in nature, remains same per unit with change in volume of production. Since there is an increase in labour cost by 10%, the per unit labour cost for 5000 units will be ₹27.50 (i.e., ₹25 + 10% of ₹25).
   Hence, the labour cost is **₹1,37,500** (i.e., ₹27.50 × 5000 units).
3. **Factory Overheads** During the prior period, Factory overheads were 16.67% of Direct Wages.
   Hence, for the proposed production, the Factory Overheads are 16.67% of estimated Direct Labour cost, that is, 16.67% of ₹1,37,500 = **₹22,916.67.**
4. **Profits** During the prior period, profit was 11.11% or $1/9^{th}$ of total cost.
   Since same percentage of profit as last year is expected for the proposed production, the estimated profit is: 11.11% (or $1/9^{th}$) × ₹2,63,666.67 = **₹29,296.30.**

Problem 21 (Problem on Preparation of Statement of Tender on the Basis of Relationships)

From the following particulars, you are required to prepare the statement of cost for the year ended 31 March, 2018:

	₹
Stock of finished goods on 01/04/2017	72,800
Stock of raw materials on 01/04/2017	33,280
Purchase of raw material	7,59,200
Sales	15,39,200
Productive wages	5,16,880
Stock of finished goods on 31/03/2018	78,000
Stock of raw materials on 31/03/2018	35,360
Works overhead	1,29,220
Office and general expenses	70,161

The company is about to send a tender for a larger plant. The costing department estimated that the materials required would cost ₹52,000 and wages of workmen ₹31,200. The tender is expected to make a profit of 20% on selling price. Prepare statement of cost and tender price.

[*BU B.Com, May (2011), modified*]

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year ended 31 March 2018

Particulars	₹	₹
Direct Material		
Opening Stock of Raw Material	33,280	
Add: Purchases during the year	7,59,200	
	7,92,480	
Less: Closing Stock of Raw Material	35,360	7,57,120
Productive Wages		5,16,880
Prime Cost		12,74,000

(*Contd.*)

Particulars	₹	₹
Works Overheads		1,29,220
Factory Cost		14,03,220
Office Overheads		70,161
Office Cost or Cost of Production		14,73,381
Add: Opening Stock of Finished Goods		72,800
		15,46,181
Less: Closing Stock of Finished Goods		78,000
Cost of Goods Sold or Total Cost		14,68,181
Profits (Balancing Figure)		71,019
Sales		15,39,200

Step 2: Calculation of percentages establishing relationships:

A. Percentage of Factory Overheads to Direct Wages

$$= \left(\frac{₹1,29,220}{₹5,16,880}\right) \times 100 = \mathbf{25\%}$$

B. Percentage of Office Overheads to factory cost

$$= \left(\frac{₹70,161}{₹14,03,220}\right) \times 100 = \mathbf{5\%}$$

C. Percentage of profits on total cost

The problem states that the tender is expected to make a profit of 20% on selling price. While preparing Statement of Tender, we arrive at total cost and not sales. Hence, it is necessary to convert 'percentage of profit on sales' to 'percentage of profit on cost'.

If selling price is ₹100, profit is ₹20 (i.e., 20% on selling price). Therefore, total cost is ₹80 (i.e., ₹100 – ₹20). Percentage of profit on total cost $= \left(\frac{₹20}{₹80} \times 100\right) = 25\%$.

Step 3: Preparation of Statement of Tender

Statement of Tender for the period ending ----------

Particulars	₹	₹
Direct Material (given)		52,000,00
Direct Wages (given)		31,200.00
Prime Cost		83,200.00
Factory Overheads (25% of Direct Wages)		7,800.00
Factory Cost		91,000.00
Office Overheads (5% of Factory Cost)		4,550.00
Cost of Goods Sold or Total Cost		95,550.00
Profits (25% of Total Cost)		23,887.50
Sales		1,19,437.50

Problem 22 (Problem on Preparation of Statement of Tender on the Basis of Relationships, When Profit and Loss Accounts are Given)

Pleasant Ltd. manufactured and sold 1000 bicycles in the year ending 31 March, 2018. The summarised trading and profit and loss accounts are as follows:

Trading and Profit and Loss Account

	₹		₹
Cost of material	80,000	Sales	4,00,000
Direct Wages	1,20,000		
Manufacturing cost	50,000		
Gross profit c/d	1,50,000		
	4,00,000		4,00,000
Management and staff salaries	60,000	Gross profit b/d	1,50,000
Rent, rates and insurance	10,000		
Selling expenses	30,000		
General expenses	20,000		
Net profit	30,000		
	1,50,000		1,50,000

For the year ended 31 March 2019, it is estimated that:

(a) Output and sales will be 1200 bicycles

(b) The price of the materials will increase by 20%

(c) The manufacturing cost will increase in proportion with the combined cost of material and wages

(d) Selling expenses per unit will remain unchanged

(e) Other expenses will remain unaffected by the change in output

You are required to submit a statement for the board of directors showing the price at which cycles would be marketed so as to show a profit of 10% on selling price.

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year ended 31 March 2018

(Production: 1000 units)

Particulars		Total (₹)	Per Unit (₹)
Direct Materials		80,000	80.00
Direct Wages		1,20,000	120.00
	Prime Cost	2,00,000	200.00
Factory Overheads (Manufacturing Cost)		50,000	50.00
	Factory Cost	2,50,000	250.00
Office and Administration Overheads			
Management and Staff Salaries	60,000		
Rent, rates and Insurance	10,000		
General Expenses	20,000	90,000	90.00
	Cost of Production or Cost of Goods Sold	3,40,000	340.00
Selling Expenses		30,000	30.00
	Total Cost or Cost of Sales	3,70,000	370.00
Profits (*Balancing Figure*)		30,000	30.00
	Sales	4,00,000	400.00

Step 2: Calculation of percentages establishing relationships

A. Percentage of Factory Overheads to combined cost of material and wages

The problem specifies that the manufacturing cost will increase in proportion with the combined cost of material and wages. Hence, the percentage is accordingly calculated.

$$= \left(\frac{₹50,000}{₹80,000 + ₹1,20,000}\right) \times 100 = \mathbf{25\%}$$

B. Percentage of Office Overheads to factory cost

The problem states that other expenses remain unaffected by the increase in output. Since the relationship and behaviour of other costs are clearly specified, this statement is applicable to Office Overheads.

The statement indicates that **Office Overheads are fixed** in nature. Since the nature of Office Overhead is known, there is no need to establish relationship and calculate percentage for estimating the same.

C. Percentage of Selling Overheads to factory cost

The problem states that selling expenses per unit will remain unchanged. The statement indicates that selling expenses are variable in nature. Since the nature of Selling Overhead is known, there is no need to establish relationship and calculate percentage for estimating the same.

D. Percentage of profits on total cost

The problem states that the tender is expected to make a profit of 10% on selling price.While preparing Statement of Tender, we arrive at total cost and not sales. Hence, it is necessary to convert 'percentage of profit on sales' to 'percentage of profit on cost'.

If selling price is ₹100, profit is ₹10 (i.e., 10% on selling price).

Therefore, total cost is ₹90 (i.e., ₹100 – ₹10).

Percentage of profit on total cost = $\left(\frac{₹10}{₹90} \times 100\right)$ = **11.11% or 1/9th.**

Step 3: Preparation of Statement of Tender

Statement of Tender for the period ending 31 March 2019

(Proposed production: 1200 units)

Particulars	Total (₹)	Per Unit (₹)
Direct Material (Refer Note No. 1)	1,15,200	96.00
Direct Labour (Refer Note No. 2)	1,51,200	126.00
Prime Cost	2,66,400	222.00
Factory Overheads (25% of ₹2,66,400)	66,600	55.50
Factory Cost	3,33,000	277.50
Office Overheads (Fixed)	90,000	75.00
Cost of Goods Sold	4,23,000	352.50
Selling Overheads (Refer Note No. 3)	36,000	30.00
Total Cost	4,59,000	382.50
Profits (11.11% of ₹4,59,000)	51,000	42.50
Sales	5,10,000	425.00

Price to be quoted per bicycle = ₹425

Notes:

1. **Direct Material** The problem specifies that the cost of raw material will increase by 20%.
   Material cost being variable in nature, remains same per unit with change in volume production. Since there is an increase in material cost by 20%, the per unit material cost for 1200 units will be ₹96 (i.e., ₹80 + 20% of ₹80).
   Hence, the material cost is **₹1,15,200** (i.e., ₹96 × 1200 units).

2. **Direct Labour** The problem specifies that the labour cost will increase by 5%. Labour cost being variable in nature, remains same per unit with change in volume of production. Since there is an increase in labour cost by 5%, the per unit labour cost for 1200 units will be ₹126 (i.e., ₹120 + 5% of ₹120).
   Hence, the labour cost is **₹1,51,200** (i.e., ₹126 × 1200 units).
3. **Selling Overheads** The selling expenses per unit will remain unchanged. Hence, the Selling Overhead is ₹30 per unit, same as last year.
   For 1,200 units, the Selling Overheads amount to ₹36,000 (i.e., ₹30 × 1200 units).

Problem 23 (Problem on preparation of Statement of Tender on the Basis of Relationship)

Following are the particulars for the production of 2000 machines of Aradhana Engineering Co. Ltd. for the year 2017.

	₹
Cost of materials	1,60,000
Productive wages	2,40,000
Manufacturing expenses	1,00,000
Depreciation	1,20,000
Rent, rates and insurance	20,000
Selling expenses	60,000
General expenses	40,000
Sales	8,20,000

The company plans to manufacture 3000 machines during the year 2018. You are required to submit a statement showing the price at which they are to be marketed to earn a profit of 20% on selling price.

The following additional information is supplied to you:

(a) The price of materials is expected to up by 25%.
(b) The wage rates are expected to show an increase of 10%.
(c) The manufacturing expenses will increase in proportion to the combined cost of material and wages.
(d) The selling expenses per unit will increase by 10%.
(e) Other expenses will remain unaffected by the change in the output. **[*BU BBM, May (2015)*]**

Solution

Step 1: Preparation of Statement of Cost for prior period

Statement of Cost for the year ended 31 December 2017

(Production: 2000 units)

Particulars		Total (₹)	Per Unit (₹)
Direct Materials		1,60,000	80.00
Direct Wages		2,40,000	120.00
	Prime Cost	4,00,000	200.00
Factory Overheads			
Manufacturing Expenses	1,00,000		
Depreciation	1,20,000	2,20,000	110.00
	Factory Cost	6,20,000	310.00
Office and Administration Overheads			
Rent, rates and Insurance	20,000		
General Expenses	40,000	60,000	30.00
	Cost of Production or Cost of Goods Sold	6,80,000	340.00
Selling Expenses		60,000	30.00
	Total Cost or Cost of Sales	7,40,000	370.00
Profits (*Balancing Figure*)		80,000	40.00
	Sales	8,20,000	410.00

Step 2: Calculation of percentages establishing relationships

A. Percentage of manufacturing expenses to combined cost of material and wages

The problem specifies that the manufacturing expenses will increase in proportion to the combined cost of material and wages. Hence, the percentage is accordingly calculated.

$$= \left(\frac{₹1,00,000}{₹1,60,000 + ₹2,40,000}\right) \times 100 = \mathbf{25\%}$$

B. Depreciation

The problem does not specify the behaviour of depreciation. Hence, it is assumed to be fixed in nature.

C. Percentage of Office Overheads to factory cost

The problem states that other expenses remain unaffected by increase in output. Since, the relationship and behaviour of other costs are clearly specified, this statement is applicable to Office Overheads.

The statement indicates that **Office Overheads are fixed** in nature. Since the nature of Office Overhead is known, there is no need to establish relationship and calculate percentage for estimating the same.

D. Percentage of Selling Overheads to factory cost

The problem states that selling expenses per unit will increase by 10%. The statement indicates that selling expenses are variable in nature. Since the nature of Selling Overhead is known, there is no need to establish relationship and calculate percentage for estimating the same.

E. Percentage of profits on total cost

The problem states that the tender is expected to make a profit of 20% on selling price. While preparing Statement of Tender, we arrive at total cost and not sales. Hence, it is necessary to convert 'percentage of profit on sales' to 'percentage of profit on cost'.

If selling price is ₹100, profit is ₹20 (i.e., 20% on selling price).

Therefore, total cost is ₹80 (i.e., ₹100 – ₹20).

Percentage of profit on total cost = $\left(\frac{₹20}{₹80} \times 100\right)$ = **25%**

Step 3: Preparation of Statement of Tender

Statement of Tender for the period ending 31 December 2018

(Proposed production: 3000 units)

Particulars	Total (₹)	Per Unit (₹)
Direct Material (Refer Note No. 1)	3,00,000	100.00
Direct Labour (Refer Note No. 2)	3,96,000	132.00
Prime Cost	6,96,000	232.00
Factory Overheads		
Manufacturing Expenses (25% of ₹6,96,000)	1,74,000	58.00
Depreciation (fixed – same as last year)	1,20,000	40.00
Factory Cost	9,90,000	330.00
Office Overheads (Fixed)	60,000	20.00
Cost of Goods Sold	10,50,000	350.00
Selling Overheads (Refer Note No. 3)	99,000	33.00
Total Cost	11,49,000	383.00
Profits (25% of ₹11,49,000)	2,87,250	95.75
Sales	14,36,250	478.75

Price to be quoted per machine = ₹478.75.

Notes:

1. **Direct Material** The problem specifies that the cost of raw material will increase by 25%.
   Material cost being variable in nature, remains same per unit with change in volume production. Since there is an increase in material cost by 25%, the per unit material cost for 3000 units will be ₹100 (i.e., ₹80 + 25% of ₹80). Hence, the material cost is **₹3,00,000** (i.e., ₹100 × 3000 units).
2. **Direct Labour** The problem specifies that the labour cost will increase by 10%.
   Labour cost being variable in nature, remains same per unit with change in volume of production. Since there is an increase in labour cost by 10%, the per unit labour cost for 3000 units will be ₹132 (i.e., ₹120 + 10% of ₹120). Hence, the labour cost is **₹3,96,000** (i.e., ₹132 × 3000 units).
3. **Selling Overheads** The selling expenses per unit will increase by 10% per unit.
   Hence, the Selling Overhead is ₹33 per unit (i.e., ₹30 + 10% of ₹30). For 3,000 units, the Selling Overheads amount to ₹99,000 (i.e., ₹33 × 3000 units).

Problem 24 (Problem on Preparation of Statement of Tender when Cost and Profit Relationships are Given)

From the following particulars taken from the cost records of J Ltd., for the month of January 2018, prepare a statement of cost and profit.

Raw materials consumed	₹91,000
Direct Wages	₹29,000
Other direct expenses	₹11,000
Factory overheads	80% of Direct Wages
Office Overheads	10% of works cost
Selling and distribution overheads	₹2 per unit sold
Units produced and sold during January 2018	10,000
Profit mark up	20% on cost

There was no stock or Work in Progress either at the beginning or at the end of the month. Ascertain the selling price to be quoted.

Solution

Statement of Tender

Particulars	₹
Raw materials consumed	91,000
Direct Wages	29,000
Direct expenses	11,000
Prime Cost	1,31,000
Factory Overheads [80% of Direct Wages (29,000 × 80%)]	23,200
Factory/Works Cost	1,54,200
Office and Administration Overheads [10% of Works Cost (1,54,200 × 10%)]	15,420
Cost of Production	1,69,620
Selling and Distribution Overheads [₹2 per unit (10,000 × 2)]	20,000
Total Cost	1,89,620
Profits [20% on Cost (₹1,89,620 × 20%)]	37,924
Sales	2,27,544

Therefore, selling price per unit should be ₹22.75 (i.e., $\frac{₹2,27,544}{10,000 \text{ units}}$).

Problem 25 (Problem on Preparation of Statement of Tender when Cost and Profit Relationships are Given)

Prepare Statement of Tender from the following information supplied to you by R Ltd.

Raw materials consumed	₹40,000
Direct Wages	₹20,000
Factory overheads	60% of Direct Wages
Office Overheads	20% on cost of production
Selling Overheads	10% on total cost
Profit	20% on sales

Solution

Statement of Tender

Particulars		₹
Raw Materials Consumed		40,000
Direct Wages		20,000
	Prime Cost	60,000
Factory Overheads [60% of Direct Wages (i.e., 20,000 x 60%)]		12,000
	Factory/Works Cost	72,000
Office and Administration Overheads (Refer Note 1)		18,000
	Cost Of Production	90,000
Selling and Distribution Overheads (Refer Note 2)		10,000
	Total Cost	1,00,000
Profits (25% on Total Cost; Refer Note 3)		25,000
	Sales	1,25,000

Notes:

1. **Calculation of Office Overheads**
   The problem states that Office Overheads are 20% of cost of production.
   Cost of production = Factory cost + Office Overheads
   So, if cost of production is ₹100, Office Overheads are ₹20 (@ 20% of cost of production), then factory cost = ₹100 – ₹20 = ₹80.
   Since, while preparing the statement of cost, we arrive at the factory cost first, Office Overheads must be calculated as a percentage of factory cost.
   Accordingly, the percentage of Office Overheads to factory cost is $\left(\frac{20}{80}\times 100\right)$ = 25%.
   The factory cost is ₹72,000. Hence, Office Overheads are ₹18,000 (i.e., 25% of ₹72,000).
2. **Calculation of selling and distribution overheads**
   The problem states that selling and distribution overheads are 10% of total cost.
   Total cost = Cost of production + Selling and distribution overheads
   So, if total cost is ₹100, selling and distribution overheads are ₹10 (@ 10% of total cost)
   Then, cost of production = ₹100 – ₹10 = ₹90.
   Since, while preparing the Statement of Cost, we arrive at the cost of production first, selling and distribution must be calculated as a percentage of cost of production.
   Accordingly, the percentage of selling and distribution overheads to cost of production is $\left(\frac{10}{90}\times 100\right)$ = 11.11% or $1/9^{th}$.
   The cost of production is ₹90,000. Hence, selling and distribution overheads are ₹10,000 (i.e., $1/9^{th}$ of ₹90,000).

3. Calculation of Profits

The problem states that profit is 20% on sales. While preparing Statement of Tender, we first arrive at total cost and not sales.

Hence, it is necessary to convert 'percentage of profit on sales' to 'percentage of profit on cost'.

If selling price is ₹100, profit is ₹20 (i.e., 20% on selling price).

Therefore, total cost is ₹80 (i.e., ₹100 – ₹20).

Percentage of profit on total cost = $\left(\frac{₹20}{₹80} \times 100\right)$ = **25%**

So, the profit is ₹25,000 (i.e., 25% of total cost of ₹1,00,000).

Problem 26 (Problem on Preparation of Statement of Tender on the Basis of Relationship when the Percentages are Given)

From the following information, prepare a monthly cost sheet of sand, lime and brick works showing the cost and profit per 1,000 bricks.

Materials used

Lime: 895 tons @ ₹50 per ton

Coal: 820 tons @ ₹40 per ton

Sand: ₹2 per 1000 bricks made

Stores: ₹1,250

Labour

Sand drying and running: ₹10,000

Bricking: ₹40,000

The factory-on-cost is 25% of Direct Charges and the office-on-cost is 10% of factory cost. Bricks sold: 35,00,000 @ ₹70 per 1,000. Stock of bricks at the end of the month was 6,00,000 bricks and in the beginning it was 1,00,000 bricks.

Solution

Number of units sold = Number of units of Opening Stock of finished goods + Number of units produced during the period – Number of units of Closing Stock of finished goods.

In this problem, the details of stock of bricks and bricks sold are given, but the number of bricks manufactured is not made available. Hence, the above formula must be used to ascertain the same.

35,00,000 = 1,00,000 + Number of bricks manufactured – 6,00,000

Therefore, **number of bricks manufactured** = 35,00,000 + 6,00,000 – 1,00,000 = **40,00,000**

Since the problem has provided the relationship of Factory Overheads with Direct Charges and Office Overheads with factory cost, there is no need to prepare Statement of Cost for prior period or calculate percentages. Hence, the Statement of Cost for the budgeted production has been directly prepared.

Statement of Cost for the month ending ---------

(Bricks produced: 40,00,000; Bricks sold: 35,00,000)

Particulars		Units ('000)	Total (₹)	Per 1000 Bricks (₹)
Materials Used				
Lime – 895 tons @ ₹50 per ton	44,750			
Coal – 820 tons @ ₹40 per ton	32,800			
Sand – ₹2 per thousand bricks made (₹2 × 40,00,000 bricks/1000 bricks)	8,000			
Stores	1,250		86,800.00	21.700

(*Contd.*)

Particulars		Units ('000)	Total (₹)	Per 1000 Bricks (₹)
Labour				
Sand drying and running	10,000			
Bricking	40,000		50,000.00	12.500
Prime Cost		4000	1,36,800.00	34.200
Factory Overheads (25% of Direct Charges, i.e., Prime Cost)			34,200.00	8.550
Factory Cost			1,71,000.00	42.750
Office Overheads (10% of Factory Cost)			17,100.00	4.275
Cost of Production			1,88,100.00	47.025
Add: Opening Stock of finished goods (Refer Note)		100	4,702.50	--------
		4100	1,92,802.50	47.025
Less: Closing Stock of finished goods(Refer Note)		600	28,215.00	--------
Cost of Goods Sold or Total Cost		3500	1,64,587.50	47.025
Profits (*Balancing figure*)			80,412.50	22.975
Sales		3500	2,45,000.00	70.000

Note:

The value of stock of finished goods is not given. Hence, they are valued at cost of production.
Cost of production per 1000 bricks is ₹47.025.

So, the value of 100000 bricks in Opening Stock = ₹4702.50 $\left[\text{i.e.,}\frac{₹47.025 \times 100000 \text{ bricks}}{1000 \text{ bricks}}\right]$

The value of 600000 bricks in Closing Stock = ₹28,215 $\left[\text{i.e.,}\frac{₹47.025 \times 600000 \text{ bricks}}{1000 \text{ bricks}}\right]$

Problem 27 (Problem with Missing Information on Ascertaining Selling Price When Changes are Anticipated)

The cost structure of an article, the selling price of which is ₹500, is as follows:

Direct Material	50% of the total cost
Direct Labour	30% of the total cost
Overheads	The balance

Due to anticipated increase in existing material price by 20% and the existing labour rate by 10%, the existing profit would come down by 30%, provided the selling price remains unchanged.

Prepare a comparative statement of cost and ascertain the selling price to the nearest rupee in order to get the same percentage of profit.

Solution

The selling price per unit is ₹500.

Let the total cost per unit at present be 'X' and the profit per unit be 'Y'.

Selling price –Total cost = Profit

So, 500 – X = Y

That is,

$\boxed{X + Y = 500}$

After the anticipated changes, the equation will be as follows:

Element of Cost	Present Structure	Anticipated Change	Expected Cost
Direct Material	0.50X	Increase by 20%	0.60X
Direct Labour	0.30X	Increase by 10%	0.33X
Overheads	0.20X	No change	0.20X
Total cost	X		**1.13X**
Profit when selling price is ₹500	Y		**0.7Y**

Notes:

1. Overheads represent balance of total cost. Hence, it is 20% of total cost = 0.2X [i.e., X (–) (0.5X + 0.3X)]
2. Direct Material cost is expected to increase by 20%. Hence, it would be 0.60X (i.e., 0.50X + 20% of 0.50X)
3. Direct Labour cost is expected to increase by 10%. Hence, it would be 0.33X (i.e., 0.30X + 10% of 0.30X)
4. If the selling price remains unchanged, the profits would come down by 30%. Hence, at the selling price of ₹500, the profits would be 0.7Y (i.e., Y – 30% of Y)

So, the equation would be:

$$500 - 1.13X = 0.7Y$$

That is,

$$\boxed{1.13X + 0.7Y = 500}$$

When the following two equations are solved, the present total cost per unit and profit per unit can be ascertained.

$$X + Y = 500 \quad (1)$$

$$1.13X + 0.7Y = 500 \quad (2)$$

Multiplying Eq. (1) by 0.7,

$$0.70X + 0.7Y = 350 \quad (3)$$

$$1.13X + 0.7Y = 500 \quad (4)$$

Subtracting Eq. (3) from Eq. (2), we get,

$$0.43X = 150$$

Therefore, $X = \frac{150}{0.43} = 348.84$

Substituting the value of X in Eq. (1), we get,

$$348.84 + Y = 500$$

Therefore, $Y = 151.16$

Based on these findings, the present and expected cost structure appears as follows:

Element of Cost	Present Cost Structure (₹)	Expected Cost Structure (₹)
Direct Material	174.42	209.34
Direct Labour	104.65	115.12
Overheads	69.77	69.77
	348.84	394.23

The problem also requires calculation of selling price to be quoted for earning same percentage of profit at present. The present total cost per unit is ₹348.84 and profit per unit is ₹151.16.

So, the percentage of profit on total cost = $\left(\frac{₹151.16}{₹348.84}\right) \times 100 =$ **43.33%.**

To earn the same percentage of profit, the selling price based on anticipated changes must be:

Total cost estimated	₹394.23
Add: Profits (43.33% of total cost)	₹170.83
	₹565.06

So, **the selling price to be quoted is ₹565** (rounded off).

Problem 28 (Problem with Missing Information on Ascertaining Selling Price When Changes are Anticipated)

Fitlass Refrigerator Company produces refrigerators and sells each one for ₹2,000. During a certain accounting year, the Direct Material, Direct Labour and overhead costs are as follows:

Material	60% of the total cost
Labour	20% of the total cost
Overheads	The balance

In the subsequent accounting year, the Direct Material cost is expected to go up by 15%, Direct Labour by 17.5% and as a result of which, there would be 50% decrease in the amount of profit, if the same selling price is maintained.

The company has asked for the appropriate price which will ensure the same percentage of profit next year as well.

Solution

The selling price per unit is ₹2000.

Let the total cost per unit at present be 'X' and the profit per unit be 'Y'.

Selling price – Total cost = Profit

So, 2000 – X = Y

That is,

$$X + Y = 2000$$

After the anticipated changes, the equation will be as follows:

Element of Cost	Present Structure	Anticipated Change	Expected Cost
Direct Material	0.60X	Increase by 15%	0.690X
Direct Labour	0.20X	Increase by 17.5%	0.235X
Overheads	0.20X	No Change	0.200X
Total cost	X		**1.125X**
Profit when selling price is ₹500	Y		**0.5Y**

Notes:

1. Overheads represent balance of total cost. Hence, it is 20% of total cost = 0.2X [i.e., X (–) (0.6X + 0.2X)]
2. Direct Material cost is expected to increase by 15%. Hence, it would be 0.690X (i.e., 0.60X + 15% of 0.60X)
3. Direct Labour cost is expected to increase by 17.5%. Hence, it would be 0.235X (i.e., 0.20X + 17.5% of 0.20X)
4. If the selling price remains unchanged, the profits would come down by 50%. Hence, at the selling price of ₹2000, the profits would be 0.5Y (i.e., Y – 50% of Y)

So, the equation would be:

$$2000 - 1.125X = 0.5Y$$

That is,

$$1.125X + 0.5Y = 2000$$

When the following two equations are solved, the present total cost per unit and profit per unit can be ascertained.

$$X + Y = 2000 \quad (1)$$
$$1.125X + 0.5Y = 2000 \quad (2)$$

Multiplying Eq. (1) by 0.5,

$$0.500X + 0.5Y = 1000 \quad (3)$$
$$1.125X + 0.5Y = 2000 \quad (4)$$

Subtracting Eq. (3) from Eq. (2), we get,

$$0.625X = 1000$$

Therefore, $X = \frac{1000}{0.625} = 1600$

Substituting the value of X in Eq. (1), we get,

$$1600 + Y = 2000$$

Therefore, $Y = 400.$

Based on these findings, the present and expected cost structure appears as follows:

Element of Cost	Present Cost Structure (₹)	Expected Cost Stricture (₹)
Direct Material	960	1104
Direct Labour	320	376
Overheads	320	320
	1600	1800

The problem also requires calculation of selling price to be quoted for earning same percentage of profit at present. The present total cost per unit is ₹1600 and profit per unit is ₹400.

So, the percentage of profit on total cost = $\left(\frac{₹400}{₹1600}\right) \times 100 =$ **25%.**

To earn the same percentage of profit, the selling price based on anticipated changes must be:

Total cost estimated	₹ 1800
Add: Profits (25% of total cost)	₹ 450
	₹ 2250

So, the selling price to be quoted is **₹2250**.

3.6 PREPARATION OF STATEMENT OF TENDER ON THE BASIS OF POLICIES

Apart from the behaviour of costs and their relationships with other cost components, certain policies of the government, industry and the company would influence the price to be quoted. For example, essential products like sugar, cotton, etc., are subject to dual pricing policy. Exports are subject to the policy of subsidy, etc. In such cases, the Statement of Tender must be prepared on the basis of such policies.

THEORY QUESTION

Write a short note on preparation of Statement of Tender on the basis of policies.

Problem 29 (Problem on Estimation of Open Market Price)

The Government of India has executed a dual pricing policy for an industry in which your firm operates. You are the head of the Costing Department of Praja Textiles Co. Ltd., and your company produces a standard type of cloth, 50% of which is procured by the government at a price of ₹4 per meter. You have to recommend a suitable price for the cloth to be sold in the open market.

The production during the year 2018 is expected to be 20,00,000 meters of cloth. Relevant information is given as follows:

	₹
Cotton consumed	10,00,000
Direct Labour	10,00,000
Carriage inwards paid on inDirect Material	50,000
Indirect labour	4,00,000
Salary of the works-director and factory staff	2,50,000
Water and power	5,00,000
Dyeing, bleaching, etc.	10,00,000
Depreciation (factory)	2,00,000
Excise and other taxes	30,00,000
Miscellaneous factory expenses	1,00,000
Office salaries	10,00,000
Salary of the managing director	1,00,000
Depreciation on office equipment	1,00,000
Miscellaneous office expenditure	1,00,000
Purchase of computer for office use	20,00,000
Miscellaneous purchase of furniture for office use	5,00,000
Dividends paid	12,00,000
Advertising and publicity	10,00,000
Director's fees	2,00,000
Commission paid to sales personnel	10,00,000
Commission paid to foreign buyers	1,00,000
Packaging and forwarding	2,00,000
Expenditure on sales depot	4,00,000

The following additional information is available:

(a) The company expects a fair return of 20% on its paid-up capital of ₹1,00,00,000

(b) Marketing expenditure outstanding are ₹1,00,000

Suggest the open market price after preparing a cost analysis sheet.

Solution

Statement of Estimated Cost & Profit for the year 2018

(Estimated Production: 20,00,000 meters)

Particulars	₹	₹
Cotton consumed		10,00,000
Direct Labour		10,00,000
Prime Cost		20,00,000
Factory Overheads		
Carriage inwards paid on inDirect Material	50,000	
Indirect labour	4,00,000	
Salary of works-director and factory staff	2,50,000	
Water and power	5,00,000	
Dyeing, bleaching etc.	10,00,000	
Depreciation	2,00,000	
Excise and other taxes	30,00,000	
Miscellaneous factory expenses	1,00,000	55,00,000
Factory Cost		75,00,000

Particulars	₹	₹
Office and Administration Overheads		
Office salaries	10,00,000	
Salary of Managing Director	1,00,000	
Depreciation on office equipment	1,00,000	
Miscellaneous office expenditure	1,00,000	
Directors fees	2,00,000	15,00,000
Cost of Goods Sold		70,00,000
Selling and Distribution Overheads		
Advertising and publicity	10,00,000	
Commission paid to sales personnel	10,00,000	
Commission paid to foreign buyers	1,00,000	
Packaging and forwarding	2,00,000	
Expenditure on sales depot	4,00,000	
Outstanding market expenditure	1,00,000	28,00,000
Total Cost		1,18,00,000
Add: Expected Profits (20% of ₹1,00,00,000)		20,00,000
Estimated Sales Revenue		1,38,00,000

Calculation of open-market price

	₹
Estimated sales during the year	1,38,00,000
Less: Purchases by government (50% of production at ₹4 per meter)	40,00,000
Estimated sales revenue from open-market sales	98,00,000

Open-market price to be quoted = $\frac{₹98,00,000}{10,00,000 \text{ meters}}$ = **₹9.80** per meter.

Note: Since the government purchases 50% of production (i.e., 50% of 20,00,000 meters), only the remaining 10,00,000 meters is available for sale in open-market.

Problem 30 (Problem on export price quotation)

Your company is an export-oriented organisation manufacturing internal-communication equipment of a standard size. The company is required to send quotations to foreign buyers for your product. As a cost accountant, you are required to submit the quotation based on the following figures relating to the year 2018:
Total output: 20,000 units.
Expenses incurred:

	₹
Local raw-material consumed	10,00,000
Import of raw material (actual consumption)	1,00,000
Direct Labour	10,00,000
Indirect labour	2,00,000
Storage of raw materials and spares	50,000
Fuel	1,50,000
Tools consumed	20,000
Depreciation on plant	1,00,000
Salaries of the work personnel	1,00,000

(*Contd.*)

	₹
Excise duty	2,00,000
Administration and office expenses	2,00,000
Salary of managing director	60,000
Salary of joint director	40,000
Fees of the director	20,000
Expenditure on advertising	1,60,000
Selling expenses	1,80,000
Sales-depot expenditure	1,20,000
Packaging	1,20,000

Note:

(a) Local raw material now cost 10% more.

(b) A profit margin of 20% on sales is to be maintained.

(c) The government grants a subsidy of ₹100 per unit of export.

Prepare a cost statement.

Solution

Statement of Estimated Cost & Profit for the year 2018

(Estimated production: 20000 units)

Particulars	₹	₹
Direct Materials		
Local raw-materials	10,00,000	
Add: 10% increase	1,00,000	
	11,00,000	
Add: Imported raw-material	1,00,000	12,00,000
Direct Labour		10,00,000
Prime Cost		22,00,000
Factory Overheads		
Indirect labour	2,00,000	
Storage of material and spares	50,000	
Fuel	1,50,000	
Tools consumed	20,000	
Depreciation on plant	1,00,000	
Salaries of works personnel	1,00,000	
Excise duty	2,00,000	8,20,000
Factory Cost		30,20,000
Office and Administration Overheads		
Administration and Office expenses	2,00,000	
Salary of Managing Director	60,000	
Salary of Joint Director	40,000	
Fees for the Director	20,000	3,20,000
Cost of Goods Sold		33,40,000
Selling and Distribution Expenses		
Expenditure on advertising	1,60,000	
Selling expenses	1,80,000	

Particulars	₹	₹
Sales department expenses	1,20,000	
Packaging	1,20,000	5,80,000
Total Cost		39,20,000
Profits (25% of Total Cost – Refer Note)		9,80,000
Sales		49,00,000

Calculation of export price to be quoted

	₹
Selling price per unit $\left(\frac{₹49,00,000}{20,000 \text{ units}}\right)$	245.00
Less: Government subsidy per unit of export	100.00
Selling price to be quoted for foreign market	**145.00**

Note:

The problem states that a profit margin of 20% on sales is to be maintained. While preparing Statement of Tender, we arrive at the total cost and not sales.

Hence, it is necessary to convert 'percentage of profit on sales' to 'percentage of profit on cost'.

If selling price is ₹100, profit is ₹20 (i.e. 20% on selling price). Therefore, total cost is ₹80 (i.e., ₹100 – ₹20).

Percentage of profit on total cost = $\left(\frac{₹20}{₹80} \times 100\right)$ = **25%.**

SUMMARY

- **Statement of Tender** is a statement prepared for ascertaining the cost and price of proposed or future production.
- The price so ascertained by preparing a Statement of Tender is called **Quotation**.
- Bases for preparation of Statement of Tender
  - ✓ Nature of cost
  - ✓ Cost relationship
  - ✓ Policies
- **Preparation of Statement of Tender on the basis of nature of cost**
  - ✓ Ascertain the nature of each cost element – fixed, variable, semi-variable.
    - Fixed cost is the cost the total of which is same at different levels of production
    - Variable cost is the cost whose per unit cost is same at different levels of production
    - Semi-variable cost is the cost which is neither fixed nor variable (i.e., neither the total nor per unit cost is same at different levels of production)
    - Semi-variable cost can be classified into fixed portion and variable portion using simultaneous equation method or analytical method.
  - ✓ Estimate the cost of producing budgeted units based on the nature.
- **Preparation of Statement of Tender on the basis of cost relationships**
  - ✓ Prepare Statement of Cost for the immediate past period.
  - ✓ Establish cost relationship for each item of overhead.
    - Calculate Factory Overhead as a percentage of Direct Wages (or as a percentage of any other item of cost specified).
    - Calculate Office Overhead as a percentage of factory cost (or as a percentage of any other cost specified)
    - Calculate selling and distribution overhead as a percentage of factory cost (or as a percentage of any other cost specified)
    - Calculate profits as a percentage of total cost (or as a percentage of any other basis mentioned)
  - ✓ Estimate cost for budgeted production based on these relationships.

EXERCISES

Section B Type Problems

Problem 1

M/S S Ltd. has received an offer for the supply of its product which requires Direct Materials worth ₹40,000 and Direct Wages ₹30,000. Past records of the company shows Factory Overheads at 25% on Direct Wages, Office Overheads at 10% of works cost and profit at 15% on selling price. You are required to calculate the price to be quoted for the above offer.

(Ans. Quotation price ₹1,00,294)

Problem 2

Past records of M/S S Ltd., reveals that the company purchased Direct Materials at ₹35 per unit and paid wages at ₹45 per unit. It also incurred other direct expenses at ₹10 per unit. The Factory Overheads were 25% of prime cost and Office Overheads were 10% of works cost.

During the current year, the company is required to submit a quotation for the supply of 500 units. The price of materials has gone up by 15% and the wage rates have increased by 10%. The other direct expenses would cost 5% more.

You are required to submit a statement containing the calculation of quotation price for 500 units so as to yield a profit of 15% on cost.

(Ans. Quotation price ₹79,260)

Section C Type Problems

Problem 1

The following data is furnished by a company for the year 2017:

- Stock of materials on 1/1/2017 ₹ 70,000
- Stock of materials on 31/12/2017 ₹ 10,000
- Purchase of materials ₹ 1,00,000
- Wages ₹ 2,00,000
- Factory overheads ₹ 40,000
- Administration overheads ₹ 40,000
- Closing Stock of finished goods ₹ 40,000
- Sales ₹ 5,00,000
- Production during the year 5,000 units

The company wants to quote for a contract for the supply of 1,000 units during the year 2018. The cost of materials is expected to increase by 15% and wages by 10%. Prepare a statement of cost for the year 2017 and a tender statement for 2018 showing the price to be quoted per unit, if the same percentage of profit is maintained as in the previous year.

(Ans. Selling price to be quoted ₹1,23,200 and estimated profit ₹24,640)

Problem 2

In respect of a factory, the following figures have been obtained for the year 2017:

- Cost of materials ₹ 6,00,000
- Direct Wages ₹ 5,00,000
- Factory overheads ₹ 3,00,000
- Administrative overheads ₹ 3,36,000
- Selling Overheads ₹ 2,24,000
- Distribution overheads ₹ 1,40,000
- Profit ₹ 4,20,000

A work order has been executed and the following expenses have been incurred:

Materials	₹	8,000
Wages	₹	5,000

Assuming that in 2018, the rate of Factory Overheads has increased by 20%, distribution overheads have gone down by 10% and selling and administration overheads have each gone up by 12.5%, at what price should the product be sold so as to earn the same rate of profit on the selling price as in 2017. Factory overheads are based on Direct Wages while all other overheads based on factory cost.

(Ans. Estimated price: ₹1,23,816; Estimated profit: ₹20,636)

Problem 3

The following expenses were incurred for a job during the year ended 31/12/2017.

• Direct Materials	₹	6,000
• Direct Wages	₹	8,000
• Chargeable expenses	₹	2,000
• Factory overhead	₹	4,000
• Selling and distribution overhead	₹	4,000
• Administration overhead	₹	6,000
• Selling price for the above job	₹	18,000

You are required to prepare a statement showing the profit earned for the year 2017 from the job and an estimated price of a job which is to be executed in the year 2018. Materials, wages and chargeable expenses will be required of ₹10,000, ₹14,000 and ₹4,000, respectively, for the job. The various overheads should be recovered on the following basis while calculating the estimated price.

(a) Factory overhead as a percentage of Direct Wages.
(b) Administration, selling and distribution overheads as a percentage of factory cost.

(Ans: Estimated price ₹63,000)

Problem 4

The following data is furnished by a company for the year 2017

• Stock of materials on 1/1/2017	₹	70,000
• Stock of materials on 31/12/2017	₹	10,000
• Purchases of materials	₹	1,00,000
• Factory wages	₹	2,00,000
• Factory expenses	₹	36,000
• Administration expenses	₹	44,000
• Opening Stock of finished goods on 1/1/2017		Nil
• Closing Stock of finished goods on 31/12/2017	₹	40,000
• Sales	₹	5,00,000
• Production during 2010		4,000 units

The company wants to quote for a contract for the supply of 1,000 units during the year 2018. During 2018, the cost of materials is going to increase by 15% and that of factory wages by 10%. Prepare a statement of cost for the year 2017 and a tender statement for 2018 showing the price to be quoted per unit, if the same percentage of profit is maintained as in the previous year. Assume the overhead charges per unit will be the same as in 2017.

(Ans. Price to be quoted for 1,000 units: ₹1,51,250 at ₹151.25 per unit)

CHAPTER 4

Material Cost Control

CHAPTER OUTLINE

4.1 INTRODUCTION

Materials refer to raw materials, components, stores and spares used in production. Being a major element in the 'cost of product', it is essential to control 'material cost' to achieve the objective of cost control and cost reduction. This chapter deals with various issues relating to control of materials.

4.2 MEANING OF CERTAIN ASSOCIATED TERMS

1. **Materials:** They refer to the tangible, physical inputs used in production of a product. It consists of raw materials, components, spare parts, consumable stores, packing material, etc.
2. **Direct Material:** It refers to the material which forms part of the finished product. Examples of Direct Material are:
   Cotton used in manufacture of textiles
   - Wood used in manufacture of pencil
   - Steel used in manufacture of pens

- Bamboo used in manufacture of papers
- Glass used in making spectacles
- Clay used in making bricks
- Fruits used in making squashes, etc.

3. **Indirect Material:** It refers to material used in the process of production but does not form part of the finished product. Examples of indirect materials are:
   - Stationery used in office
   - Items used in maintenance of machinery like cotton waste, etc.
   - Materials used in service departments like transportation, canteen, power generation, etc.
4. **Material Cost:** It refers to the cost of materials used in the manufacturing of a product. In relation to material, the following are the costs involved:
   - **Procurement Cost** It refers to the cost of purchasing or manufacturing the raw materials required for production of the finished product.
   - **Holding cost or Carrying Cost** It refers to the cost of storing the material till they are issued for production.
   - **Ordering Cost** It refers to the cost of placing an order for purchase of materials.
   - **Set-up Cost** It refers to the cost of setting up the facility for producing the materials, in case the materials are made, instead of purchasing them.
   - **Shortage Cost** It refers to the fines, penalties, loss of demand, loss of goodwill, etc. associated with shortage of material. In case, a business enterprise is not able to meet the customers' demand within the assured time due to shortage of raw material, the fines and penalties to be paid, loss of potential demand, etc. suffered by the enterprise are considered as shortage costs.

THEORY QUESTIONS

Section A Type Questions

1. What are materials?
2. What is material cost?
3. State the different types of material.
4. What is Direct Material? Give examples. **[*BU B.Com, May (2011), BBM, May (2014)*]**
5. What is inDirect Material? Give examples.
6. List the types of material cost.
7. What is procurement cost?
8. What is carrying cost?
9. State the meaning of the term ordering cost.
10. Explain the meaning of the term set-up cost.
11. What is shortage cost? Give example.

Section B Type Questions

1. What are materials? Explain the different types of material with examples.
2. What is material cost? State and explain briefly the different types of material cost?

4.3 MATERIAL CONTROL

It refers to a system which ensures the provision of required quantity of material of right quality and at required time with minimum amount of capital. It covers the various aspects of materials, i.e., procurement, storage and issue, and controls them with the help of accounting with the purpose of ensuring adequate and timely supply of material for production and reduction of costs associated with them.

Objectives of Material Control

The following are the objectives of controlling material:

- To ensure continuity in production
- To reduce the costs associated with materials
- To reduce wastage and damages in the process of production
- To supply relevant and timely information relating to material for the management and thereby enabling them to make appropriate decisions

Advantages of Materials Control

The important advantages of effective control of materials are as follows:

- Materials control facilitates smooth running of production.
- It avoids unnecessary locking up of working capital on materials.
- It reduces cost of purchasing by determining the Economic Order Quantity (EOQ).
- It reduces the cost of storage, risk of loss of materials due to wastage, pilferage, damage, etc.
- It provides prompt and correct information about the value of materials used in different departments.
- It ensures availability of ready and up-to-date information about stock of materials.
- It ensures regular supply of information to the management about the movement of materials.

THEORY QUESTIONS

Section A Type Questions

1. What is material control? **[*BU BBM, May (2014), B.Com, May (2015)*]**
2. State the objectives of material control.
3. List any four advantages of material control.

Section B Type Questions

1. Explain the meaning of material control. State its purpose and advantages. **[*BU BBM, May (2014)*]**

4.4 SCOPE OR AREAS OF MATERIAL CONTROL

The following are the broad areas relating to material which needs control and monitoring:

1. Procurement of material
2. Storage of material procured
3. Issue of material to production department

THEORY QUESTION

Section A Type Questions

What is material control? List the components (or areas) of control of material cost.

Each of these elements has been discussed in detail in the following sections.

4.4.1 Procurement of Material

The foremost and important area of material control is 'procurement of material'. There are many issues relating to procurement which needs to be addressed and decided upon to ensure that there is neither short supply of material nor the cost associated is excessive. The following are some of the decisions associated with procurement of material:

1. Whether to make the raw-material or purchase them from outside?

2. In case of purchase, what is the process to be followed?
3. How to select the vendors?
4. How much quantity of materials should be purchased and in what intervals?
5. In case of making the material internally, how much quantity must be manufactured and in what frequency?
6. What are the documents that facilitate procurement of material?

The techniques and strategies for making the above decisions have been discussed next.

Make or Buy Decision The decision regarding making or buying the material required can be made with the help of 'marginal costing'. The technique states that the marginal cost of making and the cost of buying must be compared and whichever leads to lower material cost, must be considered.

Purchase process The following processes must be followed for purchase of material to ensure fairness, transparency and minimum cost of material.

Step 1 *Receipt of purchase requisition from the department which is in need of material where the materials are procured without having a need:* It increases storage cost and leads to negligence, damage and wastage of materials. Hence, no purchase must be initiated unless purchase requisition is received.

Step 2 *Identification of suppliers who can meet the requirements, terms and conditions of the enterprise:* It is necessary to take sufficient precautions while selecting the supplier so that there is no disruption in production due to non-availability of material on account of suppliers' problems or logistic problems.

Step 3 *Placing purchase order, clearly specifying the quantity of material, quality of material, price, expected time of delivery, payment terms, etc.:* Any lax in any of the element might lead to either non-availability of right material or right time or right price.

Step 4 *Follow-up of purchase order:* Where the purchase orders are routine and standard, it is essential to follow-up the order to ensure that the delivery is made at the right time and place.

Step 5 *Receiving and inspecting the material:* On receipt of the material, the concerned authorities in the organisation must verify the delivery with regard to quantity, quality, specifications, etc. and accept or reject the delivery accordingly.

Step 6 *Checking and passing the bill for payment:* Once the material received is accepted, the bill for the same must be verified to ensure its adherence with the accepted terms and conditions and passed for payment.

Vendor Selection The following factors must be considered in selecting a suitable supplier for placing purchase orders:

- History and track record of the vendor
- Production capacity
- Quality of material
- Major customers of the vendors and their rating
- Major suppliers to the vendors and their track record
- Financial position of the vendor
- Terms and conditions offered by the vendor
- Proximity to the point of production
- Terms of payment
- Flexibility with changing schedules

Ordering Quantity and Frequency (Economic Order Quantity) Where the enterprise decides to purchase the material from outside than to make it internally, one of the major decisions to be made is regarding the quantity to be purchased in each order and the frequency of placing the orders. This has a huge relevance in reduction of the total cost of materials.

Let us understand this with an example. Suppose the annual requirement of raw material is 800 units, ordering cost per unit is ₹125, purchase price per unit is ₹100 and carrying cost (i.e., cost of storing) per unit is 20% of value of inventory (i.e., 20% of unit cost of ₹100) – ₹20.

In case, all 800 units are purchased in one order, the total material cost will be:

	₹
Total purchase price for the year (800 units × ₹100 per unit)	80,000
Ordering cost (one order × ₹125)	125
Carrying cost (assuming half the purchases will be stored at any time) $\frac{1}{2} \times 800 \times ₹20$	8,000
Total material cost	88,125

Let us say, 50 units are purchased each time. Then, the total material cost will be:

	₹
Total purchase price for the year (800 units × ₹100 per unit)	80,000
Ordering cost = $\frac{800}{50}$ = 16 orders × ₹125	2,000

Note: No. of orders = 800/50 = 16

Carrying cost (assuming half the purchases will be stored at any time) $\frac{1}{2} \times 50 \times ₹20$	500
Total material cost	82,500

From this example, it can be observed that the total material cost will differ based on the quantity purchased during each order. It is necessary to identify the quantity, which results in the lowest total material cost. The quantity ordered each time, which leads to the lowest total material cost, is called *Economic Order Quantity*. It is the quantity of purchase which has the most economical material cost.

How to ascertain economic order quantity?

Let us represent all components of material cost in the following manner:

Annual demand	D
Cost per unit	C
Ordering cost per order	O
Carrying or storage cost per unit per annum	S
Quantity of purchase in each order	Q

Based on this, the total material cost can be arrived at as follows:

Total purchase price	$D \times C$
Ordering cost $\left(\frac{D}{Q} \times O\right)$	$\left(\frac{DO}{Q}\right)$

Carrying cost $\left(\frac{1}{2} \times Q \times S\right)$ $\left(\frac{QS}{2}\right)$

So, total material cost = DC + $\left(\frac{DO}{Q}\right)$ + $\left(\frac{QS}{2}\right)$

The total material cost will be lowest when ordering cost equates carrying cost.
When equated,

$$\frac{DO}{Q} = \frac{QS}{2}$$

By cross multiplication, we get $2\,DO = Q^2S$

So, $$Q^2 = \frac{2DO}{S}$$

Therefore, $$Q = \sqrt{\frac{2DO}{S}}$$

When the quantity to be purchased is calculated using the above formula, the total material cost will be the lowest.

To summarise, the economic order quantity can be calculated using the following formula:

$$EOQ = \sqrt{\frac{2DO}{S}}$$

The total material cost of the economic order quantity can be calculated using any of the below formulae:

$$\text{Total material cost} = DC + \left(\frac{DO}{Q}\right) + \left(\frac{QS}{2}\right)$$

or

$$\text{Total material cost} = DC + \sqrt{2DOS}$$

Where,
EOQ or Q = Economic order quantity
D = Annual demand
O = Ordering cost per order
S = Storage or carrying cost per unit per annum

Notes:

1. Where the demand is given for a lesser period than one year, the storage cost also must be considered accordingly. For example, if the demand is given for six months, the storage cost per unit for six months must be taken for calculating EOQ.
2. Where the storage or carrying cost is expressed in percentage, it must be calculated on the purchase price per unit.

For the example given before, the EOQ is as follows:

$$\sqrt{800} \times \frac{125}{10} = 100 \text{ units}$$

When 100 units are purchased in each order, the total material cost will be:

	₹
Total purchase price for the year (800 units × ₹100 per unit)	80,000
Ordering cost $\left(\frac{800}{100} = 8 \text{ orders} \times ₹125\right)$	1,000
Carrying cost (assuming half the purchases will be stored at any time) $\left(\frac{1}{2} \times 100 \times ₹20\right)$	1,000
Total material cost	82,000

Or, the total material cost is = DC + $\sqrt{2}$DOS

That is, total material cost = (800 × 100) + ($\sqrt{2}$ × 800 × 125 × 20)

= ₹80,000 + ₹2,000 = ₹82,000

Manufacturing Quantity and Frequency (Economic Manufacturing Quantity) Where the enterprise decides to manufacture the raw material required, instead of buying them, it is necessary to determine the number of batches in which they should be manufactured and the quantity to be manufactured in each batch. This has a huge impact on the total material cost.

The economic manufacturing cost can be determined using the following formula:

$$EMQ = \frac{\sqrt{2}DO}{S}\left(\frac{1 - D}{P}\right)$$

The total material cost of the economic manufacturing quantity can be calculated using any of the following formulae:

$$\text{Total material cost} = DC + \left(\frac{DO}{Q}\right) + \left(\frac{(Q \times S(1 - D/P)}{2}\right)$$

or

$$\text{Total material cost} = DC + \sqrt{2}DOS\left(1 - \frac{D}{P}\right)$$

Where,

EMQ or Q = Economic manufacturing quantity

D = Annual demand

O = Set-up cost per batch (i.e., cost of setting up the facility for producing the material)

S = Storage or carrying cost per unit per annum

P = Production capacity

Notes:

1. Where the demand is given for a lesser period than one year, the storage cost also must be considered accordingly. For example, if the demand is given for six months, the storage cost per unit for six months must be taken for calculating EOQ.
2. Where the storage or carrying cost is expressed in percentage, it must be calculated on the variable production cost per unit.

Documents relating to Procurement of Materials The following are the documents used in relation to procurement of materials:

1. Bill of Materials
2. Material Requisition Note

3. Purchase Requisition
4. Purchase Order
5. Goods Received Note

Bill of Materials is a schedule of standard quantities of materials required for any job or other unit of production. It is a comprehensive list of materials with exact description and specifications required for a job or other production units. It is also known as 'material specification list'. It lays down the exact description and specifications of all materials and quantities required for a job or product. It is prepared by the Engineering Department.

The Bill of Material is used in the Stores Department to provide a basis for preparing material purchase requisitions, to act as authorisation for issuing total material requirement, to reduce paperwork and clerical activity in verification of each and every item of materials to be issued. The Costing Department can use it for preparation of budgets and for computing material cost variances. The Production Control Department can use it to control usage of material.

Material Requisition Note is a formal written demand or request usually from the production department to stores for supply of specified material and any other component. It is prepared by the production department. The purpose of Material Requisition Note is to draw material from the store by concerned departments and it authorizes the store keeper to issue the requisitioned materials and make record of the same.

Purchase Requisition is a form used for making a formal request to the purchasing department to procure materials. It is prepared by stores department and sent to purchasing department when the stock level of any material reaches re-order level.

Purchase Order is a written request to the supplier to supply certain specified materials at specified prices within a specified period. The purpose of the purchase order is to confirm the terms of supply already quoted by the supplier and agreed to by the organisation. Copies of purchase order are sent to the supplier, the Stores Department – for follow up, to Receiving Department – for verification at the time of receipt and inspection, and Accounting Department – for reference and record.

Good Received Note is a note prepared acknowledging the receipt of material supplied by the vendor. It is prepared by the Receiving Department and sent to Purchase Department for verifying supplier's bill for payment.

THEORY QUESTIONS

Section A Type Questions

1. List the decisions relating to procurement of material.
2. What is meant by 'make or buy' decision? Give example.
3. List the steps involved in purchase of material.
4. List any six factors to be considered in selection of vendors.
5. What is economic order quantity? **[*BU BBM, May (2013), May (2017)*]**
6. How can economic order quantity be calculated? State the formula and give the meaning of each term. **[*BU B.Com, May (2014)*]**
7. What is economic manufacturing quantity?
8. State the formula for calculation of economic manufacturing quantity giving meaning of each term in the formula.
9. List the documents associated with procurement of material.
10. What is Bill of Materials?
11. What is material requisition note? **[*BU B.Com, May (2016), B.Com, May (2017)*]**
12. What is purchase requisition? To whom is it submitted? **[*BU B.Com, May (2015)*]**
13. What is a purchase order? **[*BU B.Com, May (2016)*]**
14. Explain the meaning of 'Goods Received Note'?

Section B Type Questions

1. List out and briefly explain the various components of procurement of material.
2. Explain in detail the various steps involved in purchase of material.
3. What is vendor selection? List and explain the factors to be considered for selection of vendors.
4. What is economic order quantity? Explain the purpose of calculating EOQ and the formula for its calculation.
5. What is economic manufacturing quantity? Explain the purpose of calculating EMQ and the formula for its calculation.
6. Explain in brief the various documents associated with purchase of material.

Section C Type Question

What is material Control? Explain with examples the various decision areas of material procurement.

4.4.2 Stores Control or Inventory Control

All the material procured is not sent to production immediately. A major portion of the material procured is stored and sent to production department as and when demanded. So, with regard to materials, storage is an important function. The enterprise must make the following decisions relating to stores:

1. Where to Store?
2. How to Store?
3. How much to Store?
4. How to identify the materials in stores?
5. How and when to verify the materials stored?
6. What are the duties and responsibilities of the store keeper?
7. What are the records and documents to be maintained for effective functioning of the stores?

The techniques and strategies for making the above decisions have been discussed next.

A. Classes or Types of Stores

Based on where the materials are stored, stores are classified into the following categories:

1. Centralised stores or main stores
2. Sub-stores
3. Departmental stores

Central Stores are the stores which are centrally situated and accessible to all departments. Where the receipts and issues of different items of stores are not large, and the various departments are close to each other, one central store for all departments might be sufficient.

Sub Stores are the branches of central stores. They are required for organisations where the production departments are distributed over a large area. Sub stores facilitate easy accessibility to the various work spots or production departments and they accommodate regularly used and essential items. Issue of material from central stores to sub stores is treated as transfer for accounting purposes, but not as use of material.

Departmental Stores are within the production department meant for storing raw materials and Work in Progress. They are required when the production department works in multiple shifts and the central stores works for only one shift, and where the raw materials are used regularly and drawing in bulk saves time and handling costs. Further, where Work in Progress and semi-finished components are in bulk and to be stored, departmental stores will be a requirement.

In short, where the material must be stored depends on what must be stored and the frequency of their requirement.

The following points must be kept in mind while deciding on the location of stores:

- There must be reduction in transportation charges.
- There must be easy accessibility and reach from production departments.

- There must be reduction in time involved in material movement from stores to production centers.
- There must be reduction of wastage in material movement and handling.

B. Method of Storing

Another major challenge in storing material is to decide upon how to store them. The following are a few of the popular methods of storing materials.

1. ABC method
2. VED method
3. FSN method

ABC Method is a method where the materials are classified into three categories viz., A, B and C, based on value and volume of material, and stored accordingly.

- Materials which are low in volume but have high value are categorised as 'A'.
- Materials which are high in volume but low in value are considered as 'C' .
- Materials which have moderate value and volume are classified as 'B'.

'A' category materials are given utmost importance and stored with complete care. For example, chemicals, bullion, etc. are low in quantity but high in value. They are stored with complete caution. Wastage, pilferage or leakage in this category, even to a small extent, result in huge losses for the organisation.

'C' category items like stores, spares, loose tools, etc. can be stored casually since even a huge quantity loss might not have a major financial loss. There might not be a need to incur huge amount of storage cost towards this category of material.

'B' category items which include all other kind of materials are stored with more caution than 'C' category items but are not given as much importance as 'A' category items.

This method ensures minimum investment on inventory control and saving in time for the management since attention has to be paid only to some of the items rather than all the items.

VED Method is a method where the materials are classified into three categories viz., Vital, Essential and Desirable, based on the impact on production, the absence of material might cause.

- Vital materials are those whose absence for a short period might affect continuity in production.
- Essential materials are those whose absence beyond a week might hamper production and sales.
- Desirable materials are those whose absence might not have much impact on production. However, they must be procured in time to avoid any impact of production.

For example, In a fruit squash manufacturing company, fruits, sugar and other ingredients are vital material, bottles, containers and other packing material are essential material and replacements for machinery, spares, etc. are desirable material.

It is essential to stock vital materials sufficiently, essential materials adequately and desirable materials appropriately.

FSN Method is a method where the materials are classified into three categories viz., Fast moving, Slow moving and Non-moving, based on the frequency in which the materials are required in production.

- Fast moving materials are those which are required frequently in the production department.
- Slow moving materials are those whose frequency of requirement is relatively lower.
- Non-moving materials are those which are required once in a while or in situations of emergency.

For example, Direct Materials are fast-moving; stationery required at the office is slow moving; and replacement required only when the original part of component is damaged or defective is non-moving.

Usually, the best practice is to store fast moving materials closer to the entrance and exit points of the stores, slow moving materials at the middle of the stores and non-moving materials at the far end of the stores. Such arrangement facilitates easy movement of material and reduces time and efforts.

C. Stock Levels

Another important decision with regard to material storage is the quantity to be stored. While storing excessive quantity increases storage cost and might result in high wastage, storing too less quantity might affect continuity in production. Hence, it is essential to ascertain the quantity of each component of material to be stored. The following are the different levels of stock that any organisation maintains for each item of material.

1. Re-order level
2. Minimum level
3. Maximum level
4. Average level
5. Danger level

1. **Re-order Level** It is the level of stock at which action for purchase of material must be initiated. That is, when the material reaches this level, the purchase procedure for next purchase must be initiated. It is calculated by using the following formulae:

Maximum consumption during a given period × Maximum lead time Or Safety stock + Lead time consumption

Notes:

- Maximum consumption is the maximum quantity of material required for production during a given period. For example, if the material requirement during a week is 5 to 8 kg, then the maximum consumption is 8 kg.
- Lead time refers to the time period between placement of purchase order and receipt of materials. If the lead time for a particular item of material is 3 to 4 weeks, then the maximum lead time is 4 weeks.
- Safety stock is the quantity of material maintained as a cushion to meet emergency requirements.
- Lead time consumption = Maximum consumption during a given period × Maximum lead time in terms of the same period. (That is, if the consumption per week is 3 to 5 tons, lead time for procurement of the material is 2 to 3 weeks, the lead time consumption is 5 tons × 3 weeks = 15 tons.)

2. **Minimum Level** It refers to the lowest quantity (i.e., minimum quantity) of material to be maintained at all times to avoid stock-out situations. It is calculated by using the following formula:

Re-order level (less) (Average consumption × Average lead time)

Notes:

- Average consumption refers to the average of maximum consumption and minimum consumption during a given time period. For example, if the quantity of a particular item of material required per week is 4 to 6 quintals, the average consumption is five quintals [i.e., (4 + 6) /2].
- Average lead time refers to the average of maximum and minimum time for delivering the material by suppliers from the date of placing the order. For example, if the lead time for a particular item of material is 3 to 5 weeks, the average lead time is four weeks [i.e., (3+5)/2].

3. **Maximum Level** It refers to the level of stock above which the material should not be piled up. It indicates the maximum quantity of an item of material that can be held in stock at any time. It can be calculated with the help of the following formula:

[Re-order level (plus) Re-order quantity] minus [Minimum consumption × Minimum lead time]

Notes:

- Re-order quantity refers to the quantity to be ordered for when the stock of material reaches re-order level. Re-order quantity is the same as economic order quantity.
- Minimum consumption is the minimum quantity of material required for production during a given period. For example, if the material requirement during a week is 5 to 8 kg then the minimum consumption is 5 kg.

- Lead time refers to the time period between placement of purchase order and receipt of materials. If the lead time for a particular item of material is 3 to 4 weeks, then the minimum lead time three weeks.

4. **Average Level** It refers to the average of maximum and minimum levels of stock. It is calculated for the purpose of insurance, submission of stock statements to the bank, preparation of interim financial reports, etc. It can be calculated using any of the following formulae:

$$\frac{1}{2} \times [\text{Maximum level (plus) Minimum level}]$$
Or
$$[\text{Minimum level (plus)} \frac{1}{2} \times \text{Re-order quantity}]$$

5. **Danger Level** It is the level at which emergency purchase action is taken to replenish stocks up to minimum level. It is usually fixed below the minimum level. It can be calculated using the following formulae:

Minimum consumption × Minimum lead time
Or
Average consumption × Minimum lead time

D. Classification and Codification of Material

For the purpose of easy location, identification and for convenience in storage and issues, each item of stores is given a distinct name and code number. This process is known as classification and codification of materials.

Classification of materials means the analysis of materials into different classes, categories or groups, usually on the basis of nature of usage of materials. Classification gives a 'name' to each item or category of material. The purpose of classification of materials is to enable codification.

Codification is the procedure of assigning symbols for each item in accordance with a proper arrangement. The following are the popular methods of codification:

Numeric Method: Under this method, codes are given in numbers; for example, 011, 4.14, etc.

Alphabetic Method: Under this method, codes are given in alphabets; for example, B, BB, BBC, etc.

Alpha-numeric Method: Under this method, codes are given in combinations of numbers and alphabets; for example, B11, B4.4, etc.

E. Stock Verification

Stock verification involves counting of actual stock available and comparing the same with books and records to ascertain discrepancies, if any. There are two methods of stock verification, viz.,

***Periodic Stock Taking*:** In this, the stock verification takes place at the end of a defined period say, quarterly, semi-annually, annually, etc. Under this method, all items of stocks are covered in a single stretch of verification and during the period of verification regular stores procedures like material receipts, issues, etc. are suspended. While the cost of verification is less under this method, the limitations of this method are that the discrepancies can be known only periodically and hence fixing of responsibility for the discrepancy becomes difficult; and this method does not facilitate or help in compilation of financial results.

***Continuous or Perpetual Stock Taking*:** In this, stocks are verified at regular intervals or continuously during the year. In each verification, two or three items are covered, and in an entire period, all items are covered on rotation basis. There is no interference with regular work flow under this method. Due to more frequent intervals of verification, the discrepancies are ascertained immediately and corrective action can be taken. This method also enables more frequent updation of the records. Since this method provides stock figures on

real time basis, it facilitates compilation of data for ascertaining financial results. Although, this method has many advantages, the major limitation is that it is expensive and laborious.

F. Duties and Responsibilities of Stores Manager

The following are the duties and responsibilities of a store manager or store in-charge:

- To maintain material safely and ensure sustenance of both quality and quantity of material under his custody
- To maintain proper records of receipts, storage and issue of materials
- To initiate purchase requisitions for replacement of stock whenever stock level of any material reaches the re-order level and to stop further purchases when the stock level reaches maximum level
- To receive and inspect material supplied by vendors or other departments and arrange for their storage in appropriate places
- To properly classify and appropriately codify the materials for enabling easy identification of materials
- To issue materials to production departments on receipt of Material Requisition Note
- To reserve a particular material for a specific job when so required
- To take a physical count of the stock in frequent intervals and verify the same with the records
  To take corrective action in case of any discrepancies between physical stock and stock as per records
- To provide any information required by the management for decision making.

G. Records and Documents relating to Stores

The following records and documents relate to storing function of materials:

1. Bin Card
2. Stores Ledger
3. Material Return Note or Stores Debit Note or Shop Credit Note
4. Material Outward Return Note

Bin Card is a quantitative record of receipts, issues and closing balances of the items of stores. Separate bin cards are maintained for each item of stores. They are placed in shelves or bins or are suitably hung up as convenient, alongside the materials in godown. It provides a ready figure of stock of material in hand and also facilitates physical verification of material.

The following is the specimen of a Bin Card.

ARM CO LTD.
Bin Card

Description: **Maximum Level:**
Stores Code No.: **Minimum Level:**
Location: **Re-ordering Level:**
Unit of Measurement: **Danger Level:**

Date	Particulars	Receipts	Issues	Balance
Physical stock verification record: Date: Verified by: Store Keeper				

Stores Ledger is a record of all receipts, issues and balances of materials along with the rates and their values. Separate ledger sheets are maintained in stores ledger for each item of material. It serves as a quantitative and value-wise record of materials in stores.
The following is the specimen of a Stores Ledger.

ARM CO LTD
Stores Ledger

Description: **Folio No.:**
Stores Code No.: **Maximum Level:**
Location: **Minimum Level:**
Unit of Measurement: **Re-order Level:**
Normal Source of Supply: **Danger Level:**

Date	Particulars	Receipts			Issues			Balances		
		Qty.	Rate ₹	Amt. ₹	Qty.	Rate ₹	Amt. ₹	Qty.	Rate ₹	Amt. ₹
Verified with Bin Card: Date: Verified By Store Keeper										

Differences between Bin Card and Stores Ledger

	Bin Card	Stores Ledger
Maintained by	Store keeper	Cost accounting department
Nature of Record	Stores recording document	Accounting record
Contents	Only quantity	Quantity and value
Time of recording	At the time of transaction	After the transaction takes place
Source documents used	No separate document used for recording, since the recording is at the source	Recording is based on documents like Material Requisition Note, Goods Received Note, Material Transfer Note, Shop Credit Note, etc.
Basis of record	Each transaction is recorded individually	Transactions are posted on summarised basis

Material Return Note or Stores Debit Note or Shop Credit Note is prepared by the Production Department when any material is returned back to the stores. The document is sent to Stores Department for acknowledgement and a copy of the same is sent to the Costing Department for recording purposes.

Material Outward Return Note is a document prepared by the Stores Department when any material is returned back to the supplier on account of being defective, excessive, etc. It is sent to the supplier for acknowledgement and a copy of the same is sent to the Costing Department for recording purposes.

THEORY QUESTIONS

Section A Type Questions

1. What is material control? List the various decision areas relating to storage of material.
2. List the different types of Stores.
3. What are centralised stores?
4. What are sub-stores?
5. What are departmental stores?
6. List the different methods of storing material.
7. What is ABC method of storing material? Mention its objective.
   [*BU B.Com, May (2011), BBM, May (2015), B.Com, May (2016)*]
8. What is VED method of storing material? **[BU B.Com, May 2014)**
9. What is FSN method of storing material?
10. State the different levels of material storage?
11. What is re-order level?
12. State the formula for calculating re-order level.
13. What is minimum Level? How can it be calculated? **[*BU BBM, May (2011)*]**
14. What is maximum Level? What is the formula for its calculation? **[*BU BBM, May (2013)*]**
15. What is the meaning of 'average level'?
16. What is the formula for calculation of 'average level'?
17. What is the danger level of materials? **[*BU B.Com, May (2011)*]**
18. State the formula for calculation of danger level.
19. What is classification of materials?
20. What is codification of materials?
21. State the different methods of codification of material.
22. What is 'numeric method' of material codification? Give examples.
23. What is 'alphabetic method' of material codification? Give examples.
24. What is 'alpha-numeric method' of material codification? Give examples.
25. What is stock verification? List the different methods of stock verification.
26. What is periodic stock verification?
27. What is perpetual stock verification? **[*BU BBM, May (2013), B.Com, May (2016)*]**
28. List any four responsibilities of a store manager.
29. List the various documents or records relating to stores.
30. State any three differences between Bin Card and Stores Ledger.
31. What is a Bin Card? **[*BU BBM, May (2011), B.Com, May (2013)*]**
32. What is Stores Ledger? **[*BU B.Com, May (2016)*]**
33. What is Material Return Note?
34. What is Material Outward Return Note?
35. Name any four techniques of inventory control. **[*BU B.Com, May (2015)*]**

Section B Type Questions

1. Explain the different types of stores and their suitability.
2. Distinguish between centralised and decentralised methods of purchasing. **[*BU B.Com, May (2011)*]**
3. State the different methods of material storage and explain them in detail, with examples.
4. What are stock-levels? State and explain the different stock levels and their calculation.
5. Write a short note on classification and codification of material.
6. Explain the various duties and responsibilities of a store manager.
7. List the various documents associated with storage of material and explain them in brief.
8. What is a Bin Card? Draw a specimen of Bin Card.
9. What is Stores Ledger? Show the specimen of a Stores Ledger.
10. Bring out the differences between Bin Card and Stores Ledger.
11. Explain the techniques of inventory control system. **[*BU B.Com, May (2013)*]**

Section C Type Questions

1. Explain in brief the various components of Stores Control or Inventory control.
2. Explain the types of stores, methods of storing and various stock levels.
3. Explain the records relating to storage of materials and list out the various duties and responsibilities of a store manager.

4.4.3 Management of Issues

Issuing of material to the production department is not merely related to the physical supply by the stores to the production department, but it is more of an accounting challenge. When the materials are issued by the stores to the production department on the basis of requisition made by the latter, the value or worth of material so issued must be calculated and considered in finding the cost of production. The calculation becomes a necessity when the procurement of material during a given period is at different prices. The value of materials issued to the Production Department and the worth of materials lying in stock in the stores can be ascertained using different methods, which have been discussed under this head.

The following are the various methods of valuing or pricing material issued to production.

Cost Price Methods	Average Price Methods	Market Price Methods	Notional Price Methods
1. Specific Price Method 2. First-in-first-out Method 3. Last-in-first-out Method 4. Base Stock Method 5. Highest in First Out Method	1. Simple Average Price Method 2. Weighted Average Price Method	1. Replacement Price Method 2. Realisable Price Method	1. Standard Price Method 2. Inflated Price Method

A brief description of these mentioned methods has been provided next.

1. **Specific Price Method** Under this method, each consignment of materials purchased is identified separately as to its price and is issued to jobs on the basis of such specific prices. For this purpose, each lot of material will be stored separately and separate accounts or folios will be maintained for each lot in the stores ledger. This method is useful when materials are purchased and issued for a specific job or work order or for non-standard and specific products. Although the method is simple, it is difficult to operate when purchases issued are large in number.
2. **First-in-first-out Method (FIFO)** This is one of the most popular methods of pricing material issues. Under this method, the material issues are priced in the order in which they are purchased. The following example illustrates the valuation of material issued and Closing Stock under this method.
   The following are the purchases and issues of materials during the month of January 2018:
   January 5 Purchased 500 kg @ ₹10 per kg
   January 8 Purchased 600 kg @ ₹12 per kg
   January 11 Issued 700 kg to Production Department
   January 15 Purchased 400 kg @ ₹14 per kg
   January 23 Issued 500 kg to Production Department
   The value of materials issued is calculated in the following manner under FIFO method.
   Issues made on January 11: Out of 700 kg issued, 500 kg will be valued at ₹10 per kg and the balance 200 kg @ ₹12 per kg. So, the total worth of material issued will be considered as **₹7,400** [i.e., 500 kg × ₹10 (+) 200 kg × ₹12].

Issues made on January 23: Out of 500 kg issued, 400 kg will be valued at ₹12 per kg (i.e., the remaining quantity purchased at this price after deducting the issue of 200 kg made on January 11) and the balance of 100 kg @ ₹14 per kg. So, the total worth of material issued will be considered as **₹6,200** [i.e., 400 × ₹12 (+) 100 × ₹14].

The *value of Closing Stock* for the month of January is **₹4,200** (i.e., 300 kg × ₹14 per kg).

FIFO method is simple to understand and easy to calculate. This method gives best results when the prices are falling since the cost of materials included in the 'Cost of Product' will be less and the value of Closing Stock of raw materials will be high, both leading to higher profits. However, this method might not be useful when the prices fluctuate frequently.

3. **Last-in-First-out Method (LIFO)**

Under this method, the material issues are priced in the reverse order in which the materials are purchased. Continuing the above example, the value of material issued and value of Closing Stock of raw material is calculated in the following manner under LIFO Method.

Issues made on January 11: Out of 700 kg issued, 600 kg will be valued at ₹12 per kg and the balance 100 kg @ ₹10 per kg. So, the total worth of material issued will be considered as **₹8,200** [i.e., 600 kg × ₹12 (+) 100 kg × ₹10].

Issues made on January 23: Out of 500 kg issued, 400 kg will be valued at ₹14 per kg and the balance of 100 kg @ ₹10 per kg. So, the total worth of material issued will be considered as **₹6,600** [i.e., 400 × ₹14 (+) 100 × ₹10].

The *value of Closing Stock* for the month of January is **₹3,000** (i.e., 300 kg × ₹10 per kg).

LIFO method is suitable under inflationary conditions and since the profits are less on account of high cost of material captured in total cost and low value of Closing Stock, this method also helps in tax savings. This method is not as popular as FIFO on account of the complications in calculations. This method is not acceptable under accounting standards or for tax purposes.

4. **Base Stock Method**

Under this method, a minimum quantity of stock is always valued at a fixed price based upon the earliest lot of materials. It is sued as base stock or reserve stock to meet emergency consumption requirements. The quantity in excess of the base stock is valued either under FIFO method or under LIFO method.

5. **Highest-in-first-out Method (HIFO)**

Under this method, the materials are issued to production in the descending order of the prices at which the materials are procured. Continuing the earlier example, the value of material issued and value of Closing Stock of raw material is calculated in the following manner under HIFO method.

Issues made on January 11: Out of 700 kg issued, 600 kg will be valued at ₹12 per kg and the balance 100 kg @ ₹10 per kg. So, the total worth of material issued will be considered as **₹8,200** [i.e., 600 kg × ₹12 (+) 100 kg × ₹10].

Issues made on January 23: Out of 500 kg issued, 400 kg will be valued at ₹14 per kg and the balance of 100 kg @ ₹10 per kg. So, the total worth of material issued will be considered as **₹6,600** [i.e., 400 × ₹14 (+) 100 × ₹10].

The *value of Closing Stock* for the month of January is **₹3,000** (i.e., 300 kg × ₹10 per kg).

6. **Simple Average Price Method**
   Under this method, the materials issued are valued at average of unit prices of different purchases. That is, the value of material issued is calculated using the following formula:

$$\frac{\text{Total of per unit prices of different purchases}}{\text{Number of purchases}}$$

   For the example given earlier, the value of materials issued and value of Closing Stock of material can be calculated in the following manner, under this method:
   Issues made on January 11: 700 kg × ₹11 per kg [i.e., (₹10 + ₹12) ÷ 2] = **₹7,700**.
   Issues made on January 23: 400 kg × ₹13 per kg [i.e., (₹12 + ₹14) ÷ 2] = **₹5,200**.
   The *value of Closing Stock* for the month of January is **₹4,900** [i.e., total purchase cost – ₹17800 (–) total value of materials issued (₹7,700 + ₹5,200) – ₹12,900].

7. **Weighted Average price Method**
   Under this method, the value of materials issued is calculated on the basis of the weighted average cost of total material purchased. That is, the value of materials issued is calculated using the following formula:

$$\frac{\text{Total cost of materials purchased}}{\text{Total quantity purchased}}$$

   For the example given earlier, the value of materials issued and value of Closing Stock of material can be calculated in the following manner, under this method:
   Issues made on January 11: [(500 × 10 + 600 × 12) ÷ 1100] = 11.0909 × 700 = **₹7,763.64**
   Issues made on January 23: [(400 × ₹11.0909 + 400 × 14) ÷ 800] = 12.5455 × 500 = **₹6,272.73**.
   The *value of Closing Stock* for the month of January is **₹3,763.63** [i.e., total purchase cost – ₹17.800 (–) total value of materials issued (₹7,763.64 + ₹6,272.73) – ₹14,036.37].

8. **Replacement Cost Method**
   Under this method, materials issued are valued at the replacement cost of the items. Replacement cost is the price at which it is possible to purchase an item identical to that which is being replaced. This method presumes that identical materials are available in the market at a certain cost.

9. **Realizable Price Method**
   Under this method, the materials issued are valued at the price at which the material to be issued can be sold in the market. Since the realizable price might be more or less than the actual cost price, the stores ledger could show a profit or loss, if this method is adopted. In reality, this is not an accepted method for valuing issue of materials.

10. **Standard Price Method**
    Under this method, materials are priced at some predetermined rate or standard price irrespective of the actual purchase price of the materials. The standard cost might be fixed based on current price of the material, anticipated market trends, etc. While this method simplifies the valuation of material issued, the cost of the product does not depict the true cost of material used.

11. **Inflated Price Method**
    Under this method, materials issued to production are issued at a price higher than the actual cost price to provide for wastage which might be because of natural reasons or unavoidable reasons like evaporation, shrinkage, climatic conditions, etc.

Note: As per Ind AS 2 issued by ICAI, only FIFO method and weighted average cost method are recognised.

THEORY QUESTIONS

Section A Type Questions

1. What is meant by 'pricing of material issue'?
2. State the different bases on which the methods of pricing material are classified.
3. List the different types of cost pricing methods.
4. List the different types of average pricing methods.
5. State the different types of market pricing methods.
6. State the different types of notional pricing methods.
7. What is specific price method? Give example.
8. Explain the concept of FIFO method of pricing with example.
9. What is LIFO method of pricing material issue? Under what circumstances is this method preferable?

[*BU B.Com, May (2011), May (2014), May (2017)*]

10. State the meaning and concept of base stock method of pricing.
11. What is highest-in-first-out method of pricing?
12. Explain with example the method of simple average method.
13. What is weighted average method? Give example.
14. What is replacement price method?
15. Explain the meaning of realisable price method.
16. What is standard pricing method?
17. What is inflated pricing method?

Section B Type Questions

1. List out the different methods of pricing issue of materials.
2. Explain with examples the cost pricing methods and average pricing methods of ascertaining the price of material
3. Write short note on the following:
   (a) Replacement price method
   (b) Realisable price method
   (c) Standard price method
   (d) Inflated price method
4. Explain in detail FIFO, LIFO and HIFO methods of pricing material issue.

Section C Type Question

Explain in detail the different methods of 'pricing material issues'.

4.5 RATIOS RELATING TO MATERIAL CONTROL

The following ratios are often calculated for facilitating effective and efficient material control.

1. Yield ratio or input-output ratio
2. Inventory turnover ratio

Yield ratio or input-output ratio measures the effectiveness of production process and enables control of wastage. Yield ratio is calculated using the following formula:

$$\frac{\text{Quantity of material output}}{\text{Quantity of material input}}$$

When expressed as a percentage, it indicates the extent of yield the input has generated and the compliment of that indicates the wastage in the process. This ratio enables identification of wastage and provides a basis for corrective action and control.

Inventory turnover ratio measures the speed at which the stock of material is replaced. It is calculated using the following formula:

$$\frac{\text{Cost of raw materials consumed}}{\text{Average stock of raw materials}}$$

Average stock of raw material refers to the average of opening and Closing Stock of raw materials for a given period. Higher inventory turnover ratio indicates the material is fast-moving and a lower inventory turnover ratio indicates that it is slow moving. The ratio enables identification of slow moving items and provides a basis for taking corrective action.

THEORY QUESTIONS

Section A Type Questions

1. What is yield ratio?
2. How can input-output ratio be calculated?
3. What is inventory turnover ratio? State its purpose.
4. What is the formula for calculation of inventory turnover ratio?

Section B Type Question

Explain with examples the ratios relating to material control.

PROBLEMS

Problems on Calculation of Economic Order Quantity and Total Cost

Problem 1 (Problem on Calculation of Economic Order Quantity)

Find out EOQ from the following information.
Annual usage 6,000 units
Cost of materials per unit ₹20
Cost of placing and receiving one order ₹60
Annual carrying cost per unit 10% of inventory value

Solution

$$\text{EOQ} = \sqrt{\frac{2\,DO}{S}}$$

Here, D = Annual Demand = 6000 units
O = Ordering Cost per order = ₹60
S = Storage Cost per unit per annum = 10% of ₹20 = ₹2

$$\text{So, EOQ} = \sqrt{\frac{(2 \times 6{,}000 \times 60)}{(20 \times 10\%)}}$$

$$= \sqrt{\frac{7{,}20{,}000}{2}}$$

$$= \sqrt{3{,}60{,}000}$$

$$= \textbf{600 units}$$

Problem 2 (Problem on Calculation of EOQ)

Find EOQ from the following information.
Annual usage 1,20,000 units
Cost of materials per unit ₹1
Cost of placing and receiving one order ₹60
Annual carrying cost per unit 10% of inventory value

Solution

$$EOQ = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = 1,20,000 units
O = Ordering Cost per order = ₹60
S = Storage Cost per unit per annum = 10% of ₹1 = ₹0.10

$$\text{So, EOQ} = \sqrt{\frac{(2 \times 1{,}20{,}000 \times 60)}{(1 \times 10\%)}}$$

$$= \sqrt{\frac{1{,}44{,}00{,}000}{0.1}}$$

$$= \sqrt{1{,}440{,}00{,}000}$$

$$= \textbf{12,000 units}$$

Problem 3 (Problem on Calculation of EOQ)

From the following particulars, calculate the EOQ.
Annual requirement 1,600 units
Cost of material per unit ₹40
Cost of placing and receiving one order ₹50
Annual carrying cost of inventory 10% of inventory value

Solution

$$EOQ = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = 1600 units
O = Ordering Cost per order = ₹50
S = Storage Cost per unit per annum = 10% of ₹40 = ₹4

$$\text{So, EOQ} = \sqrt{\frac{(2 \times 1{,}600 \times 50)}{(40 \times 10\%)}}$$

$$= \sqrt{\frac{1{,}60{,}000}{4}}$$

$$= \sqrt{40{,}000}$$

$$= \textbf{200 units}$$

Problem 4 (Problem on Calculation of EOQ and Number of Orders)

Calculate the EOQ from the following information. Also, state the number of orders to be placed in a year.
Consumption of materials 10,000 kg per annum
Order placing costs per order ₹50
Cost of raw materials ₹2 per kg
Storage costs 8% on average inventory

Solution

$$EOQ = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = 10,000 kg
O = Ordering Cost per order = ₹50
S = Storage Cost per unit per annum = 8% of ₹2 = ₹0.16

$$\text{So, EOQ} = \sqrt{\frac{(2 \times 10{,}000 \times 50)}{(2 \times 8\%)}}$$

$$= \sqrt{\frac{10{,}00{,}000}{0.16}}$$

$$= \sqrt{62{,}50{,}000} = \textbf{2500 kg}$$

$$\text{Number of orders per annum} = \frac{D}{Q} = \frac{10{,}000}{2500} = \textbf{4 orders}$$

Problem 5 (Problem on Calculation of EOQ and Total Cost of EOQ)

Calculate EOQ and the total cost of EOQ from the following particulars.
Quantity 50 units per month
Ordering cost ₹12 per order
Carrying cost 20%
Price per unit ₹20

Solution

$$EOQ = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = (50 × 12) = 600 units
O = Ordering Cost per order = ₹12
S = Storage Cost per unit per annum = 20% of ₹20 = ₹4

$$\text{So, EOQ} = \sqrt{\frac{(2 \times 600 \times 12)}{(20 \times 20\%)}}$$

$$= \sqrt{14{,}400 \div 4}$$

$$= \sqrt{3600} = \textbf{60 units}$$

$$\text{Total Cost of EOQ} = DC + \left(\frac{DO}{Q}\right) + \left(\frac{QS}{2}\right)$$

So, Total Cost = $(600 \times 20) + \left(\frac{600 \times 12}{60}\right) + \left(\frac{60 \times 4}{2}\right)$

= 12000 + 120 + 120

= **₹12,240**

Problem 6 (Problem on Calculation of Economic Order Quantity and Re-order Level when Information is Given on Daily Basis)

About 50 items are required every day for a machine. A fixed cost of ₹50 per order is incurred for placing one order. The inventory carrying cost per item amounts to ₹0.02 per day. The lead time is 32 days. Calculate EOQ and ROL. (Consider 365 working days per annum.)

Solution

$$EOQ = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = (50×365) = 18,250 units

O = Ordering Cost per order = ₹50

S = Storage Cost per unit per annum = ₹0.02 × 365 = ₹7.30

So, $EOQ = \sqrt{\frac{(2 \times 18{,}250 \times 50)}{7.30}}$

$= \sqrt{\frac{18{,}25{,}000}{7.3}}$

$= \sqrt{2{,}50{,}000}$

= **500 units**

Re-order Level = Maximum consumption per day × Maximum re-order period

= 50 × 32 days

= **1,600 units**

Problem 7 (Problem on Calculation of EOQ, Number of Orders and Total Cost)

Following information relating to a type of material is available:
Annual demand 2,400 units
Unit price ₹2.40
Ordering cost per order ₹4
Storage cost 2% per annum
Interest rate 10% per annum
Calculate EOQ and the number of orders placed during the year.

Solution

$$EOQ = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = 2400 units

O = Ordering Cost per order = ₹4

S = Storage Cost per unit per annum = (10% + 2%) of ₹2.40 = ₹0.288

$$\text{So, EOQ} = \sqrt{\frac{(2 \times 2{,}400 \times 4)}{(2.40 \times 12\%)}}$$

$$= \sqrt{\frac{19{,}200}{0.288}}$$

$$= \sqrt{66{,}666.67}$$

= 258 units (rounded off)

$$\text{Number of orders per annum} = \frac{D}{Q} = \frac{2{,}400}{258} = \textbf{9.3 orders or 10 orders (rounded off).}$$

Note: 258 units will be purchased each time over 9 orders and the balance of 78 units only [2400 – (258 × 9)] will be purchased in the last order.

$$\text{Total Cost of EOQ} = \left(DC + \frac{DO}{Q}\right) + \left(\frac{QS}{2}\right)$$

$$\text{So, Total Cost} = (2400 \times 2.40) + \left(\frac{2400 \times 4}{258}\right) + \left(\frac{258 \times 0.288}{2}\right)$$

= 5,760 + 37.21 + 37.15

= **₹5,834.36 or ₹5,834 (rounded off)**

Problem 8 (Problem on Calculation of EOQ, Number of Orders and Time Gap between Orders)

From the following particulars, calculate EOQ, number of orders and the time gap between two orders.
Annual requirements 3200 units
Cost of materials per unit ₹40
Cost of placing and receiving one order ₹100
Annual carrying cost of inventory 10%

Solution

$$\text{EOQ} = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = 3200 units
O = Ordering Cost per order = ₹100
S = Storage Cost per unit per annum = 10% of ₹40 = ₹4

$$\text{So, EOQ} = \frac{\sqrt{2 \times 3{,}200 \times 100}}{(40 \times 10\%)}$$

$$= \frac{\sqrt{640000}}{4}$$

$$= \sqrt{160000}$$

= 400 units

$$\text{Number of orders per annum} = \frac{D}{Q} = \frac{3{,}200}{400} = \textbf{8 orders}$$

$$\text{Time gap between two orders} = \frac{12 \text{ months}}{8 \text{ orders}} = \textbf{2 months or 60 days}$$

Problem 9 (Problem on Calculation of EOQ, Total cost of EOQ, Number of Orders and Time Gap between Orders)

A manufacturer buys certain component from outside suppliers at ₹30 per unit. Total annual need is 800 units. Annual return on investment is 10%. Rent, insurance, taxes, etc., per unit per annum is ₹1, and Cost of placing one order is ₹100. Determine EOQ, Number of orders placed during the year, the Time gap between one order and the other; and the total cost of EOQ.

Solution

$$EOQ = \sqrt{\frac{2DO}{S}}$$

Here, D = Annual Demand = 800 units
O = Ordering Cost per order = ₹100
S = Storage cost per unit per annum = (10% of ₹30) + ₹1 = ₹3 + ₹1 = ₹4

$$\text{So, EOQ} = \sqrt{\frac{(2 \times 800 \times 100)}{4}}$$

$$= \sqrt{\frac{160000}{4}}$$

$$= \sqrt{40000}$$

= 200 units

$$\text{Number of orders per annum} = \frac{D}{Q} = \frac{800}{200} = \textbf{4 orders}$$

$$\text{Time gap between two orders} = \frac{12 \text{ months}}{4 \text{ orders}} = \textbf{3 months or 90 days}$$

$$\text{Total Cost of EOQ} = DC + \frac{DO}{Q} + \frac{QS}{2}$$

$$\text{So, Total Cost} = (800 \times 30) + \left(\frac{800 \times 100}{200}\right) + \left(\frac{200 \times 4}{2}\right)$$

= 24,000 + 400 + 400
= **₹24,800**

Problem 10 (Problem on Calculation of EMQ and Total Cost)

The annual demand of a product is 1,00,000 units. The optimal production capacity is 2,00,000 units per year. The set-up cost per production run is ₹500 and the variable production cost of each item is ₹10. The annual holding cost per unit is 20% of its value. Find the optimum production lot size and the length of production run.

Solution

Optimal production lot size or EMQ can be calculated using the following formula:

$$EMQ = \sqrt{\frac{2DO}{S}\left(1 - \frac{D}{P}\right)}$$

Here,
D = 1,00,000 units
O = ₹500

S = 20% of ₹10 = ₹2
P = 2,00,000 units

So, EMQ = $\sqrt{\frac{2 \times 100000 \times 500}{[2 \times (1 - 100000/200000)]}}$

Therefore, EMQ = **10,000 units**
Number of batches to be run each year = 1,00,000 units/10,000 units = **10**
Time interval between two batches = 12 months/10 batches = **1.2 months or 36 days**
Total Cost of EMQ = DC + √2DOS(1 – D/P)

$$= (100000 \times 10) + \left(\sqrt{2} \times 100000 \times 500 \times 2 \times \left(1 - \frac{100000}{200000}\right)\right.$$

= ₹10,00,000 + ₹10,000
= **₹10,10,000**

Problems on Determination of Stock Levels

Problem 11 (Problem on Calculation of Stock Levels)

Calculate Re-order Level, Maximum Level, Minimum Level and Average Level of stock from the following information.
Re-order quantity 1,500 units
Re-order period 4 to 6 weeks
Maximum consumption 400 units per week
Normal consumption 300 units per week
Minimum consumption 250 units per week

Solution

Re-order Level = Maximum consumption × Maximum re-order period
= 400 × 6
= **2,400 units**

Maximum Level = (Re-order level + Re-order quantity) – (Minimum consumption × Minimum re-order period)
= (2,400 + 1,500) – (250 × 4)
= 3,900 – 1,000
= **2,900 units**

Minimum Level = Re-order level – (Normal consumption × Normal re-order period)
= 2,400 – (300 × 5)
= 2,400 – 1,500
= **900 units**

Average Stock Level = Minimum level + ½ of Re-order quantity
= 900 + ½ of 1,500
= **1,650 units**

Problem 12 (Problem on Calculation of Various Stock Levels for Two Components)

Two components A and B are used as follows:
Normal usage 50 units per week each
Minimum usage 25 units per week each
Maximum usage 75 units per week each
Re-order quantity: A – 300 units; B – 500 units
Re-order period: A – 4 to 6 weeks; B – 2 to 4 weeks
Maximum lead time for emergency purchases: A – 2 weeks; B – 1 week.
Calculate Re-order Level, Maximum Level, Minimum Level, Average Level and Danger Level of stock for each component. **[*BU BBM, May (2013)*]**

Solution

Re-order Level = Maximum Consumption × Maximum Re-order period
Component A = 75 × 6 = **450 units**
Component B = 75 × 4 = **300 units**

Maximum Level = (Re-order Level + Re-order Quantity) – (Minimum Consumption × Minimum Re-order period)
Component A = (450 + 300) – (25 × 4)
= 750 – 100 = **650 units**
Component B = (300 + 500) – (25 × 2)
= 800 – 50 = **750 units**

Minimum Level = Re-order Level – (Normal Consumption × Normal Re-order period)
Component A = 450 – (50 × 5)
= 450 – 250 = **200 units**
Component B = 300 – (50 × 3)
= 300 – 150 = **150 units**

Average Stock Level = Minimum Level + ½ of Re-order Quantity
Component A = 200 + ½ of 300
= 200 + 150 = **350 units**
Component B = 150 + ½ of 500
= 150 + 250 = **400 units**

Danger Level = Normal Consumption × Emergency Delivery Time
Component A = 50 × 2 = **100 units**
Component B = 50 × 1 = **50 units**

Problem 13 (Problem on Calculation of various stock levels for two components)

Two materials X and Y are used as follows:
Minimum usage 50 units per week each
Maximum usage 150 units per week each
Normal usage 100 units per week each
Re-order quantity: X – 600 units; Y – 1,000 units
Delivery period: X – 4 to 6 weeks; Y – 2 to 4 weeks
Calculate Re-order Level, Maximum Level, Minimum Level and Average Level of stock for each component.

Solution

Re-order Level = Maximum Consumption × Maximum Re-order period
Component X = 150 × 6 = **900 units**
Component Y = 150 × 4 = **600 units**

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

Component X = (900 + 600) – (50 × 4)
= 1,500 – 200
= **1,300 units**
Component Y = (600 + 1,000) – (50 × 2)
= 1,600 – 100
= **1,500 units**

Minimum Level = Re-order Level – (Normal Consumption × Normal Re-order period)
Component X = 900 – (100 × 5)
= 900 – 500
= **400 units**
Component Y = 600 – (100 × 3)
= 600 – 300
= **300 units**

Average Stock Level = Minimum Level + ½ of Re-order Quantity
Component X = 400 + ½ of 600
= 400 + 300
= **700 units**
Component Y = 300 + ½ of 1,000
= 300 + 500
= **800 units**

Problem 14 (Problem on Calculation of Maximum and Minimum Stock Levels)

Calculate the Maximum and Minimum Level of stock from the following particulars.
Ordering quantity 800 units
Maximum consumption 30 units per week
Minimum consumption 10 units per week
Delivery period – maximum 30 weeks and minimum 20 weeks

Solution

Re-order Level = Maximum Consumption × Maximum Re-order period
= 30 × 30
= **900 units**

Maximum Level = (Re-order Level + Re-order Quantity) – (Minimum Consumption × Minimum Re-order period)
= (900 + 800) – (10 × 20)
= 1,700 – 200
= **1,500 units**

Minimum Level = Re-order Level – (Normal Consumption × Normal Re-order period)
= 900 – (20 × 25)
= 900 – 500
= **400 units**

Problem 15 (Problem on Calculation of Stock Levels for Three Material Components)

In manufacturing its product, a company uses three raw materials A, B and C in respect of which the following information is given as follows.

Raw Material	Usage per Unit of Output	Re-order Quantity (kg)	Price per Kg (₹)	Delivery Period (Weeks)	Re-order Level (kg)	Minimum Level (kg)
A	10	10,000	10	1–3	8,000	-
B	4	5,000	30	3–5	4,750	-
C	6	10,000	15	2–4	-	2,000

Weekly production varies from 175 units to 225 units. What would you expect the quantity of the following to be: Minimum Level of A, Maximum Level of B, Re-order Level of C and Average Level of A?

Solution

Minimum Level = Re-order Level – (Normal Consumption × Normal Re-order period)

Minimum Level for Raw Material A = 8,000 – (2000 × 2)

= 8,000 – 4,000

= **4000 units**

Note: *Normal consumption of A = Normal Output × Normal Usage*

= 200 × 10

= 2,000

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

Maximum Level for Raw-material B = (4,750 + 5,000) – (700 × 3)

= 9,750 – 2,100

= **7,650 units**

Note: *Minimum Consumption of B = Minimum Output × Normal Usage*

= 175 × 4

= 700

Re-order Level = Maximum Consumption × Maximum Re-order period

Re-order Level for Raw Material C = 1,350 × 4

= **5,400 units**

Note: *Maximum Consumption of C = Maximum Output × Normal Usage*

= 225 × 6

= 1,350

Average Stock Level = Minimum Level + ½ of Re-order Quantity

Average Stock Level of Raw Material A = 4,000 + ½ of 10,000

= 4,000 + 5,000

= **9,000 units**

Problem 16 (Problem on Calculation of Maximum Level)

Calculate the maximum level of stock from the following particulars:

Ordering quantity 1,200 units

Maximum consumption 450 units per week

Minimum consumption 150 units per week

Delivery period 2–3 weeks **[*BU B.Com, May (2014)*]**

Solution

Re-order Level = Maximum Consumption × Maximum Re-order period
= 450 × 3
= **1,350 units**

Maximum Level = (Re-order Level + Re-order Quantity) – (Minimum Consumption × Minimum Re-order period)
= (1,350 + 1,200) – (150 × 2)
= 2,550 – 300
= **2,250 units**

Problem 17 (Problem on Calculation of Various Stock Levels)

From the following data, calculate Re-ordering Level, Maximum Level and Minimum Level.
Re-order quantity 3,000 units
Re-order period 4 to 6 weeks
Maximum consumption 800 units per week
Minimum consumption 500 units per week
Normal consumption 600 units per week

Solution

Re-order Level = Maximum Consumption × Maximum Re-order period
= 800 × 6
= **4,800 units**

Maximum Level = (Re-order Level + Re-order Quantity) – (Minimum Consumption × Minimum Re-order period)
= (4,800 + 3,000) – (500 × 4)
= 7,800 – 2,000
= **5,800 units**

Minimum Level = Re-order Level – (Normal Consumption × Normal Re-order period)
= 4,800 – (600 × 5)
= 4,800 – 3,000
= **1,800 units**

Problem 18 (Problem on Calculation of Average Stock Level)

From the following data, calculate the average stock level for component X.
Maximum usage in the month 1,800 units
Minimum usage in the month 1,200 unit
Average usage in the month 1,350 units
Time lag for procurement of material 2 to 6 months
Re-ordering quantity 4,500 units

Solution

Re-order Level = Maximum Consumption × Maximum Re-order period
= 1,800 × 6
= **10,800 units**

Maximum Level = (Re-order Level + Re-order Quantity) – (Minimum Consumption × Minimum Re-order period)
= (10,800 + 4,500) – (1,200 × 2)
= 15,300 – 2,400
= **12,900 units**

Minimum Level = Re-order Level – (Normal Consumption × Normal Re-order period)
= 10,800 – (1,350 × 4)
= 10,800 – 5,400
= **5,400 units**

Average Stock Level = Minimum Level + ½ of Re-order Quantity
= 5,400 + ½ of 4,500
= 5,400 + 2,250
= **7,650 units**

Problem 19 (Problem on Calculation of Stock Levels for two components)

Two components X and Y are used as follows:
Normal usage 1,800 units per week each
Maximum usage 2,700 units per week each
Minimum usage 900 units per week each
Re-order quantity – X 14,400 units; Y 21,600 units
Re-order period – X 4 to 6 weeks; Y 2 to 4 weeks
Calculate for each component: Re-order Level, Minimum Level, Maximum Level and Average Stock Level.

Solution

Re-order Level = Maximum Consumption × Maximum Re-order period
Component X = 2,700 × 6
= **16,200 units**
Component Y = 2,700 × 4
= **10,800 units**

Maximum Level = (Re-order Level + Re-order Quantity) – (Minimum Consumption × Minimum Re-order period)
Component X = (16,200 + 14,400) – (900 × 4)
= 30,600 – 3,600
= **27,000 units**
Component Y = (10,800 + 21,600) – (900 × 2)
= 32,400 – 1,800
= **30,600 units**

Minimum Level = Re-order Level – (Normal Consumption × Normal Re-order period)
Component X = 16,200 – (1,800 × 5)
= 16,200 – 9,000
= **7,200 units**
Component Y = 10,800 – (1,800 × 3)
= 10,800 – 5,400
= **5,400 units**

Average Stock Level = Minimum Level + ½ of Re-order Quantity
Component X = 7,200 + ½ of 14,400
= 7,200 + 7,200
= **14,400 units**
Component Y = 5,400 + ½ of 21,600
= 5,400 + 10,800
= **16,200 units**

Problems on Pricing of Issues

Problem 20 (Problem on Pricing of Material Issue – FIFO and LIFO Methods)

The following transaction took place in A Ltd. in respect of purchase and issue of Material 'X'.

January 2	Purchased 4,000 units at ₹4 per unit
January 20	Purchased 500 units at ₹5 per unit
February 5	Issued 2,000 units
February 10	Purchased 6,000 units at ₹6 per unit
February 12	Issued 4,000 units
March 2	Issued 1,000 units
March 5	Issued 2,000 units
March 15	Purchased 4,500 units at ₹5.50 per unit
March 20	Issued 3,000 units

Prepare Stores Ledger Account under LIFO and FIFO methods.

Solution

Stores Ledger (LIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Jan 2	Purchases	-	4000	4.00	16,000	-	-	-	4000	4.00	16,000
Jan 20	Purchases	-	500	5.00	2,500	-	-	-	4000	4.00	16,000
									500	5.00	2,500
Feb 5	Issues	-	-	-	-	500	5.00	2,500			
						1500	4.00	6,000	2500	4.00	10,000
Feb 10	Purchases	-	6000	6.00	36,000	-	-	-	2500	4.00	10,000
									6000	6.00	36,000
Feb 12	Issues	-	-	-	-	4000	6.00	24,000	2500	4.00	10,000
									2000	6.00	12,000
Mar 2	Issues	-	-	-	-	1000	6.00	6,000	2500	4.00	10,000
									1000	6.00	6,000
Mar 5	Issues	-	-	-	-	1000	6.00	6,000			
						1000	4.00	4,000	1500	4.00	6,000
Mar 15	Purchases	-	4500	5.50	24,750	-	-	-	1500	4.00	6,000
									4500	5.50	24,750
Mar 20	Issues	-	-	-	-	3000	5.50	16,500	1500	4.00	6,000
									1500	5.50	8,250

Value of Closing Stock as at March 20, (6,000 + 8,250) = ***₹14,250****.*

Stores Ledger (FIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Jan 2	Purchases	-	4000	4.00	16,000	-	-	-	4000	4.00	16,000
Jan 20	Purchases	-	500	5.00	2,500	-	-	-	4000	4.00	16,000
									500	5.00	2,500
Feb 5	Issues	-	-	-	-	2000	4.00	8,000	2000	4.00	8,000
									500	5.00	2,500

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Feb 10	Purchases	-	6000	6.00	36,000	-	-	-	2000	4.00	8,000
									500	5.00	2,500
									6000	6.00	36,000
Feb 12	Issues	-	-	-	-	2000	4.00	8,000			
						500	5.00	2,500			
						1500	6.00	9,000	4500	6.00	27,000
Mar 2	Issues	-	-	-	-	1000	6.00	6,000	3500	6.00	21,000
Mar 5	Issues	-	-	-	-	2000	6.00	12,000	1500	6.00	9,000
Mar 15	Purchases	-	4500	5.50	24,750	-	-	-	1500	6.00	9,000
									4500	5.50	24,750
Mar 20	Issues	-	-	-	-	1500	6.00	9,000			
						1500	5.50	8,250	3000	6.00	16,500

Value of Closing Stock as at March 20 = ***₹16,500.***

Problem 21 (Problem on Pricing of Material Issue – FIFO and LIFO Methods)

The stock in hand of a material as on September 1, in the Stores Ledger of B Ltd., was 500 units at ₹1 per unit. The following purchases and issues were subsequently made.

Purchases		Issues	
Sep 6	100 units at ₹1.10 per unit	Sep 9	500 units
Sep 20	700 units at ₹1.20 per unit	Sep 22	500 units
Sep 27	400 units at ₹1.30 per unit	Sep 30	500 units
Oct 13	1,000 units at ₹1.40 per unit	Oct 15	500 units
Oct 20	500 units at ₹1.50 per unit	Oct 22	500 units
Nov 17	400 units at ₹1.60 per unit	Nov 11	500 units

You are required to prepare the Stores Ledger under LIFO and FIFO method and state the value of Closing Stock under both the methods.

Solution

Stores Ledger (LIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Sep 1	Op. Bal.	-	-	-	-	-	-	-	500	1.00	500
Sep 6	Purchases	-	100	1.10	110	-			500	1.00	500
									100	1.10	110
Sep 9	Issues	-	-	-	-	100	1.10	110			
						400	1.00	400	100	1.00	100
Sep 20	Purchases	-	700	1.20	840	-	-	-	100	1.00	100
									700	1.20	840
Sep 22	Issues	-	-	-	-	500	1.20	600	100	1.00	100
									200	1.20	240

(*Contd.*)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Sep 27	Purchases	-	400	1.30	520	-	-	-	100	1.00	100
									200	1.20	240
									400	1.30	520
Sep 30	Issues	-	-	-	-	400	1.30	520	100	1.00	100
						100	1.20	120	100	1.20	120
Oct 13	Purchases	-	1000	1.40	1,400	-	-	-	100	1.00	100
									100	1.20	120
									1,000	1.40	1,400
Oct 15	Issues	-	-	-	-	500	1.40	700	100	1.00	100
									100	1.20	120
									500	1.40	700
Oct 20	Purchases	-	500	1.50	750	-	-	-	100	1.00	100
									100	1.20	120
									500	1.40	700
									500	1.50	750
Oct 22	Issues	-	-	-	-	500	1.50	750	100	1.00	100
									100	1.20	120
									500	1.40	700
Nov 11	Issues	-	-	-	-	500	1.40	700	100	1.00	100
									100	1.20	120
Nov 17	Purchases	-	400	1.60	640	-	-	-	100	1.00	100
									100	1.20	120
									400	1.60	640

Value of Closing Stock as at November 17 (100+120+640) = ***₹860***

Stores Ledger (FIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Sep 1	Op. Bal.	-	-	-	-	-	-	-	500	1.00	500
Sep 6	Purchases	-	100	1.10	110	-			500	1.00	500
									100	1.10	110
Sep 9	Issues	-	-	-	-	500	1.00	500	100	1.10	110
Sep 20	Purchases	-	700	1.20	840	-	-	-	100	1.10	110
									700	1.20	840
Sep 22	Issues	-	-	-	-	100	1.10	110			
						400	1.20	480	300	1.20	360
Sep 27	Purchases	-	400	1.30	520	-	-	-	300	1.20	360
									400	1.30	520
Sep 30	Issues	-	-	-	-	300	1.20	360			
						200	1.30	260	200	1.30	260
Oct 13	Purchases	-	1000	1.40	1,400	-	-	-	200	1.30	260
									1,000	1.40	1,400

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Oct 15	Issues	-	-	-	-	200	1.30	260			
						300	1.40	420	700	1.40	980
Oct 20	Purchases	-	500	1.50	750	-	-	-	700	1.40	980
									500	1.50	750
Oct 22	Issues	-	-	-	-	500	1.40	700	200	1.40	280
									500	1.50	750
Nov 11	Issues	-	-	-	-	200	1.40	280			
						300	1.50	450	200	1.50	300
Nov 17	Purchases	-	400	1.60	640	-	-	-	200	1.50	300
									400	1.60	640

Value of Closing Stock as at November 17 (300+640)= ***₹940****.*

Problem 22 (Problem on Pricing of Material Issue – FIFO and LIFO Methods When There is Surplus and Shortage)

C Ltd. uses copper wire as a raw material which is purchased from the market as and when necessary. The following particulars are available in respect of the transactions for January, 2018.

Jan 1 Opening balance 300 kg at ₹25 per kg (Purchase Order No. 101)
Jan 3 Purchased 500 kg at ₹26.60 per kg (Purchase Order No. 102)
Jan 4 Issued 220 kg (Material Requisition No.201)
Jan 10 Issued 440 kg (Material Requisition No.202)
Jan 20 Purchased 490 kg at ₹23 per kg (Purchase Order No. 103)
Jan 25 Issued 300 kg (Material Requisition No.203)
Jan 27 Surplus 20 kg returned to stores out of quantity issued on Jan 4

There was a shortage of 25 kg on Jan 15. Prepare Stores Ledger for these transactions under LIFO and FIFO methods.

Solution

In this problem, Surplus and Shortage of materials are given. While surplus shall be treated as receipts, shortage shall be treated as issues.

Stores Ledger (LIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Jan 1	Op. Bal.		-	-	-	-	-	-	300	25.00	7,500
Jan 3	Purchases	101	500	26.60	13,300	-	-	-	300	25.00	7,500
									500	26.60	13,300
Jan 4	Issues	201	-	-	-	220	26.60	5852	300	25.00	7,500
									280	26.60	7,448
Jan 10	Issues	202	-	-	-	280	26.60	7448			
						160	25.00	4000	140	25.00	3,500
Jan 15	Shortage		-	-	-	25	25.00	625	115	25.00	2,875
Jan 20	Purchases	102	490	23.00	11,270	-	-	-	115	25.00	2,875
									490	23.00	11,270

(*Contd.*)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Jan 25	Issues	203	-	-	-	300	23.00	6900	115	25.00	2,875
									190	23.00	4,370
Jan 27	Surplus		20	26.60	532	-	-	-	115	25.00	2,875
									190	23.00	4,370
									20	26.60	532

Value of Closing Stock as at January 27 (115+190+20 units) (₹2,875+₹4,370+₹532) = ***₹7,777****.*

Stores Ledger (FIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Jan 1	Op. Bal.		-	-	-	-	-	-	300	25.00	7,500
Jan 3	Purchases	101	500	26.60	13,300	-	-	-	300	25.00	7,500
									500	26.60	13,300
Jan 4	Issues	201	-	-	-	220	25.00	5500	80	25.00	2,000
									500	26.60	13,300
Jan 10	Issues	202	-	-	-	80	25.00	2,000			
						360	26.60	9,576	140	26.60	3,724
Jan 15	Shortage		-	-	-	25	26.60	665	115	26.60	3,059
Jan 20	Purchases	102	490	23.00	11,270	-	-	-	115	26.60	3,059
									490	23.00	11,270
Jan 25	Issues	203	-	-	-	115	26.60	3,059			
						185	23.00	4,255	305	23.00	7,015
Jan 27	Surplus		20	25.00	500	-	-	-	305	23.00	7,015
									20	25.00	500

Value of Closing Stock as at January 27 (305 + 20 units) (₹7,015 + 500) = ***₹7,515****.*

Problem 23 (Problem on Pricing of Material Issue – FIFO and LIFO Methods)

Following is the history of receipts and issues of a raw material in D Ltd., during February 2018.

February 1 Opening balance 500 quintals at ₹25 per quintal
February 3 Issued 70 quintals
February 4 Issued 100 quintals
February 8 Issued 80 quintals
February 13 Purchased from supplier 200 quintals at ₹24.50 per quintal
February 14 Return of surplus from a work order 15 quintals at ₹24 per quintal
February 16 Issued 180 quintals
February 20 Received from supplier 240 quintals at ₹24.40 per quintal
February 24 Issued 304 quintals
February 25 Received from supplier 320 quintals at ₹24.30 per quintal
February 26 Issued 112 quintals
February 27 Return of surplus from a work order 12 quintals at ₹24.50 per quintal
February 28 Received from supplier 100 quintals at ₹25 per quintal

Note: Paid freight charges on the purchases on February 28: ₹200. The stock verifier noticed that on February 15, there was a shortage of 5 quintals and on February 27, another shortage of 8 quintals.

Prepare Stores Ledger under LIFO and FIFO methods.

Solution

In this problem, Surplus and Shortage of materials are given. While surplus shall be treated as receipts, shortage shall be treated as issues. Freight charges on the purchases of February 28 shall be added to the cost of the said purchases.

Stores Ledger (LIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Feb 1	Op. Bal.	-	-	-	-	-	-	-	500	25.00	12500
Feb 3	Issues	-	-	-	-	70	25.00	1750	430	25.00	10750
Feb 4	Issues	-	-	-	-	100	25.00	2500	330	25.00	8250
Feb 8	Issues	-	-	-	-	80	25.00	2000	250	25.00	6250
Feb 13	Purchases	-	200	24.50	4900	-	-	-	250	25.00	6250
									200	24.50	4900
Feb 14	Surplus	-	15	24.00	360	-	-	-	250	25.00	6250
									200	24.50	4900
									15	24.00	360
Feb 15	Shortage	-	-	-	-	5	24.00	120	250	25.00	6250
									200	24.50	4900
									10	24.00	240
Feb 16	Issues	-	-	-	-	10	24.00	240	250	25.00	6250
						170	24.50	4165	30	24.50	735
Feb 20	Purchases	-	240	24.40	5856	-	-	-	250	25.00	6250
									30	24.50	735
									240	24.40	5856
Feb 24	Issues	-	-	-	-	240	24.40	5856			
						30	24.50	735			
						34	25.00	850	216	25.00	5400
Feb 25	Purchases	-	320	24.30	7776	-	-	-	216	25.00	5400
									320	24.30	7776
Feb 26	Issues	-	-	-	-	112	24.30	2722	216	25.00	5400
									208	24.30	5054
Feb 27	Surplus	-	12	24.50	294	-	-	-	216	25.00	5400
									208	24.30	5054
									12	24.50	294
Feb 27	Shortage	-	-	-	-	8	24.50	196	216	25.00	5400
									208	24.30	5054
									4	24.50	98
Feb 28	Purchases	-	100	27.00	2700	-	-	-	216	25.00	5400
									208	24.30	5054
									4	24.50	98
									100	27.00	2700

*Value of Closing Stock as on February 28 (216+208+4+100=528 units) (₹5,400+₹5,054+₹98+2,700) = **₹13,252**.*

Stores Ledger (FIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Feb 1	Op. Bal.	-	-	-	-	-	-	-	500	25.00	12500
Feb 3	Issues	-	-	-	-	70	25.00	1750	430	25.00	10750
Feb 4	Issues	-	-	-	-	100	25.00	2500	330	25.00	8250
Feb 8	Issues	-	-	-	-	80	25.00	2000	250	25.00	6250
Feb 13	Purchases	-	200	24.50	4900	-	-	-	250	25.00	6250
									200	24.50	4900
Feb 14	Surplus	-	15	24.00	360	-	-	-	250	25.00	6250
									200	24.50	4900
									15	24.00	360
Feb 15	Shortage	-	-	-	-	5	25.00	125	245	25.00	6125
									200	24.50	4900
									15	24.00	360
Feb 16	Issues	-	-	-	-	180	25.00	4500	65	25.00	1625
									200	24.50	4900
									15	24.00	360
Feb 20	Purchases	-	240	24.40	5856	-	-	-	65	25.00	1625
									200	24.50	4900
									15	24.00	360
									240	24.40	5856
Feb 24	Issues	-	-	-	-	65	25.00	1625			
						200	24.50	4900			
						15	24.00	360			
						24	24.40	586	216	24.40	5270
Feb 25	Purchases	-	320	24.30	7776	-	-	-	216	24.40	5270
									320	24.30	7776
Feb 26	Issues	-	-	-	-	112	24.40	2733	104	24.40	2537
									320	24.30	7776
Feb 27	Surplus	-	12	24.50	294	-	-	-	104	24.40	2537
									320	24.30	7776
									12	24.50	294
Feb 27	Shortage	-	-	-	-	8	24.40	195	96	24.40	2342
									320	24.30	7776
									12	24.50	294
Feb 28	Purchases	-	100	27.00	2700	-	-	-	96	24.40	2342
									320	24.30	7776
									12	24.50	294
									100	27.00	2700

*Value of Closing Stock as on February 28 (96+320+12+100=528 units) (₹2,342+₹7,776+₹294+2,700) = **₹13,112**.*

Problem 24 (Problem on Pricing of Material Issue – FIFO and LIFO Methods)

Following particulars are available from the cost records of E Ltd., for the month of March 2018, in respect of raw Material 'X'.

March 1 Opening balance 25 units worth ₹162.50
March 4 Issued 8 units
March 6 Received 50 units at ₹5.75 per unit
March 7 Issued 12 units
March 10 Returned to vendor 10 units
March 12 Issued 15 units
March 13 Issued 20 units
March 15 Received 25 units at ₹6.10 per unit.
March 17 Issued 10 units
March 19 Received replacement 10 units
March 20 Returned to stores 5 units
March 22 Transferred 5 units from Job 182 to Job 187
March 26 Issued 10 units
March 29 Transferred 5 units from Dept. A to Dept. B
March 30 Shortage 2 units treated as abnormal loss

Prepare Stores Ledger under LIFO and FIFO methods.

Solution

Stores Ledger (LIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Mar 1	Op. Bal.	-	-	-	-	-	-	-	25	6.50[1]	162.50
Mar 4	Issues	-	-	-	-	8	6.50	52	17	6.50	110.50
Mar 6	Purchases	-	50	5.75	287.5	-	-	-	17 50	6.50 5.75	110.50 287.50
Mar 7	Issues	-	-	-	-	12	5.75	69	17 38	6.50 5.75	110.50 218.50
Mar 10	Returned to Vendors	-	-	-	-	10	5.75[2]	57.5	17 28	6.50 5.75	110.50 161.00
Mar 12	Issues	-	-	-	-	15	5.75	86.25	17 13	6.50 5.75	110.50 74.75
Mar 13	Issues	-	-	-	-	13 7	5.75 6.50	74.75 45.5	10	6.50	65.00
Mar 15	Purchases	-	25	6.10	152.5	-	-	-	10 25	6.50 6.10	65.00 152.50
Mar 17	Issues	-	-	-	-	10	6.10	61	10 15	6.50 6.10	65.00 91.50
Mar 19	Replacement from Vendors[3]	-	10	5.75	57.5	-	-	-	10 15 10	6.50 6.10 5.75	65.00 91.50 57.50

(*Contd.*)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Mar 20	Returns to Stores[4]	-	5	6.10	61	-	-	-	10 20 10	6.50 6.10 5.75	65 122 57.5
Mar 22	Transfer from Job 182 to 187[5]	-	-	-	-	-	-	-	-	-	-
Mar 26	Issues	-	-	-	-	10	5.75	57.5	10 20	6.50 6.10	65 122
Mar 29	Transfer from Dept. A to Dept. B[5]	-	-	-	-	-	-	-	-	-	-
Mar 30	Shortage	-	-	-	-	2	6.10	12.2	10 18	6.50 6.10	65 109.8

1. Opening balance in quantity and in amount is given but rate is not given. Hence, rate per unit is arrived at as follows: $\frac{162.5}{25} = 6.5$.
2. Return to vendors is assumed to be made out of most recent purchases. Hence, the most recent rate per unit is taken into consideration and the stock is reduced from the same lot.
3. Received Replacement: This means the goods are received against the returns made to vendors on March 10. Hence, this receipt is considered at the rate at which it was recorded as returns.
4. Returns to Stores: This represents the goods returned by the production department back to the stores. It is taken back at the most recent issue price and added back to the same lot.
5. Transfer from one job to another or from one department to another does not result in the movement of goods from or to stores department. Hence, it is ignored.

Value of Closing Stock (10 +18 =)28 units (₹65 + ₹109.8)= ***₹174.8***

Stores Ledger (FIFO Method)

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Mar 1	Op. Bal.	-	-	-	-	-	-	-	25	6.5[1]	162.5
Mar 4	Issues	-	-	-	-	8	6.50	52	17	6.5	110.5
Mar 6	Purchases	-	50	5.75	287.5	-	-	-	17 50	6.5 5.75	110.5 287.5
Mar 7	Issues	-	-	-	-	12	6.50	78	5 50	6.5 5.75	32.5 287.5
Mar 10	Returned to Vendors	-	-	-	-	10	5.75[2]	57.5	5 40	6.5 5.75	32.5 230
Mar 12	Issues	-	-	-	-	5 10	6.50 5.75	32.5 57.5	30	5.75	172.5
Mar 13	Issues	-	-	-	-	20	5.75	115	10	5.75	57.5
Mar 15	Purchases	-	25	6.10	152.5	-	-	-	10 25	5.75 6.1	57.5 152.5
Mar 17	Issues	-	-	-	-	10	5.75	57.5	25	6.1	152.5

Date	Particulars	G.R. No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Mar 19	Replacement from Vendors[3]	-	10	5.75	57.5	-	-	-	25 10	6.10 5.75	152.5 57.5
Mar 20	Returns to Stores[4]	-	5	6.10	61	-	-	-	30 10	6.10 5.75	183 57.5
Mar 22	Transfer from Job 182 to 187[5]	-	-	-	-	-	-	-	-	-	-
Mar 26	Issues	-	-	-	-	10	6.10	61	20 10	6.10 5.75	122 57.5
Mar 29	Transfer from Dept. A to Dept. B[5]	-	-	-	-	-	-	-	-	-	-
Mar 30	Shortage	-	-	-	-	2	6.10	12.2	18 10	6.10 5.75	109.8 57.5

1. Opening balance in quantity and in amount is given but rate is not given. Hence, rate per unit is arrived at as follows: $\frac{162.5}{25} = 6.5$.
2. Return to vendors is assumed to be made out of most recent purchases. Hence, the most recent rate per unit is taken into consideration and the stock is reduced from the same lot.
3. Received Replacement: This means the goods are received against the returns made to vendors on March 10. Hence, this receipt is considered at the rate at which it was recorded as returns.
4. Returns to Stores: This represents the goods returned by the production department back to the stores. It is taken back at the most recent issue price and added back to the same lot.
5. Transfer from one job to another or from one department to another does not result in the movement of goods from or to stores department. Hence, it is ignored.

Value of Closing Stock (18 + 10 =) 28 units (₹109.8 + 57.5) = ***₹167.30***

Problem 25 (Problem on Pricing of Material Issue – FIFO and LIFO Methods)

The Stores Ledger Account of a material in the books of F Ltd. revealed the following transactions for the month of March 2018.

Mar 1	Opening balance 200 kg at ₹7.50 per kg
Mar 5	Received 400 kg at ₹7.75 per kg
Mar 8	Issued 240 kg
Mar 10	Issued 160 kg
Mar 12	Received 500 kg at ₹7.90 per kg
Mar 15	Issued 400 kg
Mar 16	Received 250 kg at ₹8 per kg
Mar 19	Received 600 kg at ₹8.25 per kg
Mar 21	Issued 350 kg
Mar 24	Issued 260 kg
Mar 27	Issued 340 kg

You are required to price the issues and draw out the closing balances in the Stores Ledger Account under a pricing method suitable for the following two alternatives:

(a) The closing balances should be closely related to the current prices.

(b) The material cost charged to production should be closely related to current prices.

Solution

In this problem, the method of issue of materials to be adopted is not given directly. In alternative (a), it is stated that the **closing balances** should be closely related to the current prices. This means that the Closing Stock should consist of materials bearing current prices. When the materials issue is made under FIFO method, the Closing Stock consists of materials bearing current prices. Hence, for alternative (a) FIFO method is to be used.

In alternative (b), it is stated that the **material cost charged to production** should be closely related to current prices. This means that the materials must be issued at current prices. When LIFO method is used, material cost charged to production will be closely related to current prices. Hence, for alternative (b) LIFO method is to be used.

Stores Ledger (FIFO Method)

Date	Particulars	Note No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Mar 1	Op. Bal.	-	-	-	-	-	-	-	200	7.50	1500
Mar 5	Purchases	-	400	7.75	3100	-	-	-	200 400	7.50 7.75	1500 3100
Mar 8	Issues	-	-	-	-	200 40	7.50 7.75	1500 310	360	7.75	2790
Mar 10	Issues	-	-	-	-	160	7.75	1240	200	7.75	1550
Mar 12	Purchases	-	500	7.90	3950	-	-	-	200 500	7.75 7.90	1550 3950
Mar 15	Issues	-	-	-	-	200 200	7.75 7.90	1550 1580	300	7.90	2370
Mar 16	Purchases	-	250	8.00	2000	-	-	-	300 250	7.90 8.00	2370 2000
Mar 19	Purchases	-	600	8.25	4950	-	-	-	300 250 600	7.90 8.00 8.25	2370 2000 4950
Mar 21	Issues	-	-	-	-	300 50	7.90 8.00	2370 400	200 600	8.00 8.25	1600 4950
Mar 24	Issues	-	-	-	-	200 60	8.00 8.25	1600 495	540	8.25	4455
Mar 27	Issues	-	-	-	-	340	8.25	2805	200	8.25	1650

Value of Closing Stock on March 27, (200 units) = ***₹1,650***

Stores Ledger (LIFO Method)

Date	Particulars	Note No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Mar 1	Op. Bal.	-	-	-	-	-	-	-	200	7.50	1500
Mar 5	Purchases	-	400	7.75	3100	-	-	-	200 400	7.50 7.75	1500 3100
Mar 8	Issues	-	-	-	-	240	7.75	1860	200 160	7.50 7.75	1500 1240

Date	Particulars	Note No.	Receipts			Issues			Balance		
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Amt.
Mar 10	Issues	-	-	-	-	160	7.75	1240	200	7.50	1500
Mar 12	Purchases	-	500	7.90	3950	-	-	-	200 500	7.50 7.90	1500 3950
Mar 15	Issues	-	-	-	-	400	7.90	3160	200 100	7.50 7.90	1500 790
Mar 16	Purchases	-	250	8.00	2000	-	-	-	200 100 250	7.50 7.90 8.00	1500 790 2000
Mar 19	Purchases	-	600	8.25	4950	-	-	-	200 100 250 600	7.50 7.90 8.00 8.25	1500 790 2000 4950
Mar 21	Issues	-	-	-	-	350	8.25	2888	200 100 250 250	7.50 7.90 8.00 8.25	1500 790 2000 2062
Mar 24	Issues	-	-	-	-	250 10	8.25 8.00	2062 80	200 100 240	7.50 7.90 8.00	1500 790 1920
Mar 27	Issues	-	-	-	-	240 100	8.00 7.90	1920 790	200	7.50	1500

Value of Closing Stock on March 27 (200 units) = ***₹1,500***

Problem 26 (Problem on Pricing of Material Issues – Simple Average and Weighted Average Methods)

The following transactions took place in respect of a raw material in the books of G Ltd. during September 2017.

Date	Receipts (units)	Rate per unit (₹)	Issues (units)
September 2	200	2.00	-
September 10	300	2.40	-
September 15	-	-	250
September 18	250	2.60	-
September 20	-	-	200
September 25	400	2.70	-
September 30	-	-	400

You are required to record the above transactions in Stores Ledger pricing the issues under: a) Simple Average Method, and b) Weighted Average Method.

Solution

Stores Ledger (Simple Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
Sep 2	Receipts	-	200	2.00	400	-	-	-	200	400
Sep10	Receipts	-	300	2.40	720	-	-	-	500	1120
Sep15	Issues	-	-	-	-	250	(2 + 2.4)/2= 2.2	550	250	570
Sep18	Receipts	-	250	2.60	650	-	-	-	500	1220
Sep 20	Issues	-	-	-	-	200	(2.6 + 2.4)/2 = 2.5[1]	500	300	720
Sep 25	Receipts	-	400	2.70	1080	-	-	-	700	1800
Sep 30	Issued	-	-	-	-	400	(2.7 + 2.6 + 2.4)/3 = 2.57[2]	1028	300	772

Value of Closing Stock as on September 30 (300 units) = ***₹772****.*

1. Closing Stock on September 18 is 500 units. This includes 250 units purchased on September 18 at ₹2.6 and another 250 units purchased on September 10 at ₹2.4. Hence, the simple average price is taken as $\frac{(2.6 + 2.4)}{2} = 2.5$.
2. Closing Stock on September 25 is 700 units. This includes 400 units purchased on September 25 at ₹2.7; 250 units purchased on September 18 at ₹2.6 and another 50 units purchased on September 10 at ₹2.4. Hence, the simple average price is taken as $\frac{(2.7 + 2.6 + 2.4)}{3} = 2.57$.

Stores Ledger (Weighted Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
Sep 2	Receipts	-	200	2.00	400	-	-	-	200	400
Sep 10	Receipts	-	300	2.40	720	-	-	-	500	1120
Sep 15	Issues	-	-	-	-	250	1120/500 = 2.24	560	250	560
Sep 18	Receipts	-	250	2.60	650	-	-	-	500	1210
Sep 20	Issues	-	-	-	-	200	1210/500 = 2.42	484	300	726
Sep 25	Receipts	-	400	2.70	1080	-	-	-	700	1806
Sep 30	Issued	-	-	-	-	400	1806/700 = 2.58	1032	300	774

Value of Closing Stock as on September 30 (300 units) = ***₹774****.*

Problem 27 (Problem on Pricing of Material Issues – Simple Average and Weighted Average Methods)

From the following particulars of H Ltd., prepare the Stores Ledger A/c pricing the issues under a) Simple Average Method and b) Weighted Average Method.

Jan 1 Opening balance 400 units at ₹10 per unit
Jan 2 Purchases 100 units at ₹11 per unit
Jan 4 Issued 400 units
Jan 8 Purchased 600 units at ₹12 per unit
Jan 10 Issued 500 units
Jan 13 Purchased 500 units at ₹13 per unit
Jan 15 Issued 600 units
Jan 17 Purchased 800 units at ₹14 per unit

Jan 20 Issued 500 units
Jan 22 Issued 200 units
Jan 25 Purchased 500 units at ₹15 per unit
Jan 28 Purchased 300 units at ₹16 per unit
Jan 31 Issued 400 units

Solution

Stores Ledger (Simple Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
Jan 1	Op. Bal.	-	-	-	-	-	-	-	400	4000
Jan 2	Purchases	-	100	11	1100	-	-	-	500	5100
Jan 4	Issues	-		-	-	400	(11 + 10)/2 = 10.5	4200	100	900
Jan 8	Purchases	-	600	12	7200	-	-	-	700	8100
Jan 10	Issues	-	-	-	-	500	(12 + 11)/2 = 11.5	5750	200	2350
Jan 13	Purchases	-	500	13	6500	-	-	-	700	8850
Jan 15	Issues	-	-	-	-	600	(13 + 12)/2 = 12.5	7500	100	1350
Jan 17	Purchases	-	800	14	11200	-	-	-	900	12550
Jan 20	Issues	-	-	-	-	500	(14 + 13)/2 = 13.5	6750	400	5800
Jan 22	Issues	-	-	-	-	200	14/1 = 14	2800	200	3000
Jan 25	Purchases	-	500	15	7500	-	-	-	700	10500
Jan 28	Purchases	-	300	16	4800	-	-	-	1000	15300
Jan 31	Issues	-	-	-	-	400	(16 + 15 + 14)/3 = 15	6000	600	9300

Value of Closing Stock as on January 31 (600 units) = ***₹9,300***

Stores Ledger (Weighted Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
Jan 1	Op. Bal.	-	-	-	-	-	-	-	400	4000
Jan 2	Purchases	-	100	11	1100	-	-	-	500	5100
Jan 4	Issues	-		-	-	400	5,100/500 = 10.2	4,080	100	1020
Jan 8	Purchases	-	600	12	7200	-	-	-	700	8220
Jan 10	Issues	-	-	-	-	500	8220/700 = 11.74	5870	200	2350
Jan 13	Purchases	-	500	13	6500	-	-	-	700	8850
Jan 15	Issues	-	-	-	-	600	8850/700 = 12.64	7584	100	1266
Jan 17	Purchases	-	800	14	11200	-	-	-	900	12466
Jan 20	Issues	-	-	-	-	500	12466/900 =13.85	6925	400	5541
Jan 22	Issues	-	-	-	-	200	5541/400 = 13.85	2770	200	2771
Jan 25	Purchases	-	500	15	7500	-	-	-	700	10271
Jan 28	Purchases	-	300	16	4800	-	-	-	1000	15071
Jan 31	Issues	-	-	-	-	400	15071/1000 = 15.07	6028	600	9043

Value of Closing Stock as on January 31 (600 units) = ***₹9,043***

Note: *Issue prices are rounded off to two digits after the decimal point. Sometimes four digits after the decimal point are considered to arrive at more accurate numbers.*

Problem 28 (Problem on Pricing of Material Issues – Simple Average and Weighted Average Methods)

Following are the receipts and issues of a raw material in I Ltd. during April 2018.

April 1 Opening balance 1,000 units at ₹50 per unit
April 3 Issued 140 units
April 4 Issued 200 units
April 8 Issued 160 units
April 13 Received 400 units at ₹48 per unit
April 16 Issued 360 units
April 18 Return of surplus from work order 30 units at ₹48 per unit
April 20 Received 480 units at ₹52 per unit
April 24 Issued 608 units
April 25 Received 640 units at ₹50 per unit
April 26 Issued 524 units
April 28 Refund of surplus from a work order 24 units (issued on April 3)
April 30 Received 200 units at ₹54 per unit

You are required to record the above transactions in Stores Ledger, pricing the issues under: a) Simple Average Method, and b) Weighted Average Method.

Solution

Stores Ledger (Simple Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
Apr 1	Op. Bal.	-	-	-	-	-	-	-	1000	50000
Apr 3	Issues	-	-	-	-	140	50	7000	860	43000
Apr 4	Issues	-	-	-	-	200	50	10000	660	33000
Apr 8	Issues	-	-	-	-	160	50	8000	500	25000
Apr 13	Purchases	-	400	48	19200	-	-	-	900	44200
Apr 16	Issues	-	-	-	-	360	(48 + 50)/2 = 49	17640	540	26560
Apr 18	Return of Surplus	-	30	48	1440	-	-	-	570	28000
Apr 20	Purchases	-	480	52	24960	-	-	-	1050	52960
Apr 24	Issues	-	-	-	-	608	(52 + 48 + 50)/3 = 50	30400	442	22560
Apr 25	Purchases	-	640	50	32000	-	-	-	1082	54560
Apr 26	Issues	-	-	-	-	524	(50 + 52)/2 = 51	26724	558	27836
Apr 28	Refund of Surplus	-	24	50	1200	-	-	-	582	29036
Apr 30	Purchases	-	200	54	10800	-	-	-	782	39836

Value of Closing Stock as on April 30 (782 units) = ***₹39,836***

Stores Ledger (Weighted Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
Apr 1	Op. Bal.	-	-	-	-	-	-	-	1000	50000
Apr 3	Issues	-	-	-	-	140	50	7000	860	43000
Apr 4	Issues	-	-	-	-	200	50	10000	660	33000
Apr 8	Issues	-	-	-	-	160	50	8000	500	25000
Apr 13	Purchases	-	400	48	19200	-	-	-	900	44200
Apr 16	Issues	-	-	-	-	360	44200/ 900 = 49.11	17680	540	26520
Apr 18	Return of Surplus	-	30	48	1440	-	-	-	570	27960
Apr 20	Purchases	-	480	52	24960	-	-	-	1050	52920
Apr 24	Issues	-	-	-	-	608	52920/1050 = 50.40	30643	442	22277
Apr 25	Purchases	-	640	50	32000	-	-	-	1082	54277
Apr 26	Issues	-	-	-	-	524	54277/1082 = 50.16	26284	558	27993
Apr 28	Refund of Surplus	-	24	50	1200	-	-	-	582	29193
Apr 30	Purchases	-	200	54	10800	-	-	-	782	39993

Value of Closing Stock as on April 30 (782 units) = ***₹39,993***

Note: *Issue prices are rounded off to two digits after decimal point. Sometimes four digits after the decimal point are considered to arrive at more accurate numbers.*

Problem 29 (Problem on Pricing of Material Issues – Simple Average and Weighted Average Methods)

Following are the receipts and issues of raw material in J Ltd. during May 2018.

1st May Opening balance 200 units worth ₹7,000
3rd May Purchased 300 units at ₹40 per unit
13th May Purchased 900 units at ₹43 per unit
23rd May Purchased 600 units at ₹38 per unit
5th May Issued 400 units
15th May Issued 600 units
25th May Issued 600 units

You are required to record the above transactions in Stores Ledger, pricing the issues under: a) Simple Average Method, and b) Weighted Average Method.

Solution

Stores Ledger (Simple Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
May 1	Op. Bal.	-	-	-	-	-	-	-	200	7000
May 3	Purchases	-	300	40	12000	-	-	-	500	19000
May 5	Issues	-	-	-	-	400	(40 + 35)/2 = 37.5	15000	100	4000
May 13	Purchases	-	900	43	38700	-	-	-	1000	42700

(*Contd.*)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
May 15	Issues	-	-	-	-	600	(43 + 40)/2 = 41.50	24900	400	17800
May 23	Purchases	-	600	38	22800	-	-	-	1000	40600
May 25	Issues	-	-	-	-	600	(38 + 43)/2 = 40.50	24300	400	16300

Value of Closing Stock as on May 25 (400 units) = ***₹16,300****.*

Stores Ledger (Simple Average Method)

Date	Particulars	Note No.	Receipts			Issues			Balance	
			Qty.	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Amt.
May 1	Op. Bal.	-	-	-	-	-	-	-	200	7000
May 3	Purchases	-	300	40	12000	-	-	-	500	19000
May 5	Issues	-	-	-	-	400	19000/500 = 38.0	15200	100	3800
May 13	Purchases	-	900	43	38700	-	-	-	1000	42500
May 15	Issues	-	-	-	-	600	42500/1000 = 42.5	25500	400	17000
May 23	Purchases	-	600	38	22800	-	-	-	1000	39800
Mar 25	Issues	-	-	-	-	600	39800/1000 = 39.8	23880	400	15920

Value of Closing Stock as on May 25 (400 units) = ***₹15,920****.*

SUMMARY

- Materials refer to the tangible, physical inputs used in production of a product. It consists of raw materials, components, spare parts, consumable stores, packing material, etc.
- Materials are of two types, viz., Direct Material and Indirect Material.
- Material Cost refers to the cost of materials used in the manufacturing of a product. Material cost includes Procurement Cost, Handling or Carrying Cost, Ordering Cost, Set-up Cost and Shortage Cost.
- Material Control refers to a system which ensures the provision of required quantity of material of right quality at required time and with minimum amount of capital.
- Components of Material Control – Procurement of Material, Storage of Material, Pricing of Material Issues.
- Procurement of Material involves making the following decisions:
  - Whether to make the raw material or purchase them from outside?
  - In case of purchase, what is the process to be followed?
  - How to select the vendors?
  - How much quantity of materials should be purchased and in what intervals?
  - In case of making the material internally, how much quantity of material must be manufactured and in what frequency?
  - What are the documents that facilitate procurement of material?
- The quantity ordered each time which leads to the lowest total material cost is called *Economic Order Quantity*. It is the quantity of purchase, which has the most economical material cost.
- The quantity produced each time which leads to the lowest total material cost is called *Economic Manufacturing Quantity*. It is the quantity of production, which has the most economical material cost.
- Stores Control or Inventory Control involves making the following decisions:
  - Where to store?
  - How to store?
  - How much to Store?
  - How to identify the materials in stores?

- How and when to verify the materials stored?
- What are the duties and responsibilities of the store keeper?
- What are the records and documents to be maintained for effective functioning of the stores?

➢ There are three types of stores where material storage can be made, viz., Centralised Stores, Sub-stores and Departmental Stores.

➢ There are three popular methods of storing material, viz., ABC Method, VED Method and FSN Method.

➢ The following are the different levels of stores that need to be ascertained for enabling better inventory control:
- Re-order Level
- Minimum Level
- Maximum Level
- Average Level
- Danger Level

➢ Pricing of Material is carried out using different methods, all of which are classified on the following bases:
- Cost Price Methods
- Average Price Methods
- Market Price Methods
- Notional Price Methods

➢ Most popular pricing methods are FIFO Method, LIFO Method and Weighted Average Method.

➢ For enabling better material control, two ratios are of utmost use, viz., Input-Output Ratio and Inventory Turnover Ratio

SNAPSHOT OF FORMULAE

Economic Order Quantity

$$EOQ = \sqrt{\frac{2DO}{S}}$$

The Total Material Cost of the Economic Order Quantity can be calculated using any of the below formulae:

$$\text{Total Material Cost} = DC + \left(\frac{DO}{Q}\right) + \left(\frac{QS}{2}\right)$$

Or

$$\text{Total Material Cost} = DC + \sqrt{2DOS}$$

Where,

EOQ or Q = Economic Order Quantity
D = Annual Demand
O = Ordering Cost per order
S = Storage or Carrying Cost per unit per annum

Economic Manufacturing Quantity

$$EMQ = \sqrt{\frac{2DO}{S}}\left(1-\frac{D}{P}\right)$$

The Total Material Cost of the Economic Manufacturing Quantity can be calculated using any of the following formulae:

$$\text{Total Material Cost} = DC + \left(\frac{DO}{Q}\right) + \left(\frac{Q \times S\left(\frac{1-D}{P}\right)}{2}\right)$$

Or

Total Material Cost = $DC + \sqrt{2DOS}\left(\frac{1-D}{P}\right)$

Where,

EMQ or Q = Economic Manufacturing Quantity
D = Annual Demand
O = Set-up Cost per batch (i.e., cost of setting up the facility for producing the material)
S = Storage or Carrying Cost per unit per annum
P = Production Capacity

Re-order Level

Maximum Consumption during a given period × Maximum Lead Time

Or

Safety Stock + Lead Time Consumption

Minimum Level

Re-order Level – (Average Consumption × Average Lead Time)

Maximum Level

(Re-order Level + Re-order Quantity) – (Minimum Consumption × Minimum Lead Time)

Average Level

½ × (Maximum Level + Minimum Level)

Or

(Minimum Level + ½ × Re-order Quantity)

Danger Level

Minimum Consumption × Minimum Lead Time

Or

Average Consumption × Minimum Lead time

Yield Ratio or Input-Output Ratio

Quantity of Material Output/Quantity of Material Input

Inventory Turnover Ratio

Cost of raw materials consumed/Average stock of raw materials

EXERCISES

Section B Type Questions

Problem 1 (Problem on Calculation of EOQ)

From the following information, calculate Economic Order Quantity and calculate the number of orders to be placed in a year.

(a)	Quarterly consumption of materials	2,000 units
(b)	Cost of placing one order	₹50
(c)	Cost per unit	₹40
(d)	Storage and carrying cost	8% of inventory

[BU B.Com, May (2016)]
(Ans: 500 Units)

Problem 2 (Problem on Calculation of EOQ)

ABC Company Ltd. gives the following details about the Material 'X'. Monthly consumption: 200 units, Average cost per order: ₹40, Average price per unit: ₹20 and Holding cost: 24% per year. Determine EOQ.

[*BU B.Com, May 2015)*]
(Ans: 200 Units)

Problem 3 (Problem on Calculation of Stock Levels)

The manufacturing concern particulars of Material 'X' are as follows:
Re-order quantity 1,800 units
Maximum consumption 450 units
Minimum consumption 150 units
Re-order period 3 to 5 weeks
Calculate Re-order level, Minimum level, Maximum level and Average level.

[*BU B.Com, May 2017)*]
(Ans: 2,250 units; 1,050 units; 3,600 units and 1,950 or 2,325 units)

Problem 4 (Problem on Calculation of Stock Levels)

Calculate Re-order level, Minimum level, Maximum level and Average Stock level from the following information

Normal usage	600 units per week
Maximum usage	900 units per week
Minimum usage	300 units per week
Re-order period	8 to 12 weeks
Re-order quantity	4,800 units

[*BU B.Com, May (2016)*]
(Ans: 10,800 units; 4,800 units; 13,200 units and 7,200 or 9,000 units)

Problem 5 (Problem on Calculation of Stock Levels)

From the following particulars, calculate Re-order level and Minimum level.
Maximum consumption 150 units per day
Minimum consumption 50 units per day
Re-order period 25 to 30 days

[*BU B.Com, May 2015)*]
(Ans: 4,500 units and 1,750 units)

Problem 6 (Problem on Calculation of Stock Levels)

Calculate Minimum Stock level, Maximum Stock level and Re-order level from the following:

Minimum consumption	100 units per day
Maximum consumption	150 units per day
Normal consumption	120 units per day
Re-order period	10 to 15 days
Re-order quantity	600 units

[*BU BBM, May (2015)*]
(Ans: 750 units; 1,850 units and 2,250 units)

Problem 7 (Problem on Calculation of Stock Levels)

From the following particulars relating to Material 'X', find Re-order level, Maximum level, Minimum level and Average Stock level.

Normal usage	50 units per week
Minimum usage	25 units per week

Maximum usage	75 units per week
Re-order quantity	400 units
Re-order period	4 to 6 weeks

[*BU BBM, May (2015)*]
(Ans: 450 units; 750 units; 200 units and 400 or 475 units)

Problem 8 (Problem on Calculation of Stock Levels)

Calculate Maximum Store level, Minimum Store level and Re-order level from the following data:

Normal usage per week	200 units
Re-order quantity	1,500 units
Maximum usage per week	250 units
Minimum usage per week	100 units
Re-order period	6 to 12 weeks

[*BU B.Com, May (2013)*]
(Ans: 3,900 units; 1,200 units and 3,000 units)

Problem 9 (Problem on Calculation of Stock Levels)

From the following data furnished by a company, calculate the Ordering level, Minimum level and Maximum level of stock.
ROQ 900 units
Consumption per week: Minimum 15 units, Normal 25 units and Maximum 35 units.
Lead time varies from 20 to 30 weeks

[*BU B.Com, May (2011)*]
(Ans: 1,050 units; 425 units and 1,650 units)

Problem 10 (Problem on Pricing of Issue – Weighted Average Method)

Following transactions relate to the Receipts and Issues of Material 'Z'.

Receipts:

3/10/2015	1,000 units at ₹8 per unit
13/10/2015	1,800 units at ₹8.60 per unit
23/10/2015	1,200 units at ₹7.60 per unit

Issues:

5/10/2015	800 units
15/10/2015	800 units
25/10/2015	1,200 units

Prepare Stores Ledger under Weighted Average Method

[*BU B.Com, May (2017)*]
(Ans: Closing Balance 1,200 units – ₹9,684)

Problem 11 (Problem on Pricing of Issue – Weighted Average Method)

Prepare Stores Ledger under Weighted Average Method.

Date	Receipts (Units)	Rate per unit (₹)	Issues (Units)
1/3/16	6,500	20	-
8/3/16	8,500	25	-
12/3/16	-	-	10,000
18/3/16	15,000	30	-
22/3/16	-	-	7,500
31/3/16	-	-	3,000

[*BU B.Com, May (2016)*]
(Ans: Closing Balance 9,500 units – ₹2,67,979)

Problem 12 (Problem on Pricing of Issue – FIFO Method)

Following is the record of Receipts and Issues of a certain material in a factory during a week. Prepare Stores Ledger under FIFO Method.

April 1	Opening balance 50 units at ₹10 per unit
April 1	Issued 30 units
April 2	Received 60 units at ₹10.20 per unit
April 3	Issued 25 units (stock verification reveals loss of 1 unit)
April 4	Received back from orders 10 units (previously issued at ₹9.15 per unit
April 5	Issued 40 units
April 6	Received 22 units at ₹10.30 per unit
April 7	Issued 38 units

[*BU BBM, May (2015)*]

(Ans: Closing Balance 8 units at ₹10.30 per unit – ₹82.40)

Problem 13 (Problem on Pricing of Issue – FIFO Method)

Record the following transactions in Stores Ledger, pricing the materials under FIFO Method.

May 1	Balance 50 units at ₹25 per unit
May 3	Received 300 units at ₹30 per unit
May 5	Issued 200 units
May 7	Issued 120 units
May 8	Received back 10 units (issued on May 7)
May 10	Returned to vendor 15 units purchased on May 3
May 15	Received 200 units at ₹32 per unit
May 18	Issued 150 units
May 19	Issued 50 units

The stock verifier found a shortage of 10 units on May 20 and left a note.

[*BU BBM, May (2014)*]

(Ans: Closing Balance 15 units at ₹32 per unit – ₹480)

Problem 14 (Problem on Pricing of Issue – FIFO Method)

Following are the Receipts and Issues of material.

Date	Receipts (units)	Cost (₹)	Issues (units)
01/01/2017	1,000	1,000	-
01/02/2017	1,000	800	-
28/02/2017	-	-	1,200
01/03/2017	1,000	1,200	-
31/03/2017	-	-	1,200

Prepare Stocks Ledger Account under FIFO Method.

[*BU BBM, May (2014)*]

(Ans: Closing Balance 600 units at ₹1.20 per unit – ₹720)

Problem 15 (Problem on Pricing of Issue – LIFO Method)

Following are the Receipts and Issues of material.

Date	Receipts (units)	Cost (₹)	Issues (units)
01/01/2018	1,000	1,000	-
01/02/2018	1,000	800	-
28/02/2018	-	-	1,200

01/03/2018	1,000	1,200	-
31/03/2018	-	-	1,200

Prepare Stocks Ledger Account under LIFO Method.

[*BU BBM, May (2014)*]
(Ans: Closing Balance 600 units at ₹1 per unit – ₹600)

Problem 16 (Problem on Pricing of Issue – Simple Average Method)

Following are the Receipts and Issues of material.

Date	Receipts (units)	Cost (₹)	Issues (units)
01/01/2018	1,000	1,000	-
01/02/2018	1,000	800	-
28/02/2018	-	-	1,200
01/03/2018	1,000	1,200	-
31/03/2018	-	-	1,200

Prepare Stocks Ledger Account under Simple Average Method.

[*BU BBM, May (2014)*]
(Ans: Closing Balance 600 units – ₹720)

Problem 17 (Problem on Pricing of Issue – Simple Average Method)

The following transactions took place in respect of Material 'X'.

Date	Receipts (units)	Rate per unit (₹)	Issues (units)
2	2,000	2.00	-
4	3,000	2.40	-
6	-	-	2,500
8	2,500	2.60	-
10	-	-	2,000

Prepare Stores Ledger Account under Simple Average Price Method.

[*BU B.Com, May (2014)*]
(Ans: Closing Balance 3,000 units – ₹7,200)

Problem 18 (Problem on Pricing of Issue – Weighted Average Method)

The following transactions took place in respect of Material 'X'.

Date	Receipts (units)	Rate per unit (₹)	Issues (units)
2	2,000	2.00	-
4	3,000	2.40	-
6	-	-	2,500
8	2,500	2.60	-
10	-	-	2,000

Prepare Stores Ledger Account under Weighted Average Price Method.

[*BU B.Com, May (2014)*]
(Ans: Closing Balance 3,000 units – ₹7,260)

Problem 19 (Problem on Pricing of Issue – Weighted Average Method)

Following transactions relates to the Receipts and Issues of Material 'X'.

Receipts

03/06/2017	500 units at ₹4.00 per unit
13/06/2017	900 units at ₹4.30 per unit
23/06/2017	600 units at ₹3.80 per unit

Issues

05/06/2017	400 units
15/06/2017	400 units
25/06/2017	600 units

Prepare Stores Ledger under Weighted Average Method.

[*BU B.Com, May (2013)*]

(Ans: Closing Balance 600 units – ₹2,421)

Problem 20 (Problem on Pricing of Issue – FIFO Method)

From the following particulars relating to Material 'X', show how the value of the issues should be arrived under FIFO Method.

1/1/2018	Opening Stock 1,000 units at ₹5 each
4/1/2018	Purchased 900 units at ₹6 each
8/1/2018	Issued 1,200 units
15/1/2018	Purchased 800 units at ₹6.20 each
18/1/2018	Issued 1,000 units

[*BU B.Com, May (2011)*]

(Ans: Closing Balance 500 units at ₹6.20 each – ₹3,100)

Section C Type Questions

Problem 1 (Problem on Pricing of Issues – FIFO Method)

From the following data, prepare Stores Ledger Account under FIFO method.

Stock on March 1 2018 15,000 units at ₹20 per unit

Purchases

Date	Units	Rate per unit (₹)
March 2	16,000	19
4	13,000	21
8	20,000	22.50
24	40,000	24
25	30,000	25

Issues

Date	Units
March 5	13,600
7	7,000
15	17,200
18	4,900
22	15,100
28	45,000

On 31/3/2018 stock checking revealed a shortage of 600 units.

[*BU B.Com, May (2017)*]

(Ans: Closing Balance 600 units at ₹24 per unit – ₹14,400 and 30,000 units at ₹25 per unit – ₹7,50,000)

Problem 2 (Problem on Pricing of Issues – LIFO and FIFO Method)

Prepare Stores Ledger Account showing the issue of materials for the month of April 2018 under FIFO and LIFO Methods.

April 2	Purchased 4,000 units @ ₹4 per unit
April 5	Purchased 500 units @ ₹5 per unit
April 7	Issued 2,000 units
April 10	Purchased 6,000 units @ ₹6 per unit

April 13	Issued 4,000 units
April 15	Issued 2,000 units
April 16	Issued 1,000 units
April 18	Purchased 4,500 units @ ₹5.50 per unit
April 22	Issued 3,000 units
April 25	Issued 500 units
April 28	Purchased 1,000 units @ ₹8 per unit

[*BU B.Com, May (2017)*]

(Ans: FIFO Method – Closing Balance 2,500 units at ₹5.5 per unit – ₹13,750 and 1,000 units at ₹8 per unit – ₹8,000; LIFO Method – Closing Balance 1,500 units at ₹4 per unit – ₹6,000; 1,000 units at ₹5.5 per unit – ₹5,500 and 1,000 units at ₹8 per unit – ₹8,000)

Problem 3 (Problem on Pricing of Issues – FIFO Method)

The following details are obtained from the books of X Co. Ltd. for the month of March 2016.

Date	Particulars
March 2016	
2	Purchased 8,000 units at ₹38 per unit
4	Purchased 6,500 units at ₹42 per unit
5	Issued 6,800 units
7	Issued 3,500 units
8	Purchased 10,000 units at ₹45 per unit
15	Issued 8,600 units
18	Issued 2,450 units
22	Issued 2,550 units
24	Purchased 20,000 units at ₹48 per unit
25	Purchased 15,000 units at ₹50 per unit
28	Issued 22,500 units
30	Issued 3,750 units

Stock verification was conducted on 31 March 2016 which revealed that there was a shortage of 300 units. Prepare a stores ledger under FIFO method

[*BU B.Com, May (2016)*]

(Ans: Closing Balance 9,350 units at ₹50 per unit – ₹4,67,500)

Problem 4 (Problem on Pricing of Issues – LIFO Method)

The following purchases have been extracted in respect of Material 'S'. Prepare Stores Ledger Account under LIFO method of pricing of material issues.

Receipts

03/1/18	Purchased 500 units at ₹4 per unit
04/1/18	Purchased 100 units at ₹4.20 per unit
10/1/18	Purchased 50 units at ₹4.25 per unit
13/1/18	Purchased 800 units at ₹4.30 per unit
23/1/18	Purchased 850 units at ₹3.80 per unit

Issues

05/1/18	Issued 400 units
10/1/18	Issued 50 units
15/1/18	Issued 900 units
25/118	Issued 450 units

[*BU B.Com, May (2016), May (2015)*]

(Ans: Closing Balance 100 units at ₹4 per unit – ₹400 and 400 units at ₹3,8 per unit – ₹1,520)

(Note: Since there are both purchases and issues on the same date i.e., on 10-1-16, purchases is recorded first and issues is recorded next)

Problem 5 (Problem on Pricing of Issues – FIFO Method)

Following is the Receipts and Issues of raw material in X Ltd. during January 2018. On 1/1/2018 opening balance is 5,000 units at ₹20 per unit

Date	Receipts (Units)	Rate per unit	Issues (Units)
03/1/18	-	-	900
06/1/18	-	-	1,800
09/1/18	3,000	25	-
11/1/18	-	-	900
17/1/18	4,000	30	-
23/1/18	-	-	3,000
25/1/18	3,600	35	-
26/1/18	-	-	1,200
28/1/18	1,000	40	-

You are required to prepare Stores Ledger under FIFO Method.

[*BU B.Com, May (2016)*]

(Ans: Closing Balance 200 units at ₹25 per unit – ₹5,000; 4,000 units at ₹30 per unit – ₹1,20,000; 3,600 units at ₹35 per unit – ₹1,26,000 and 1,000 units at ₹40 per unit – ₹40,000)

Problem 6 (Problem on Pricing of Issues – LIFO Method)

Prepare a Stores Ledger Account from the following details using LIFO Method of pricing the issue of materials.

May 1	Opening balance 10,850 kg at ₹130 per kg
May 2	Purchased 20,000 kg at ₹134 per kg
May 3	Issued 6,750 kg
May 5	Issued 8,500 kg
May 6	Received back 550 kg from production being surplus
May 7	Purchased 17,550 kg at ₹128 per kg
May 8	Issued 11,250 kg
May 9	Physical verification revealed a loss of 250 kg
May 10	Issued 8,950 kg
May 12	Issued 6,300 kg
May 15	Purchased 10,000 kg at ₹132 per kg
May 16	Issued 7,750 kg

[*BU BBM, May (2015)*]

(Ans: Closing Balance 6,950 units at ₹130 per kg – ₹9,03,500 and 2,250 units at ₹132 per kg – ₹2,97,000)

Problem 7 (Problem on Pricing of Issues – FIFO and LIFO Method)

Prepare Stores Ledger under FIFO Method and LIFO Method from the following information:

March 1	Opening balance 250 units at ₹10 per unit
March 3	Issued 50 units M.R. No. 61
March 6	Received 800 units at ₹12 per unit G.R. No. 13
March 7	Issued 300 units M.R. No. 63
March 8	Returned to stores 20 units issued on M.R. No. 61
March 9	Issued 100 units M.R. No. 102
March 15	Received 200 units at ₹10 per unit G.R. No. 93
March 26	Issued 150 units M.R. No. 130

[*BU BBM, May (2015)*]

(Ans: FIFO Method Closing Balance 450 units at ₹12 per unit – ₹5,400 and 220 units at ₹10 per unit – ₹2,200; LIFO Method Closing Balance 200 units at ₹10 per unit – ₹2,000; 420 units at ₹12 per unit – ₹5,040 and 50 units at ₹10 per unit – ₹500)

Problem 8 (Problem on Pricing of Issues – FIFO Method)

Prepare Stores Ledger Account showing the issue of materials for the month of April 2012 under FIFO Method.

April

1 Opening Stock 1,000 units at ₹26 each
3 Issued 500 units
5 Issued 400 units
7 Purchased 750 units at ₹27.50 each
9 Issued 360 units
11 Purchased 500 units at ₹29 each
13 Issued 700 units
15 Returns to vendor, purchased on 11th April 15 units
17 Received back from work-order, issued on 9th April 20 units
19 Issued 250 units
20 Purchased 250 units at ₹32 each
23 Issued 200 units
25 Purchased 750 units at ₹34 each
27 Issued 150 units

On April 30, when stock is verified, it is found that the actual stock is more by 10 units.

[*BU B.Com, May (2013)*]

(Ans: Closing Balance 704 units at ₹34 per unit – ₹23,970)

(Note: Excess stock found on stock verification is taken at the most recent purchase rate of ₹34 per unit.)

Problem 9 (Problem on Pricing of Issues – FIFO Method)

Prepare from the following data a Stores Ledger Account in a proper format using FIFO Method of pricing the material issues.

1 Nov 2017 Opening Stock 400 units at ₹8 per unit
5 Nov 2017 Received 800 units at ₹7.80 per unit
8 Nov 2017 Issued to production department 480 units
10 Nov 2017 Issued to production department 320 units
12 Nov 2017 Received 1,000 units at ₹7.70 per unit
15 Nov 2017 Issued to production department 800 units
16 Nov 2017 Received 500 units at ₹7.50 per unit
19 Nov 2017 Received 1,200 units at ₹7 per unit
21 Nov 2017 Issued to production department 700 units
24 Nov 2017 Issued to production department 520 units
27 Nov 2017 Issued to production department 680 units
28 Nov 2017 Refund of surplus from work order 50 units from issues of November 10

On 30 November 2017, the stock verification report revealed a shortage of 20 units.

[*BU B.Com, May (2011)*]

(Ans: Closing Balance 380 units at ₹7 per unit – ₹2,660 and 50 units at ₹7.8 per unit – ₹390)

CHAPTER 5

Labour Cost Control

CHAPTER OUTLINE

5.1 INTRODUCTION

Labour refers to the manpower engaged in manufacture or processing of finished goods. It refers to those engaged in converting raw materials into finished goods and further processing until they are ready for sale.

Labour of a business organisation can be classified into the following categories:

1. Direct Labour: Direct Labour or Operating Labour refers to those who are directly engaged in the production process like foremen, machine operators, etc. They are also known as Productive Labour.
2. Indirect Labour: Indirect labour refers to those who are indirectly engaged in the production process like packers, loaders, cleaners, etc.

THEORY QUESTIONS

Section A Type Questions

1. What is Labour?
2. List the different types of Labour.

5.2 LABOUR COST

Labour Cost refers to the payment made to the labour force of the organisation. It is the payment made to employees, permanent or temporary, for their services.

Labour Cost includes the following:

Monetary Wages: This includes basic wages, Dearness Allowance, City Compensatory Allowance, House Rent Allowance, Overtime Wages, other special allowances, production bonus, employer's contribution to provident fund, State Insurance, Medical Fund, Pension Fund and Welfare Funds, Leave Pay, etc.

Non-monetary Wages: This includes benefits which an employee receives by virtue of his employment like medical facilities, education and training facilities, recreational and sports facilities, housing and social welfare, cost of subsidised canteen and co-operative societies, maintenance of staff quarters by the company, etc.

Labour cost can be classified into the following two categories.

***Direct Labour Cost*:** It is the cost incurred in payment of labour who are directly engaged in the production process. It can be easily identified and allocated to cost unit. It usually varies proportionately with the production. Direct Labour Cost is also called Direct Wages, Productive Wages, Manufacturing Wages or Factory Wages.

Indirect Labour Cost: It is the cost incurred for payment of labour who are not directly engaged in the production process. It is apportioned to cost unit on some appropriate basis. It may or may not vary with production.

THEORY QUESTIONS

Section A Type Questions

1. What is Labour Cost? What does it include?
2. Which are the different types of Labour Cost?

Section B Type Question

1. What are Labour and Labour Cost? Explain the different types of Labour and Labour Cost.

5.3 LABOUR COST CONTROL

Labour cost is the most significant element of cost after material cost. In most business enterprises, labour cost is substantial in nature and forms a significant part of the cost. Further, this cost has peculiar characteristics which other elements of cost do not have. There are many instances of companies failing and winding up on account of huge and unsubstantiated labour cost. Hence, it is necessary for every business enterprise to exercise control on labour cost.

Labour cost control means control over cost incurred on labour. Control over labour costs does not imply control over the size of the wage bill and it also does not imply that wages of each worker should be kept as low as possible. It means aiming to keep the wages cost per unit of output as low as possible.

The objectives of labour cost control are as follows:

- To motivate workers and utilise their skill and talent in increasing output, and thereby optimising production
- To minimise the wage cost per unit of output
- To contribute to overall organisational profitability and employee-welfare

5.4 SCOPE OF LABOUR COST CONTROL

For exercising effective control on labour costs, a business enterprise must have knowledge of the following:

1. Departments involved in control of labour costs
2. Time Analysis – Time and Motion Study
3. Time Keeping and Time Booking
4. Pay-roll Procedure
5. Idle-time and Overtime
6. Labour Turnover
7. Wage and Incentive Systems
8. Job Evaluation and Merit Rating
9. Labour Productivity

THEORY QUESTIONS

Section A Type Questions

1. What is Labour Cost Control?
2. State the objectives of Labour Cost Control.
3. List the areas of Labour Cost Control.

Section B Type Question

1. What is Labour Cost Control? State the scope or areas of Labour Cost Control.

Each of these components has been discussed in detail in the following paragraphs:

5.4.1 Departments Involved in Control of Labour Costs

The following are the various departments which can be associated with labour and labour costs, directly or indirectly:

- **Personnel Department**
  This department is responsible for searching the persons with required skills and qualification, on receipt of labour requisition from other departments. The department ensures that the people recruited possess the requisite qualification and skills required for the job, arranges for proper training for the newly recruited workers, and workshops for existing workers; maintains all personal and job related records of the employees; and conducts evaluation of performance in timely intervals.
- **Engineering and Work Study Department**
  This department is responsible for preparing plans and specifications for each job, providing training and guidance to the employees, supervising production activities, conducting time and motion studies, undertaking job analysis and conducting job evaluation.
- **Time-keeping Department**
  This department is responsible for maintaining attendance records of all the employees and the time spend by them on various jobs, etc.
- **Payroll Department**
  This department is responsible for preparing payroll of employees and disbursing their salary and wage payments.

- **Cost Accounting Department**
  This department is responsible for the accumulation, analysis and allocation of labour costs to various jobs, processes, departments etc.

THEORY QUESTIONS

Section A Type Question

1. List the departments involved in control of labour cost.

Section B Type Question

1. Briefly explain the departments involved in Labour Cost Control

5.4.2 Time Analysis or Work Study

Time Analysis or Work Study is a technique of cost reduction, which seeks to reduce labour cost by reducing unnecessary movements during the course of work and by determining the standard time to be spent on a job.

The following are the objectives of time analysis or work study:

- To determine the best way of doing things by avoiding wasteful movements
- To reduce stress and strain in job performance
- To determine standard time for completion of a job
- To lay down norms for efficiency and performance evaluation
- To determine fair rate of wages, based on output achievable per day

Time Analysis or Work Study is conducted by carrying out Time Study and Motion Study.

Time study is a direct and continuous observation of a task, using a time keeping device, to record the time taken to accomplish a task. The Industrial Engineering Terminology Standard defines time study as 'a work measurement technique consisting of careful time measurement of the task with a time measuring instrument, adjusted for any observed variance from normal effort or pace and to allow adequate time for such items as foreign elements, unavoidable or machine delays, rest to overcome fatigue, and personal needs'. Time study is undertaken to determine the standard time required to carry out a job more efficiently.

Motion study is the study of the motions or movements made by the workers with the object of eliminating unnecessary motions or movements and simplifying the method of doing the work.

The following are the steps involved in Time and Motion Study:

1. Observation of workers to record their movements.
2. Classification of movements into necessary and wasteful.
3. Elimination of wasteful movements and improvisation of necessary movements.
4. Provision of standard tools and equipment to workers.
5. Observation of workers and recording time taken for necessary movements.
6. Determination of standard time required for the job, on the basis of average time required and allowance for idle time.

THEORY QUESTIONS

Section A Type Questions

1. What is Time Analysis or Work Study?
2. List the objectives of Time Analysis or Work Study.
3. What is Time Study and Motion Study?

Section B Type Question

1. What is Time Analysis or Work Study? Briefly set out the objectives, method and steps involved in Time Analysis?

5.4.3 Time-keeping and Time-booking

Time-keeping and time-booking are similar, but quite distinct in what they achieve and cover. An independent discussion is made for both in the following paragraphs:

Time-Keeping It means keeping a record of the total time spent by a worker inside a factory. It refers to correct recording of the employees' attendance time.

The following are the objectives or purposes of time-keeping:

- To enable preparation of pay-roll
- To calculate overtime entitlement and overtime worked by the workers
- To ascertain idle time of workers if any, by taking difference between total recorded time and total productive time
- To enable disciplinary action, if found necessary
- To meet statutory requirements
- To enable distribution of overheads, which are based on labour time and cost

Methods of Time-keeping

There are various methods for time-keeping, which are broadly classified into two categories – Manual and Mechanical.

(i) Manual Methods

The following are the different methods of keeping time manually:

Attendance Register Method Under this method, an attendance register is kept in the office time adjacent to the factory gate or in each department, for workers employed therein. The time of arrival and departure may be noted down by an employee as time-keeper. It is the oldest method of time-keeping.

The *advantages* of this method are:

- It is simple and expensive.
- It is useful when number of employees is not large.
- It is useful for recording time of workers who work at customer's premises.

The *limitations or disadvantages* of this method are:

- There may be possibility of mistakes under this method.
- There would be no authentic proof of presence or absence of workers.
- There is a possibility of dishonest practices by way of collusion between workers and time-keeper.
- There may be inclusion of dummy workers, leading to fraud and misappropriation.

Metal Disk Method Under this method, each worker is allotted a metal disc or a token with a hole bearing his identification number. These discs or tokens are placed on a board at the gate. As the workers enter the factory gate, they remove their respective discs or tokens and place them in a box or tray kept near the board. Immediately after the scheduled time for entering the factory, the box is removed and the late comers will have to give their tokens to the time-keeper personally so that the exact time of their arrival could be recorded. The tokens still lying on the board at the factory gate denotes absenting workers. The attendance and time of arrival of workers is recorded in the Daily Muster Roll, which is then handed over to the Payroll Department.

The *advantages* of this method are:

(a) It is simple to understand and practice, even by illiterate workers.
(b) It is relatively inexpensive.

The *limitations or disadvantages* of this method are:

(a) There may be possibility of mistakes.
(b) There would be no authentic proof of presence or absence of workers.

(c) There is a possibility of dishonest practices like a worker removing co-worker's disc or token.
(d) There may be inclusion of dummy workers in Muster Roll, leading to fraud and misappropriation.

(ii) Mechanical Methods

The following are the different methods of keeping time mechanically:
1. Time-recording Clock Method
2. Dial Time Record Method
3. Punch Card Attendance System
4. Bio-metric Attendance System

Time-recording Clock Method It is a mechanical device which automatically records the time of the workers. Under this method, each worker is given a Time Card and all the cards are serially arranged in a tray near the factory gate and as the worker enters the gate, he/she picks up the card from the tray, puts it in the time recording clock which prints the exact time of arrival in the proper space against the particular day. This process is repeated for recording time of departure for lunch, return from lunch and time of leaving the factory in the evening. Late arrivals, early leaving and overtime are printed in red to attract the attention of the management.

The *advantages* of this method are:
- Exact time of arrival and departure are recorded.
- Possibility of dishonest practices is partly eliminated since the machine records the time.
- There are no chances of disputes arising in connection with recording of time of workers because time is recorded by the machine and not by time-keeper.
- There is no scope for partiality or carelessness of the time-keeper as it is in case of manual methods.
- It is useful when the number of employees is large.

The *limitations or disadvantages* of this method are:
- It is expensive to install time recording clocks.
- There is a possibility of misuse – for example, a worker may record the attendance and time of his co-worker.
- It cannot be completely relied upon since there are possibilities for machines to go out of order.

Dial Time Record Method The dial time recorder is a machine which has a dial around the clock. This dial has a number of holes (usually about 150) and each hole bears a number corresponding to the identification number of the worker **concerned.** There is one redial arm at the center of the dial. As a worker enters the factory gate, he/she has to press the redial arm after placing it at the hole of his/her number and the time will automatically be recorded on a roll of a paper inside the dial time recorder against the number. The sheet on which the time is recorded provides a running account of workers' time.

The advantages of this method are:
- Exact times of arrival and departure are recorded.
- Possibility of dishonest practices is partly eliminated since the machine records the time.
- This method allows greater accuracy and can itself transcribe the number of hours to the wage sheets.
- The machine can also calculate the wages of the workers and this avoids much loss of time.

The *limitations or disadvantages* of this method are:
- It is expensive to install Dial Time Recorders.
- There is a possibility of misuse – for example, a worker may record the attendance and time of his co-worker.
- It cannot be completely relied upon since there are possibilities for machines to go out of order.
- It is restricted to a limited number of workers since the maximum number of holes/dials will be around 150.

Punch Card Attendance System One of the most popular time clock attendance systems is punch card attendance system. A punch card is a flat and stiff paper with notches cut in it and contains digital information. In punch card attendance system, employees use this punch or proximity card for in and/or out. To use a punch card, employees just need to wave the card near a reader, which then ensures whether the correct person is logging in and/or out.

The *advantages* of this method are:

- Punch card attendance system prevents the proxy attendance and records the accurate in and/or out time of each employee.
- Employees just need to punch their cards and their attendance along with the time gets recorded. So, there is no manual intervention which avoids misappropriation and dishonest practices.
- There is no scope of editing and manipulation in records so it keeps utmost transparency in the organisation.

The *limitations or disadvantages* of this method are:

- It is expensive to install punch card attendance system.
- It has a complex hardware and software. Any interceptions or damage may corrupt the entire system and lead to loss of data.

Bio-metric Attendance System Biometrics has unique recognising features which are based on physical or behavioral traits of an individual. Recognising an individual on the basis of physical traits include identification based on his fingerprint, face, DNA, eyes, iris, palm, etc., while behavioral traits identification refers to voice or rhythm recognition. Based on this technology different recognition systems have been designed depending on different traits. This method has two types of systems: web-based and PC based.

The *advantages* of this method are:

- It is real-time.
- It saves lot of time and efforts.
- It has replaced all the paper sheets and other manual systems.
- It can be adopted irrespective of the number of workers.

The only *limitation or disadvantage* of this method is that it is relatively expensive.

Features or Requisites of a Good Time-keeping System:

A good time-keeping system should be able to:

- Cover all workers regardless of time-based or piece-rate payment, to ensure uniformity and discipline.
- Record time of arrival and departure of workers clearly.
- Avoid disputes as to the exact time of arrival or departure.
- Simple, smooth and quick, to avoid unnecessary and long queues for recording time at the factory gate.
- Record late arrivals, early leavings, overtime, etc., and promptly report them to management.
- Be supervised by a responsible official.
- Be cost-effective.
- Be capable of curbing dishonest practices.

Time Booking

Time-booking means analysing the total time spent on various jobs for each day and each employee.

The clock card (time-keeping card) is required essentially, for the correct determination of the amount of wages due to a worker on the basis of time he/she has put in the factory. It merely records the total time spent by each worker in the factory for every day, but does not show how the time was put to use in the factory. Information is required about how a worker utilised his time in completing jobs entrusted to him, how long

he was kept waiting for one reason or another due to lack of work, lack of material and supplies, lack of instructions, machine breakdowns, power failures, etc. Control of cost without such information might not be possible. Recording such information for each worker is called time-booking.

For example, time-keeping gives information that a worker spent eight hours a day at the factory, whereas time-booking given information on how he/she had spent that eight hours – three hours for job A, two hours for job B, one hour idle-time, time taken for lunch, etc.

Objectives of Time-booking

The following are the objectives of Time-booking:

- To ensure that time paid for, according to time keeping, has been properly utilised on different jobs or work orders
- To ascertain the cost of each job or work order
- To provide a basis for apportionment of overhead expenses over various jobs/work orders when the method for the allocation of overhead depends upon time spent on different jobs
- To ascertain the labour hours spent on each job and the idle labour hours
- To calculate the amount of wages and bonus payable under the wage incentive system

Time-card or Job-card

Where payment to labour is on time rate basis, the Gate Card (Clock Card) is a record of the hours of work that should be paid for. Since the Gate Card merely records the hours during which the worker has been within the premises of the factory and it does not contain any details as to how these hours have been put to use by the worker in his department, a job card must be prepared to provide the necessary information. So, for collecting information on how a worker utilises the time paid for, a time-card or job-card is used. Job-card enables a reconciliation of the time spent by the worker in each department with the time paid for as per attendance record. Further, it also helps in preventing dummy workers being put on the payroll.

Time-card or Job-card can be of two types:

(i) ***Job card based on Jobs:*** In this type of time-card or job-card, a separate card is issued for each job or operations there-under. The time spent by all the workers on a single job or operation is recorded on the same card. Cost of the job can be immediately ascertained, as total time spent on the job is recorded in the job card. A worker may have worked on different jobs during a given day and hence, the time spent by the worker on any day may be scattered over various job cards. Therefore, under this type, a reconciliation statement is prepared comparing the total time as per various job cards with the time recorded in time-keeping records.

Following is a specimen of job-card based on jobs.

JOB CARD

Description of _____ Job No_____

Department _____ Date_____

Worker No.	Start	Stop	Elapsed Time	Actual Time Taken	Rate	Amount

Supervisor's Initial

(ii) ***Job Card based on Workers*** In this type of time card or job card, a separate time card is issued to each worker, valid for a specific period – a month or a week or a day. The total time spent by that worker on various jobs and idle time, is recorded on the same card. Time spent by the worker on any day is found on the same card. So, analysis of idle time, computation of wages and reconciliation with time-keeping records becomes easy. The cost of any particular job will be found scattered over various time cards, since many workers can be engaged on the same job or same worker can be engaged on various days/weeks on that job. An Abstract Sheet is prepared to ascertain cost of the particular job.

Following is a specimen of job card based on workers.

TIME CARD

Worker No. _____ Date_____

Name of Worker _____ Department_____

Job No.	Start	Stop	Elapsed Time	Actual Time Taken	Rate	Amount

Supervisor's Initial

THEORY QUESTIONS

Section A Type Questions

1. What is Time-keeping? **[*BU BBM, May (2011), B.Com May (2013), May (2016)*]**
2. List the objectives of Time-keeping.
3. List the various methods of Time-keeping.
4. What is Time-booking?
5. What is Time-card or Job-card?

Section B Type Questions

1. What is Time-keeping? Briefly explain its objectives.
2. Explain briefly the manual methods of Time-keeping.
3. Explain briefly the mechanical methods of Time-keeping.
4. Explain the Attendance Register Method of Time-keeping.
5. Explain the Metal Disk Method of Time-keeping.
6. Explain the Time-recording Clock Method of Time-keeping.
7. Explain the Dial-time Record Method of Time-keeping.
8. Explain the Punch Card Attendance System of Time-keeping.
9. Explain the Bio-metric Attendance System of Time-keeping.
10. What are the requisites of a good time-keeping system?
11. What is Time-booking? Briefly explain the objectives of Time-booking.
12. What is Time-card? Explain the Time-card based on jobs, along with its specimen.
13. What is Time-card? Explain the Time-card based on workers, along with its specimen.
14. Differentiate between time-keeping and time-booking. **[*BU B.Com, May (2014)*]**

Section C Type Question

1. Explain in detail Time-keeping and Time-booking.

5.4.4 Payroll Procedure

Following are the steps in the process of making payments to employees:

(i) Attendance and time details

A detailed sheet of number of days or hours worked by each employee (in case of time based payment) and units or percentage of work (in case of piece rate) as reflected by the time keeping methods, are sent to the payroll department by the time keeping department. Further, payroll department with the help of time booking records calculate any further incentives such as overtime payment, bonus to be paid to employees, etc.

(ii) List of employees and other details

A list of employees on roll and the rate at which they will be paid is sent by personnel/HR department. Payroll department should ensure that no unauthorized person can be paid.

(iii) Computation of wages and other incentives

On the basis of details provided by the time keeping department and personnel department, payroll department calculates wages/salary to be paid to employees. Payroll department prepares pay slips for all employees authorised by the personnel department and forward the same to the cost accounting department for further deductions and payment.

(iv) Payment to employees

The accounting department deducts all statutory deductions such as employee's contribution to provident fund, employee state insurance scheme, professional tax, TDS on salary, etc., and pays the net amount to the employees.

(v) Deposit of all statutory liabilities

All statutory deductions made from the employees' salary, along-with employer's contributions such as provident fund and employee state insurance scheme are paid to the respective statutory bodies.

THEORY QUESTIONS

Section A Type Question

1. List the steps involved in the payment of wages to employees.

Section B Type Question

1. Explain in brief the Pay-roll Procedure.

5.4.5 Idle-time and Over-time

(i) Idle time

Idle time refers to unproductive time. It is the time during which no production is carried out because the workers remain idle even though payment is made. Idle time is the total time (as per time keeping records) *minus* productive time (as per time booking records).

Idle time is of two types – normal idle time and abnormal idle time.

Normal idle time refers to the idle time inherent in every work situation. It can be estimated in advance. It is unavoidable and cannot be completely eliminated.

Abnormal idle time refers to the idle time over and above normal idle time. That is, abnormal Idle time = actual idle time *minus* normal idle time. Abnormal idle time is avoidable. It is further classified into (a) controllable and (b) uncontrollable.

Causes or Reasons for Idle-time

(a) *For Normal idle-time*
- Time lost between factory gate and place of work.
- Time lost between the finish of one job and starting of next job.
- Time spent on setting up of a machine.
- Time spent to overcome fatigue and tiredness.
- Time spent on workers' personal needs like taking lunch, tea, recess, etc.

(b) *For Abnormal idle-time*
- Time lost on account of machine break-downs, power failure, non-availability of equipment, etc.
- Time lost on account of non-availability of raw material and tools.
- Time lost in long-waiting time due to defective planning and lack of coordination.
- Time lost on account of strikes, lock-outs, poor supervision, fire, floods, accidents, etc.

Treatment for idle-time in cost accounts

(a) *For Normal idle-time*
Normal idle time is treated as a part of cost of production. In the case of direct workers, an allowance for normal idle time is built into the labour cost rates. While, in the case of indirect works, normal idle time is spread over all the products or jobs through the process of absorption of factory overheads.

(b) *For Abnormal idle-time*
Cost of abnormal idle time constitutes a loss, which should be debited to Costing Profit and Loss Account. If it is controllable, the responsibility should be fixed on the person in default.

(ii) Overtime

Work done beyond normal working hours is called overtime work. Under the Factories Act, 1948, 'where a worker works in a factory for more than nine hours in any day or for more than forty-eight hours in any week, he shall, in respect of overtime work, be entitled to wages at the rate of twice his ordinary rate of wages'. The amount of wages paid for working beyond normal working hours is called *overtime payment*. The extra rate at which the worker is paid over the normal rate is called *overtime premium*.

Causes or Reasons for Overtime

Overtime may arise due to any of the following reasons:
- Genuine labour shortage, leading to the firm being understaffed.
- Pressure of immediate/urgent delivery by a customer.
- Making up shortfall in production targets, due to some fault of management, or uncontrollable factors, etc.
- Increase in production targets than the budgeted to meet rise in market demand.

Effect of Overtime

Overtime increases the cost of production in the following ways:
- The overtime premium paid is an extra payment in addition to the normal rate.
- The efficiency of operators during overtime work may fall and thus actual output may be less than normal output.
- In order to earn more, the workers may not concentrate on work during normal time and thus the output during normal hours may also fall.
- Reduced output and increased premium of overtime will bring about an increase in costs of production.
- It gives rise to associated costs like wear and tear of machinery, additional power consumption, etc.

Accounting Treatment for Overtime

The treatment for overtime payment in costing records depends on the reason for overtime. The following tables gives the reason for overtime and corresponding accounting treatment:

Reason or Situation	Accounting Treatment
Genuine shortage of labour	Should be treated as regular cost of production – as Direct Labour – by inflating normal wage rate
Customers' desire and demand like urgent delivery, etc.	Charged to the job directly – such amount will be suitably recovered from the customer by charging at a higher rate
Irregular overtime to meet production requirements due to unexpected developments	Charged to job – treated as factory overheads
Fault of a particular department, for example, non-availability of materials during normal time, improper planning, etc.	Charged to the department in default, in order to fix responsibility and prevent recurrence
Abnormal conditions, for example, strike, etc.	Charged to Costing Profit and Loss Account as loss

Measures for Controlling Overtime Cost

Overtime, if worked occasionally, indicates that the firm is operating at its optimum capacity. It is considered as a healthy indicator. But, persistent overtime may signify that either there is understaffing or there are limited production facilities or labour inefficiency. Overtime work should be resorted to only when it is extremely essential because it involves extra cost.

To keep overtime to its minimum, it is necessary to exercise proper control over the overtime work. The suitable procedure which may be adopted for controlling overtime comprises the following steps or measures:

1. Work done during normal hours should be monitored carefully. This will ensure that there is no spillover from normal time to overtime, when the output can be achieved in regular time itself.
2. Overtime work should have prior sanction of the competent authority. The reasons justifying overtime should be specified and considered acceptable.
3. Overtime efficiency should be compared with regular time efficiency. If the overtime efficiency is very low, it may not be worthwhile to work overtime.
4. Report on overtime work, output achieved, efficiency, reasons for overtime work, etc., should be sent periodically to top management for review and action.
5. If possible, an upper limit may be fixed for each category of workers in respect of overtime.

THEORY QUESTIONS

Section A Type Questions

1. What is idle time? List the types of idle time. **[*BU B.Com, May (2011), May (2013), BBM, May (2014)*]**
2. State the causes of idle time. **[*BU B.Com, May (2014)*]**
3. State any two reasons for normal idle time.
4. State any two reasons for abnormal idle time.
5. What is the treatment for idle time in cost accounts?
6. What is overtime? **[*BU BBM, May (2011), B.Com, May (2013), May (2016), May (2017)*]**
7. State the reasons for overtime.
8. What are the effects of overtime?
9. List the measures for controlling overtime cost.

Section B Type Questions

1. What is idle-time? Explain briefly the reasons for idle-time. How is it treated in cost accounting?
2. What is overtime? Explain briefly the reasons and effects of overtime.
3. What is overtime? Explain the accounting treatment for overtime in costing records.
4. Briefly explain the various measures for controlling overtime cost.

5.4.6 Labour Turnover

'Labour turnover' in an organisation is the rate of change in the composition of labour force during a specified period measured against suitable index. It is expressed as a percentage. The standard of usual labour turnover in the industry or locality or the labour turnover rate for a past period may be taken as the index or norm against which actual labour turnover rate is compared.

Calculation or Measurement of Labour Turnover

Computation of Labour Turnover Rate depends on whether the business entity is under expansion, or otherwise.

Calculation of Labour Turnover Rate when there is no Expansion

There are three methods of computing labour turnover rate under this situation, viz.,

1. **Separation Method**

   Under this method, labour turnover rate is calculated using the following formula:

$$\text{Labour Turnover Rate} = \frac{S}{L}$$

   Where,

   S = Number of employees separated (i.e., left or discharged) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of employees at the beginning of the period} + \text{Number of employees at the end of the period}]}{2}$$

2. **Replacement Method**

   Under this method, labour turnover rate is calculated using the following formula:

$$\text{Labour Turnover Rate} = \frac{R}{L}$$

   Where,

   R = Number of employees replaced (i.e., substituted) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of employees at the beginning of the period} + \text{Number of employees at the end of the period}]}{2}$$

3. **Flux Method or Mixed Method**

Under this method, labour turnover rate is calculated using the following formula:

$$\text{Labour Turnover Rate} = \frac{(S + R)}{L}$$

Where,

S = Number of employees separated (i.e., left or discharged) during the period.

R = Number of employees replaced (i.e., substituted) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of employees at the beginning of the period} + \text{Number of employees at the end of the period}]}{2}$$

Calculation of Labour Turnover Rate when there is Expansion

Expansion refers to increase in production facilities on account of which new workers are recruited, e.g., diversification, plant capacity increase, commencement of new factory, introduction of additional shift, etc.

There are three methods of computing labour turnover rate under this situation, viz.,

1. **Separation Method**

Under this method, labour turnover rate is calculated using the following formula:

$$\text{Labour Turnover Rate} = \frac{S}{L}$$

Where,

S = Number of employees separated (i.e., left or discharged) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of employees at the beginning of the period} + \text{Number of employees at the end of the period}]}{2}$$

2. **Accession Method**

Under this method, labour turnover rate is calculated using the following formula:

$$\text{Labour Turnover Rate} = \frac{A}{L}$$

Where,

A = Number of accessions during the period = Number of employees replaced during the period + Number of employees newly recruited during the period

Or,

A = [Number of employees at the end of the period *plus* Number of separations during the period *minus* Number of employees at the beginning of the period]

$$L = \text{Average Labour Force} = \frac{[\text{Number of employees at the beginning of the period} + \text{Number of employees at the end of the period}]}{2}$$

3. Flux Method

Under this method, labour turnover rate is calculated using the following formula:

$$\text{Labour Turnover Rate} = \frac{S + A}{L}$$

Where,

S = Number of employees separated (i.e., left or discharged) during the period.

A = Number of accessions during the period = Number of employees replaced during the period + Number of employees newly recruited during the period

Or

A = [Number of employees at the end of the period *plus* Number of separations during the period *minus* Number of employees at the beginning of the period]

$$L = \text{Average Labour Force} = \frac{[\text{Number of Employees at the beginning of the period} + \text{Number of Employees at the end of the period}]}{2}$$

Note: Where the period for which employee data is given, is not annual – then the labour turnover rate must be annualised using the following formula: $\left(\frac{\textbf{Labour Turnover Rate}}{\textbf{Number of days in the given period}}\right) \times \textbf{365}$

Causes or Reasons for Labour Turnover

The main causes for labour turnover in a business enterprise can be broadly classified into the following:

Personal Causes

These are the causes which induce or compel workers to leave their jobs, like:

- Change of jobs for betterment
- Premature retirement due to ill health or old age
- Domestic problems and family responsibilities
- Discontent over the job and working environment

Unavoidable Causes

These are the causes for which it becomes obligatory on the part of management to ask for one or more of their employees to leave the organisation, like:

- Seasonal nature of business
- Shortage of raw material, power, slack market for the product, etc.
- Change in the plant location
- Disability, making the worker unfit for work
- Disciplinary measures, etc.

Avoidable Causes

These are the causes which require the attention of management on a continuous basis so as to keep the labour turnover as low as possible, like:

- Dissatisfaction with job, remuneration, hours of work, working conditions, etc.
- Strained relationship with management, supervisors or fellow workers
- Lack of training facilities and promotional avenues
- Lack of recreational and medical facilities
- Low wages and allowances

Costs associated with Labour Turnover

The following are the two costs associated with labour turnover:

1. ***Preventive Costs*** These are the costs incurred to keep the labour turnover at low level, for example, cost of medical services, welfare schemes and pension schemes, etc. If the firm incurs high preventive costs, its rate of labour turnover can be low.
2. ***Replacement Costs*** These are the costs arising due to high labour turnover, and represent the amount spent on new workers. Some examples are cost of employment, training and induction, abnormal breakage and scrap, extra wages and overheads due to inefficiency of new workers, etc. When the labour turnover of a company is high, the replacement costs also will be high.

Effects of Labour Turnover

Labour turnover, whether high or low, will have an impact on the cost, profits and performance of a business enterprise.

The following are the effects of high labour turnover:

- Increase in cost of selection, recruitment and training.
- Increase in material wastage, tool breakage, and chances of breakdown of machinery at the shop-floor level.
- Increase in the number of accidents.
- Disruption of regular flow and production schedule.
- Loss of customers and their brand loyalty due to non-supply of finished goods or sub-standard production of finished goods.

The following are the effects of low labour turnover:

- Low cost of selection, recruitment and training.
- Minimum material wastage, tool breakage and breakdown of machines.
- Reduction in number of accidents.
- Achievement of production targets.
- No loss of customers due to timely and prompt supply of quality finished goods.

Thus, it becomes essential for any business enterprise to minimise labour turnover.

Remedial Steps to Minimise Labour Turnover

The following steps are useful for minimising labour turnover:

1. *Exit Interview:* An interview be arranged with each outgoing employee to ascertain the reasons of his leaving the organisation.
2. *Job Analysis and Evaluation:* Before recruiting workers, job analysis and evaluation may be carried out to ascertain the requirements of each job.

3. *Scientific system of recruitment, placement and promotion:* The organisation should make use of a scientific system of recruitment, selection, placement and promotion for employees.
4. *Enlightened Attitude of Management:* The management should introduce the following steps for creating a healthy working atmosphere:
   (i) Service rules should be framed, discussed and approved among management and workers, before their implementation.
   (ii) Provide facilities for education and training of workers.
   (iii) Introduce a procedure for settling worker's grievances.
5. *Use of Committee:* Issues like control over workers, handling their grievances etc., may be dealt by a committee, comprising of members from management and workers.

THEORY QUESTIONS

Section A Type Questions

1. What is Labour Turnover? **[*BU B.Com, May (2013)*]**
2. List the different methods of measuring Labour Turnover. **[*BU B.Com, May (2015)*]**
3. How is labour turnover measured under Separation Method?
4. How is labour turnover measured under Replacement Method?
5. How is labour turnover measured under Flux Method?
6. How is labour turnover measured under Accession Method?
7. List the various personal causes of employees which lead to labour turnover.
8. List the various unavoidable causes of labour turnover.
9. List the various avoidable causes of labour turnover.
10. State the effects of high labour turnover.
11. State the effects of low labour turnover.
12. List the remedial measures for minimising labour turnover.

Section B Type Questions

1. What is Labour Turnover? Briefly explain the different methods of measuring Labour Turnover. **[*BU B.Com, May (2011)*]**
2. What is Labour Turnover? Explain briefly the causes and effects of Labour Turnover. **[*BU B.Com, May (2013), May (2016)*]**
3. Explain the effects of Labour Turnover on the performance of a business enterprise.
4. What are the remedial measures for minimisation of Labour Turnover?

Section C Type Question

1. What is Labour Turnover? Explain in detail, the causes and effects of Labour Turnover, along with the costs associated with Labour Turnover. How can Labour Turnover be measured and minimised?

5.4.7 Wage and Incentive Systems

'Wages' include basic wages, dearness allowance, City Compensatory Allowance, House Rent Allowance, overtime wages, other special allowances, production bonus, employer's contribution to provident fund, State Insurance, Medical Fund, Pension Fund and Welfare Funds, Leave Pay, etc. Further, it also includes benefits extended in non-monetary form.

Different systems of wage payment and incentives for the labour force exist, and all such systems are classified as following:

1. Time Rate Systems
2. Payment by Results
3. Profit-sharing and Co-partnership Schemes

Time Rate Systems include the following:

- Simple Time Rate System
- High Wage Plan
- Measured Day Work
- Differential Time Rate

Payment by Results include the following:

I. Piece Work System
   (a) Straight Piece Rate
   (b) Differential Piece Rate
      (i) Taylor System
      (ii) Merrick System

II. Combination of Time and Piece Work
   (a) Gantt Task and Bonus System
   (b) Emerson's Efficiency System
   (c) Points Scheme
      (i) Bedaux System
      (ii) Haynes System
   (d) Accelerated Premium System

III. Premium Bonus Methods
   (a) Halsey System
   (b) Halsey Weir System
   (c) Rowan System
   (d) Barth system

IV. Group System of Wage Payment

V. System Incentive Schemes for Indirect Workers

A detailed discussion is made on each of these mentioned methods in the following paragraphs:

Simple Time Rate System

Under this system, the worker is paid by the hour, day, week or month. The amount of wages, due to a worker are arrived at by multiplying the time worked (obtained from gate card) by the appropriate time rate. For example, where a worker is paid hourly and during a given period if he has worked for 200 hours, he will be paid for those many hours at a prescribed rate per hour. Let us say the rate per hour is ₹100. Then, the worker will be paid ₹20,000 (i.e., 200 hours × ₹100 per hour).

This method is suitable to ascertain the wages of persons whose services cannot be directly or tangibly measured (like general helpers, clerical staff etc.), and for workers engaged on highly skilled jobs or rendering skilled services (like tool-making, inspection, testing, etc.).

The following are the merits of this system:

(i) This system is simple to understand and easy to calculate.
(ii) It brings stability in wages for workers.
(iii) It reduces temptation on the part of workers to increase the output at the cost of quality.
(iv) It encourages unity in labour, since there is no distinction between efficient and inefficient labour due to quality of production.

This system suffers from the following demerits:

(i) There is no monetary incentive to raise the level of production.
(ii) There is no distinction between the slow and the efficient worker.
(iii) On account of lack of monetary incentive, if there is fall in output, the cost per unit increases.

High Wage Plan

This method was first adopted by Ford Motor Company, USA. Under this method, a worker is paid a wage rate which is substantially higher than the rate prevailing in the area or in the industry. In return, the worker is expected to maintain a very high level of performance. This method helps in inducting workers to exercise extra effort in their work.

This method is suitable when high quality of work and increased productivity are required.

The *merits* of this method are:

(i) It is a simple method.
(ii) It is inexpensive to operate.
(iii) It helps in reducing the extent of supervision.
(iv) It helps in attracting highly skilled and efficient workers by providing suitable incentive..
(v) Increased productivity may result in reduction of unit labour cost.

This method might also carry the following *demerits*:

(i) Every time higher wages are to be paid. If desired output is not achieved, cost per unit will increase.
(ii) Lesser supervision may result in sub-standard quality.

Measured Day Work

Under this method, wages are paid for number of actual hours worked by the worker. However, the rate per hour consists of two parts, fixed and variable.

The fixed portion is based on the nature of job and job requirements, i.e., job evaluation. The variable portion is based on the worker's merit rating and cost of living index. The total of fixed and variable portions for a day is termed as Measured Day's Work Rate of a worker.

The *merits* of this method are:

(i) It induces every worker to give his best performance.
(ii) It recognizes workers' skills and performance.

The following are the possible *limitations* of this method:

(i) The rates fixed are not easily understood by the workers.
(ii) Merit rating tends to be arbitrary and unless changed at rapid intervals, the ratings will not reflect the correct ranking of the qualities of a worker.

Differential Time Rate Method

Under this method, different hourly rates are fixed for different levels of efficiency. Up to a certain level of efficiency the normal rate or day rate is paid. Based on the efficiency level the hourly rate increases gradually. For example,

Let N denote Normal Rate Per Hour

Then, differential time rate is fixed as follows:

Level of Efficiency	Wage Rate per hour
Up to 75%	N
76% to 80%	$1.1 \times N$
81% to 90%	$1.2 \times N$
91% to 100%	$1.3 \times N$
Above 100%	$1.4 \times N$

While this method recognizes the level of efficiency of workers, being linked with efficiency, it cannot be strictly called as time rate method of wage payment. This method is similar to differential piece work system.

Straight Piece Rate System

Under this method, each operation, job or unit of production is termed as piece. A rate of payment, known as piece rate or piece work rate is fixed for each piece. The wages of the worker depends upon his output and rate of each unit of output, independent of the time taken by the worker. So, under this method the wages for a worker is calculated in the following manner:

Wages = Number of units produced × Piece Rate per unit

While fixing the piece rate, considerable care must be taken by the management. If the rate fixed is too high or too low, it would operate to the disadvantage of either the employer or the employee. It would be advisable to employ scientific methods of job evaluation and time and motion study for the purpose of setting the rates, to avoid the problems associated with too high or too low piece rate.

The merits of this system are:

(i) The system is simple to understand.
(ii) It is easy to operate.
(iii) The incentive provided is quite effective as the workers get the full benefit of any increase in production and the employer also gains by saving on overhead costs.
(iv) Labour cost per unit being constant, these can be calculated in advance and quotations can be confidently submitted.

The demerits of this system are:

(i) The quality of output suffers, when workers concentrate on quantum of output.
(ii) Maintenance of detailed information as regards production of individual workers would be necessary, thereby increasing the cost of accounting.
(iii) Disciplining workers in adhering to timings might become difficult.
(iv) In the ambition of producing high quantity, the workers may damage the machines and may also increase the wastage of materials.
(v) Skilled workers and supervisors (who are often paid on time basis) may resent higher wages to unskilled workers paid on piece basis.

Taylor's Differential Piece Rate System

Under this method, a worker is paid at below and above normal piece rate, depending on the level of efficiency of the worker.

This method suggests the following rates:

Less than 100% level of Efficiency	83.33% of Normal Piece Rate
100% or more than 100% level of Efficiency	125% of Normal Piece Rate

Notes:

(a) Some authors use 80% and 120% of Normal Piece Rate instead of the above.
(b) In either case, the higher rate is 150% of the lower rate. So, for less efficient workers, wages are paid at lower rate and for more efficient workers, the wages are paid at higher rate.

The advantages of this method are:

(i) It is simple to understand and operate.
(ii) The incentive is very good and attractive for efficient workers.
(iii) It has a beneficial effect where overheads are high as increased production has the effect of reducing their incidence per unit of production.

The limitation of this method is that it is quite harsh to workers. A slight reduction in output may result in a large reduction in the wages earned by them. This system is no longer in use in its original form, though the main idea behind it is used in many wage schemes.

Merrick's Differential Piece Rate System

This method is an improvement over Taylor's Differential Piece Rate System. Under this method, three piece rates for a job are fixed. Unlike Taylor's System, a worker will not get paid at lower than normal wages. The following are the piece rates under this system:

Level of Efficiency	Rate per Piece
Up to 83.33%	Normal Piece Rate
83.33% to 100%	1.1 × Normal Piece Rate
Above 100%	1.2 (or) 1.3 × Normal Piece Rate

This method has all the advantages of Taylor's method but overcomes its limitation.

Gantt Task and Bonus System

This system is a combination of time and piece rate systems. Under this system, a high standard or task is set and payment is made at time rate to a worker for production below the set standard. If the standards are achieved or exceeded, the payment to the concerned worker is made at a higher piece rate, which is inclusive of an element of bonus.

The following is the wage system under this method:

Output	Wage Rate
Output below Standard	Guaranteed Time Rate
Output at Standard	1.2 × Time Rate
Output above Standard	High Piece Rate (inclusive of bonus)

The a*dvantages* of this method are:

(i) it provides good incentive for efficient workers and at the same time protects the less efficient by guaranteeing the time rate.

(ii) It is simple to understand and operate.

(iii)It encourages better supervision and planning.

The *limitation* of this method is that it may not give adequate motivation for slower workers to increase their output.

Emersons's Efficiency System

Under this system, minimum time wages are guaranteed and for efficiency beyond certain level, bonus is given in addition to time wages.

The following is the wage system under this method:

Level of Efficiency	Wage Rate
Up to 66.67%	Guaranteed Time Rate
66.67% to 100%	Time Rate + Bonus ranging from 0.01% to 20% of time rate, based on actual efficiency
Above 100%	1.2 × Time Rate + 1% of Time Rate for every 1% increase in efficiency above 100%

The *advantages* of this method are:

(i) It encourages the slow worker to do a little better than before, than under Differential Piece Rate System.

(ii) Workers are assured of their time-based wages.

The *limitation* of this method is that it does not set a high degree of average performance as 2/3rd efficiency is rewarded with time wages.

Points Scheme or Bedaux System

Under this system, Wages for a worker = Basic Wages + Bonus.
Basic Wages is calculated at time rate. That is, Hours Worked × Rate per Hour.
Bonus is calculated in the following manner: 75% × Points Earned × Rate per Point.
Point Earned represents time saved and are denoted by Bs (i.e., Bedaux)

Hayne's System

Under this system, Wages for a worker = Basic Wages + Bonus.
Basic Wages is calculated at time rate. That is, Hours Worked × Rate per Hour.
Bonus is calculated in the following manner:

- For Repetitive work – $\frac{5}{6}$ × Points Earned × Rate per Point.
- For Non-repetitive work – 50% × Points Earned × Rate per Point.
- Point Earned represents time saved and are denoted by MANITs (i.e., Man Minutes)

Accelerated Premium System

Under this system, earnings increase with output; the rate of increase of earnings itself increases progressively with output. The increase in earnings will be higher in proportion to the increase in production. This system acts as a strong incentive for skilled workers to earn high wages by increasing output and for production beyond standard.

Halsey Method

Under this method, a standard time is fixed for each job or process. If there is no saving on this standard time, the worker is paid only his day rate. The worker is assured of time rate even in case the actual time exceeds standard time. However, where the worker completes the job within standard time and saves times, he will be awarded bonus to the extent of 50% of the wages of time saved. The employer will enjoy the remaining 50% of the wages for time saved.
So, under this method the wages of a worker is calculated using the following formula:

(Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)

The *advantages* of this method are:
(i) Time rate is guaranteed while there is opportunity for increasing earnings by increasing production.
(ii) The system is equitable in as much as the employer gets a direct return for his efforts in improving production methods and providing better equipment.

The *disadvantages* of this method are:
(i) Incentive is not as strong as with piece rate system. In fact the harder he works, the lesser he gets per piece.
(ii) The sharing principle may not be liked by employees.

Halsey Weir Method

This method is same as that of Halsey Method except that the employee gets only 30% of wages of time saved as bonus.
So, under this method the wages of a worker is calculated using the following formula:

(Time Taken × Time Rate) + (Time Saved × Time Rate × 30%)

Rowan System

Under this system, a standard time is fixed for the performance of a job and bonus is paid if time is saved. The bonus will be in proportionate to the time saved on standard time, on the wages for time saved.

So, under this method the wages of a worker is calculated using the following formula:

$$(\text{Time Taken} \times \text{Time Rate}) + \left(\frac{\text{Time Taken} \times \text{Time Rate} \times \text{Time Saved}}{\text{Standard Time}}\right)$$

Under this system, an employee earns maximum amount of bonus when the actual time taken is one-half of the standard time.

The *advantages* of this method are:

(i) Time rate is guaranteed.
(ii) Workers can earn money by saving time.
(iii) Share between employer and employee is just and equitable.
(iv) Moderately efficient workers are rewarded reasonably than under Halsey Plan.

The *limitations* of this method are:

(i) Incentive is not as strong as piece rate system.
(ii) It is difficult to compute than Halsey System.
(iii) Sharing principle is not welcomed by employees.
(iv) Where time saved is more than 50% of time allowed, the incentive is lower.

Barth System

Under this method, wages of a worker is calculated using the following formula:

$$\text{Wages} = \text{Hourly Rate} \times \sqrt{(\text{Standard Hours} \times \text{Actual Hours worked})}$$

The system is particularly suitable for trainees and beginners and also for unskilled workers. The reason is that for low production efficiency, the earnings are higher than in the piece-work system, but as the efficiency increases, the rate of increase in the earnings falls. This system is not suitable for workers having more than 100% efficiency as it does not provide incentive on working at more than 100% efficiency.

Group System of Wage Payment

Group system of wage payment should be preferred when:

(a) Jobs are performed collectively by a number of workers.
(b) Each man's work depends on the work performed by one or more of his colleagues, and
(c) When the output of each worker cannot be measured separately.

The following are some of the methods for distributing group wages to each worker:

(i) Equally, if all the workers of the group are of the same grade and skill, are paid the same rate and have worked for the same duration.
(ii) Pro-rate to the time of each worker, where the time spent by the individual worker is same.
(iii) On the basis of time rates and attendance of each worker.
(iv) On a specified percentage basis, the percentage applicable to a worker is pre-determined on the basis of skill, rate of pay, etc.
(v) In a group of unskilled and skilled workers, a method of distribution is to pay the unskilled workers at their time rates. The balance amount remaining out of the total earnings after payment to unskilled workers is distributed among the skilled workers by any of the methods discussed above.

Group Bonus

Group bonus refers to the bonus paid for the collective efforts made by a group of workers. Generally, such a scheme is introduced, when individual efficiency cannot be established or measured for the payment of bonus. The quantum of bonus is determined on the basis of productivity or output of the team as a whole. Bonus is shared by the individual workers in specified proportions e.g., on proportions of time based wages.

System of Incentive Schemes for Indirect Workers

Since the setting of work standards and measurement of output in the case of indirect workers is not an easy task in respect of maintenance, internal transport, inspection, packing and cleaning, the introduction of a system of payment by results for indirect workers is difficult. Despite its difficulty, it is essential to provide incentives to indirect workers:

The following is some of the examples of incentive schemes to indirect workers:

(a) Incentives to Supervisors and Foremen

Supervisors and foremen are an important link between the management and the workers. Incentive payment to these persons would assist in maintaining all round efficiency. Incentive to supervisors and foremen may be provided in the form of non-monetary benefits. It can also be provided in the form of bonus.

(b) Incentives to Maintenance and Repairs Staff

Under mass production work, repair and maintenance duties can be considered as routine and repetitive for which percentage of efficiency can be evaluated. In case such an evaluation is not possible or practicable, a group bonus system may be established, on the basis of reduction in breakdown or on the number of complaints.

Profit-Sharing and Co-partnership Schemes

A profit-sharing scheme implies that the net profit of the business would be shared between the workers and the shareholders or the partners in a pre-determined ratio.

Co-partnership, on the other hand, implies that the workers shall own the business jointly with the shareholders. In this case, usually the workers' share of profits is given in the form of equity shares.

Factors to be Considered in Introducing an Incentive System

The factors to be considered before introducing a system of incentives include the following:

- The industry norms and prevalent practices in the locality or similar occupations.
- Standards of performance.
- Measurability of the work done.
- Quality control system, which can enable high quality work and reduce wastages.
- Optimizing production and maximizing volume of production must be given importance than compensation of workers.
- Nature of task, i.e., whether the quality of work and volume of production is within the control of worker, or not.
- Nature of work, i.e., whether the work is repetitive in nature or constant planning is required regularly.
- The impact of incentives on earnings.
- The attitude and support of trade unions.

Principles of a Sound or Good System of Wages and Incentives

The main principles of a good system of wages and incentives are:

- Guarantee of minimum wages
- Understandability of the method of calculating wages and incentives

- Achievable standards
- Effort- linked, rather than arbitrary
- Non-restrictive, i.e., no limits on the amount of additional earnings for a worker
- Stable and reasonable
- Fair for both employer and employees
- Ability to fix responsibilities for inefficiency
- Economical
- Flexible to adopt for changes in standards and industry practises
- Legal

THEORY QUESTIONS

Section A Type Questions

1. List the different methods of wage payment based on "Time Rate System". **[*BU B.Com, May (2014)*]**
2. List the different methods of wage payment on the basis of "Payment by Results".
3. What is Simple Time Rate System?
4. What is 'High Wage Plan System'?
5. What is 'Measured Day Work'?
6. What is 'Differential Time Rate Method'?
7. What is Piece Rate System? **[*BU BBM, May (2015)*]**
8. What is 'Straight Piece Rate System'?
9. State any two merits of piece rate system. **[*BU B.Com, May (2017)*]**
10. What is 'Taylor's Differential Piece Rate System'?
11. What is "Merrick's Differential Piece Rate System'?
12. What is 'Gantt Task and Bonus System' of wage payment?
13. What is 'Emerson's Efficiency System' of wage payment?
14. What is 'Bedaux System' of wage payment?
15. What is 'Hayne's System' of wage payment?
16. What is 'Accelerated Premium System'?
17. How are wages calculated under 'Halsey Method'?
18. How are wages calculated under 'Halsey-weir Method'?
19. How are wages calculated under 'Rowan Method'?
20. How do you calculate bonus under (i) Halsey Plan and (ii) Rowan Plan? **[*BU B.Com, May (2015)*]**
21. What is 'Barth System' of wage payment?
22. When should a business entity prefer group system of wages?
23. What are the various methods of distributing group wages?
24. What is 'Group Bonus'?
25. What is 'Profit Sharing'?
26. What is 'Co-partnership Scheme'?

Section B Type Questions

1. List the various categories of Wage payment system and the different methods under each category. **[*BU B.Com, May (2013)*]**
2. Explain the 'Simple Time Rate System' of Wage payment, along with its merits and demerits.
3. Explain the 'High Wage Plan System' of wage payment, along with its merits and demerits.
4. What is 'Measured Day Work System' of wage payment? Bring out the advantages and limitations of this method.
5. Explain briefly, the 'Differential Time Rate Method' of wage payment.
6. What is 'Straight Piece Rate System' of wage payment? Explain the advantages and limitations of this method. **[*BU BBM, May (2014)*]**

7. What is 'Taylor's Differential Piece Rate System' of wage payment? Bring out the advantages and limitations of this method.
8. Explain 'Merrick's Differential Piece Rate System' of wage payment, along with its merits and demerits.
9. Explain 'Gantt Task and Bonus System' of wage payment, in detail.
10. Explain in detail, 'Emerson's Efficiency System' of wage payment.
11. Explain in detail 'Bedaux' and 'Haynes' systems of wage payment.
12. What is 'Halsey Method' of wage payment? Explain the merits and demerits of this method.
13. What is 'Halsey-Weir Method' of wage payment? Explain the merits and demerits of this method.
14. What is 'Rowan Method' of wage payment? Explain the merits and demerits of this method.
15. Explain in detail the 'Group System of Wage Payment'.
16. Explain the System of Incentive Schemes for Indirect Workers.
17. Explain the factors to be considered in introducing incentive system.
18. What are the principles of a sound system of wages and incentives? **[*BU B.Com, May (2017)*]**

Section C Type Questions

1. Explain in detail, the different systems of wages and incentives based on "Payment by Results".
2. List out the different systems of wage payment. What are the factors to be considered in introducing an incentive system? List out the principles of a good system of wages and incentives.

5.4.8 Job Evaluation and Merit Rating

In addition to all the above components relating to labour cost control, two other factors which have a huge relevance are – Job Evaluation and Merit Rating. The following paragraphs provide a detailed discussion of these two components.

Job Evaluation

'Job evaluation' is a process by which the following aspects of a job are analyzed and evaluated-

(a) Nature and importance of tasks to be performed.
(b) Skill requirements of job holder like technical background, experience etc.
(c) Responsibilities of the job holder, superior-subordinate reporting relationships, etc.
(d) Importance of the job in relation to other jobs.

The purpose or objectives of job evaluation are as follows:

(a) To assess the importance of each job.
(b) To determine the skill requirements of the job holder and fit the right person in the right job.
(c) To provide a basis for determining wage and salary structure for various job positions in the firm.
(d) To provide a basis for superior-subordinate relationships i.e., managerial hierarchy.

Merit Rating

'Merit Rating' is the systematic evaluation of the performance of each employee. Performance Evaluation i.e., Merit Rating may be done by the supervisor or any other authorized person.

The purpose or objectives of merit rating are as follows:

(a) To identify efficient workers and reward them suitably.
(b) To determine training and development needs.
(c) To provide a basis for promotion and transfers.
(d) To assess the worth of the worker to the firm.

Differences between Job Evaluation and Merit Rating

The following are the points of distinction between job evaluation and merit rating.

Job Evaluation	Merit Rating
It means rating or evaluating the job itself	It means rating or evaluating the workers on their jobs.
It is intended to create a rational wage and salary structure.	It provides a basis for providing incentives to workers on the basis of their ability and performance.
It simplifies wage administration by bringing uniformity in wage rates.	It determines the total wages payable to workers, which includes performance-linked bonus.

THEORY QUESTIONS

Section A Type Questions

1. What is 'Job Evaluation'?
2. List the purposes of 'Job Evaluation'.
3. What is 'Merit Rating'?
4. List the objectives of 'Merit Rating'.
5. List the differences between 'Job Evaluation' and 'Merit Rating'.

Section B Type Questions

1. What is 'Job Evaluation'? Explain in detail.
2. What is 'Merit Rating'? Explain in detail.
3. Differentiate between 'Job Evaluation' and 'Merit Rating'.

5.4.9 Labour Productivity or Efficiency Rating

'Labour productivity' refers to the ability of labour force in generating output. It is an index of efficiency of workers. Measurement of labour productivity (i.e., rating efficiency of workers) is required for the following purposes-

1. To determine incentives payable based on the system in operation.
2. To identify the training needs of workers, whose efficiency rating is low, and
3. To prepare labour requirement budget.

Measurement of Labour Productivity

Labour productivity can be measured using any of the following formulae-

(a) $$\text{Efficiency} = \frac{\text{Standard Time Allowed for Actual Output}}{\text{Actual Time Taken}}$$

(b) $$\text{Efficiency} = \frac{\text{Actual Output produced}}{\text{Standard Output for Actual Time Worked.}}$$

Measures or Steps for increasing Labour Productivity

Labour productivity can be increased by taking the following steps:

- Employing only those workers who possess the right type of skill.
- Placing a right type of man on the right job.
- Training young and old workers by providing them right opportunities.
- Taking appropriate measures to avoid excess or shortage of labour at the shop floor.
- Carrying out work-study for fixing wage rates, and for simplification and standardization of work.
- Proper production planning.

- Better plant layout.
- Proper maintenance of machines.
- Better working conditions.
- Reducing idle time
- Reducing over time.
- Reducing labour turnover, etc.

THEORY QUESTIONS

Section A Type Questions

1. What is 'Labour Productivity'/'Efficiency Rating'?
2. List the various methods for measurement of 'Labour Productivity'.

Section B Type Questions

1. What is 'Labour Productivity'? Explain the different methods of measuring 'Labour Productivity'.
2. Explain the various measures for increasing 'Labour Productivity'.

Section C Type Questions

1. Explain the following, in detail:
   (a) Job Evaluation.
   (b) Merit Rating
   (c) Labour Productivity.

PROBLEMS

Problems on Measurement of Labour Turnover

Problem 1 (Problem on Calculation of Labour Turnover Rates)

The following information is collected from the Personnel Department of ST Ltd., for the year ending 31st March.

Number of workers at the beginning of the year	8000
Number of workers at the end of the year	9600
Number of workers left the company during the year	500
Number of workers discharged during the year	100
Number of workers replaced due to left and discharges	700
Additional workers employed for expansion during the year	1500

Calculate Labour Turnover Rate by using Separation Method, Replacement Method and Flux Method.

Solution

The following are the requirements for calculation of labour turnover rates:

$$L = \text{Average Labour Force} = \frac{(8000 + 9600)}{2} = 8800$$

S = Number of Separations (left and discharged) = 500 + 100 = 600
R = Number of Replacements = 700
A = Number of Accessions = 700 + 1500 OR (9600 + 600 – 8000) = 2200

Labour Turnover Rates under –

Separation Method:

$$\frac{\mathbf{S}}{\mathbf{L}} = 600/8800 = 0.06818 \text{ OR } 6.82\%$$

Replacement Method:

$$\frac{\mathbf{R}}{\mathbf{L}} = 700/8800 = 0.0795 \text{ OR } 7.95\%$$

Flux Method:

$$\frac{\mathbf{(S + A)}}{\mathbf{L}} = (600 + 2200)/8800 = 0.3182 = 31.82\%$$

Problem 2 (Problem on Calculation of Labour Turnover Rates)

Number of workers on 1st January is 7600 and Number of workers on 31st December is 8400.

During the year, 80 workers left while 320 workers were discharged. 1200 workers were recruited during the year. Of these, 300 workers were recruited because of exits and the rest were recruited in accordance with expansion of plants.

From the given information, calculate Labour Turnover Rate under various methods.

Solution

The following are the requirements for calculation of labour turnover rates:

$$\text{L = Average Labour Force} = \frac{(7600 + 8400)}{2} = 8000$$

S = Number of Separations (left and discharged) = 80 + 320 = 400

R = Number of Replacements = 300

A = Number of Accessions = 1200 (given)

Labour Turnover Rates under –

Separation Method:

$$\frac{\mathbf{S}}{\mathbf{L}} = 400/8000 = 0.05 = 5\%$$

Replacement Method:

$$\frac{\mathbf{R}}{\mathbf{L}} = 300/8000 = 0.0375 = 3.75\%$$

Accession Method:

$$\frac{\mathbf{A}}{\mathbf{L}} = 1200/8000 = 0.15 = 15\%$$

Flux Method:

$$\frac{\mathbf{(S + A)}}{\mathbf{L}} = \frac{(400 + 1200)}{8000} = 0.20 = 20\%$$

Problem 3 (Problem on Calculating Missing Information with the Help of Labour Turnover Rates)

The Cost Accountant of Y Ltd., has computed labour turnover rates for the quarter ended 31st March, 2013 as 10%, 5% and 3% respectively under 'Flux Method', 'Replacement Method' and 'Separation Method' respectively. If the number of workers replaced during that quarter is 30, find the number of:

(a) Workers recruited and joined, and

(b) Workers left and discharged.

Solution

Labour Turnover Rate (Replacement Method) = $\frac{R}{L}$

So, 0.05 = $\frac{30}{L}$

Therefore, L = $\frac{30}{0.05}$ = 600.

Hence, *average labour force* = 600.

Labour Turnover Rate (Separation Method) = $\frac{S}{L}$

So, 0.03 = $\frac{S}{600}$

Therefore, S = 600 × 0.03 = 18
Hence, *number of separations (i.e., workers left and discharged)* = 18.

Labour Turnover Rate (Flux Method) = $\frac{(S + A)}{L}$

So, 0.10 = $\frac{(18 + A)}{600}$

That is, 18 + A = 600 × 0.10
So, 18 + A = 60
Therefore, A = 60 – 18 = 42.
Hence, *number of accessions (i.e., workers recruited and joined)* = 42.

Problems on Calculation of Labour Cost

Problem 4 (Problem on Calculation of Labour Cost)

From the following particulars ascertain the labour cost per day of 8 hours.

Basic Pay	₹8,000 per month.
Dearness Allowance	₹800 per month
Leave Salary	₹650 per month
Employers Contribution to RPF	10% of Basic Pay
Employers Contribution to ESI	2.5% of Basic Pay
Pro-rata amenities per worker per month	₹275
No. of working hours in a month	200

Solution

Calculation of Labour Cost

Particulars	₹
Basic Pay	8,000
Dearness Allowance	800
Leave Salary	650
Employers Contribution to RPF (8,000 × 10%)	800
Employers Contribution to ESI (8,000 × 2.5%)	200
Pro-rata amenities	275
	10,725

Labour cost per hour = $\frac{10,725}{200}$ = **₹53.63**

Labour cost per day of 8 hours = 53.625 × 8 = **₹429**

Problem 5 (Problem on Calculation of Labour Cost)

The following details are supplied to you relating to a worker in a factory

Monthly salary	₹10,000
Dearness Allowance	25%
Leave Salary-one month salary every year	
Employers Contribution to RP	8% of Basic + DA
Employers Contribution to ESI	2.5% of Basic + DA

The employer maintains a canteen on which he spends ₹43,500 per month. There are 250 workers in the factory and the factory works for 200 hours in a month.

Prepare a statement showing labour cost per day of 8 hours.

Solution

Calculation of Labour Cost

Particulars	₹
Monthly salary	10,000.00
Dearness Allowance (10,000 × 25%)	2,500.00
Leave Salary (10,000/12)	833.33
Employers Contribution to RPF (10,000 + 2,500) × 8%	1,000.00
Employers Contribution to ESI (10,000 + 2,500) × 2.5%	312.50
Proportionate cost of canteen facility (43,500/250)	174.00
	14,819.83

Labour cost per hour = $\frac{14,819.83}{200}$ = **₹74.10**

Labour cost per day of 8 hours = 74.099 × 8 = **₹592.79**

Problem 6 (Problem on Calculation of Labour Cost)

Calculate labour cost per day of 8 hours from the following information
Basic Salary ₹12,500 per month.
Dearness Allowance ₹15 for every point over 50 cost of living index for working class. Current cost of living index for working class is 523.
Leave Salary 5% of Basic and DA
Employers Contribution to RPF and ESI 8% of Basic and 2.5% of Basic, respectively
Expenditure on amenities to workers ₹475 per worker per month
No. of working days in a month 25, No. of working hours in a day 8

Solution

Calculation of Labour Cost

Particulars	₹
Basic Salary	12,500.00
Dearness Allowance (523 – 50) × 15	7,095.00
Leave Salary (12,500 + 7,095) × 5%	979.75
Employers Contribution to RPF (12,500 × 8%)	1,000.00
Employers Contribution to ESI (12,500 × 2.5%)	312.50
Proportionate cost of amenities	475.00
	22,362.25

Labour cost per hour = $\frac{22,362.25}{200}$ = **₹111.81**

Labour cost per day of 8 hours = 111.81 × 8 = **₹894.48**

Problem 7 (Problem on Calculation of Labour Cost)

Find out the labour cost per hour if the worker is paid Basic Salary ₹12,000 per month and DA of ₹4,500 per month. He is entitled to a bonus of 2 months' salary per annum. Employers Contribution to RPF and ESI is 8% and 2.5%, respectively on, Basic + DA. The worker is entitled for leave on pay for 1/20th day per week. The employer maintains a canteen where subsidised tea and lunch is provided to all the workers and a monthly subsidy of ₹25,000 is provided to the canteen. There are totally 475 workers taking the benefit of this canteen. Normal idle time works out to 20%. The average working days in a month are 25 days of 8 hours each.

Solution

Calculation of Labour Cost

Particulars	₹
Basic Salary	12,000.00
Dearness Allowance	4,500.00
Bonus (12,000/12) × 2	2,000.00
Employers Contribution to RPF (12,000 + 4,500) × 8%	1,320.00
Employers Contribution to ESI (12,000 + 4,500) × 2.5%	412.50
Proportionate cost of canteen facility (25,000/475)	52.63
	20,285.13

Labour cost per hour = $\frac{20,285.13}{152*}$ = **₹133.45**

Labour cost per day of 8 hours = 133.4548 × 8 = **₹1,067.64**

* No. of effective working hours is calculated in the following manner:

Total no. of hours in a month (25 days × 8 hours)	200
Less: Leave pay 1/20th of 200 hours	10
	190
Less: Normal idle time 20% of 190	38
Effective working hours	152

Problem 8 (Problem on Calculation of Labour Cost)

A worker is paid ₹8,000 per month as basic pay and in addition he is paid DA of ₹750 per month. He is entitled to bonus at 10% on basic pay. Employer's contribution to RPF and ESI is 8% and 2.5% respectively on Basic Pay and DA. The employer maintains a canteen where subsidized food is provided to the employees and a monthly subsidy of ₹60,000 is provided to the canteen. The total number of employees working in this company is 430. The employees are entitled to 15 days earned leave. The factory works for 300 days of 8 hours each in a year. Normal idle time is 20%. Find out the labour cost per hour.

Normal idle time is 20%. Average working days in a month are 25 days of 8 hours each.

Solution

Calculation of Labour Cost

Particulars	₹
Basic Salary	8,000.00
Dearness Allowance	750.00
Bonus (8,000 × 10%)	800.00
Employers Contribution to RPF (8,000 + 750) × 8%	700.00
Employers Contribution to ESI (8,000 + 750) × 2.5%	218.75
Proportionate cost of canteen facility (60,000/430)	139.53
	10608.28

Labour cost per hour = $\frac{10608.28}{152*}$ = **₹69.79**

Labour cost per day of 8 hours = 69.79 × 8 = **₹558.32**

* No. of effective working hours is calculated in the following manner:

Total no. of hours in a year (300 × 8)	2,400
Less: Leave period (15 days × 8 hours)	120
	2,280
Less: Normal idle time 20% of 2,280	456
Effective working hours in a year	1,824
Effective working hours in a month $\left(\frac{1,824}{12}\right)$	152

Problem 9 (Problem on Calculation of Labour cost)

From the following information calculate the labour cost per day for a worker assuming that the worker works 8 hours a day and avail of all the entitled leave:

(a) Basic Pay ₹12,000 per month
(b) Dearness Allowance 75% of Basic Pay
(c) House Rent Allowance 50% of Basic Pay
(d) Number of working days in a year 300
(e) Leave entitlement – 30 days of earned leave (full pay) and 20 days of medical leave at half-pay.

Solution

(a) Calculation of effective working days in a year:

Total working days	300
Less: Days equal to make half pay to full pay (i.e., days for which no payment is made) {20 – (20 × ½)}	10
Effective working days in a year	290

(b) Calculation of total remuneration per month:

	₹
Basic Pay per month	12,000
Dearness Allowance	9,000
House Rent Allowance	6,000
Total remuneration per month	27,000

(c) Total remuneration per year = ₹27,000 × 12 = ₹3,24,000

(d) Labour cost per day = $\frac{₹3,24,000}{290 \text{ days}}$ = **₹1,117.24**

Problems on calculation of overtime wages

Problem 10 (Problem on Calculation of Total Wages, Including Overtime Wages)

From the following details calculate total wages payable to a worker.

Days	No. of Hours Worked
Monday	12
Tuesday	11
Wednesday	09
Thursday	08
Friday	13
Saturday	06

Normal working hours in a week is 44 hours (i.e., 8 hours per day except on Saturday where the normal working hours is 4 hours). Labour cost per normal hour is ₹27. Overtime wages is to be calculated as under: (1) Up-to one hour per day at single rate and over one hour per day at double rate or (2) Up-to a total of 4 hours in a week at single rate and over 4 hours in a week at double rate; whichever is beneficial to the worker.

Solution

Analytical Table

Days	Total Number of Hours Worked	Normal Time (Hours)	Total Overtime (Total Number of Hours Worked - Normal Time)	Over Time (Hours)	
				At Single Rate	At Double Rate
Monday	12	8	4	1	3
Tuesday	11	8	3	1	2
Wednesday	09	8	1	1	-
Thursday	08	8	-	-	-
Friday	13	8	5	1	4
Saturday	06	4	2	1	1
	59	44	15	5	10

Calculation of Wages

Option I: Overtime wages up-to one hour per day at single rate and over one hour per day at double rate

	₹
Normal wages for normal working hours (44 × 27)	1,188
Overtime wages for 5 hours at single rate (5 × 27)	135
Overtime wages for 10 hours at double rate (10 × 27 × 2)	540
	1,863

Option II: Overtime wages up-to a total of 4 hours in a week at single rate and over 4 hours in a week at double rate

	₹
Normal wages for normal working hours (44 × 27)	1,188
Overtime wages for first 4 hours at single rate (4 × 27)	108
Overtime wages for balance 11 hours at double rate (11 × 27 × 2)	594
	1,890

Conclusion: Since the wages under option II is higher, it is beneficial to the worker. Hence, the Total wages payable is **₹1,890**

Problem 11 (Problem on Calculation of Total Wages, Including Overtime Wages)

Calculate total wages payable to a worker from the following data:

Normal working hours 8 per day; Normal wage rate ₹25 per hour; Overtime wages (1) Up-to 1 hour per day at single rate and over 1 hour per day at double rate or (2) Up-to 4 hours in a week at single rate and over 4 hours in a week at double rate; whichever is beneficial to the worker.

The number of actual working hours of the worker is as follows:

Days	No. of Hours Worked
Monday	13
Tuesday	10
Wednesday	13
Thursday	08
Friday	12
Saturday	05

Solution

Analytical Table

Days	Total Number of Hours Worked	Normal Time (Hours)	Total Overtime (Total Number of Hours Worked - Normal Time)	Over Time (Hours)	
				At Single Rate	At Double Rate
Monday	13	8	5	1	4
Tuesday	10	8	2	1	1
Wednesday	13	8	5	1	4
Thursday	08	8	-	-	-
Friday	12	8	4	1	3
Saturday	05	4	1	1	-
	61	44	17	5	12

Calculation of Wages

Option I: Overtime wages up-to one hour per day at single rate and over one hour per day at double rate

	₹
Normal wages for normal working hours (44 × 25)	1,100
Overtime wages for 5 hours at single rate (5 × 25)	125
Overtime wages for 10 hours at double rate (12 × 25 × 2)	600
	1,825

Option II: Overtime wages up-to a total of 4 hours in a week at single rate and over 4 hours in a week at double rate

	₹
Normal wages for normal working hours (44 × 27)	1,100
Overtime wages for first 4 hours at single rate (4 × 27)	100
Overtime wages for balance 11 hours at double rate (11 × 27 × 2)	650
	1,850

Conclusion: Since the wages under option II is higher, it is more beneficial to the worker. Hence, the Total wages payable is **₹1,850.**

Problem 12 (Problem on Calculation of Total Wages, Including Overtime Wages)

From the following details calculate total wages payable to a worker.

Days	No. of Hours Worked
Monday	08
Tuesday	10
Wednesday	09
Thursday	11
Friday	09
Saturday	04

Normal working hours in a week is 44 hours (i.e., 8 hours per day except on Saturday where the normal working hours is 4 hours). Labour cost per normal hour is ₹100. Overtime wages is to be calculated as under: (1) Up-to one hour per day at single rate and over one hour per day at double rate or (2) Up-to a total of 4 hours in a week at single rate and over 4 hours in a week at double rate; whichever is beneficial to the worker.

Solution

Analytical Table

Days	Total Number of Hours Worked	Normal Time (Hours)	Total Overtime (Total Number of Hours Worked - Normal Time)	Over Time (Hours)	
				At Single Rate	At Double Rate
Monday	08	8	-	-	-
Tuesday	10	8	2	1	1
Wednesday	09	8	1	1	-
Thursday	11	8	3	1	2
Friday	09	8	1	1	-
Saturday	04	4	-	-	-
	51	44	7	4	3

Calculation of Wages

Option I: Overtime wages up-to one hour per day at single rate and over one hour per day at double rate

	₹
Normal wages for normal working hours (44 × 100)	4,400
Overtime wages for 5 hours at single rate (4 × 100)	400
Overtime wages for 10 hours at double rate (3 × 100 × 2)	600
	5,400

Option II: Overtime wages up-to a total of 4 hours in a week at single rate and over 4 hours in a week at double rate

	₹
Normal wages for normal working hours (44 × 100)	4,400
Overtime wages for 5 hours at single rate (4 × 100)	400
Overtime wages for 10 hours at double rate (3 × 100 × 2)	600
	5,400

Conclusion: Since the wages under options I and II both are same, the Total wages payable is **₹5,400.**

Problems on Wages and Incentive Systems

Problem 13 (Problem on Calculation of Wages Under Straight Piece Rate System and Taylor's Differential Piece Rate System)

Calculate the earnings of Mr. A and Mr. B on Straight Piece Rate System and Taylor's Differential Piece Rate System.

(a) Standard production 8 units per hour
(b) Normal piece rate ₹20 per unit
(c) Differential piece rate to be applied:
  (i) 80% of piece rate below standard and
  (ii) 120% of piece rate at or above standard.

In a day of 9 hours, Mr. A produces 56 units and Mr. B produce 76 units.

[*BU BBM, May (2014)*]

Solution

Calculation of Earnings of Mr. A and Mr. B

		Mr. A	Mr. B
I	Under Straight Piece Rate System (No. of Units Produced × Piece Rate)	56 × 20 = ₹1,120	76 × 20 = ₹1,520
II	Under Taylor's Differential Piece Rate System (No. of Units Produced × Differential Piece Rate)	56×16^{1} = ₹896	76×24^{2} = ₹1,824

Notes:

1. Standard production per day is 72 units (i.e., 8 units per hour × 9 hours). Mr. A has produced only 56 units in a day. Hence his performance is below standard. He will be paid at the rate of 80% of piece rate. Therefore, the Taylor's differential piece rate applicable for Mr. A is **₹16 per unit** (i.e., ₹20 per unit × 80%)

2. Standard production per day is 72 units (i.e., 8 units per hour × 9 hours). Mr. B has produced 76 units in a day. Hence his performance is above standard. He will be paid at the rate of 120% of piece rate. Therefore, the Taylor's differential piece rate applicable for Mr. B is **₹24 per unit** (i.e., ₹20 per unit × 120%).

Problem 14 (Problem on Calculation of Wages Under Straight Piece Rate System and Taylor's Differential Piece Rate System)

Calculate the earnings of Mr. A and Mr. B on Straight Piece Rate System and Taylor's Differential Piece Rate System.

(a) Standard production 8 units per hour
(b) Normal time rate ₹80 per hour
(c) Differential piece rate to be applied:
  (i) 80% of piece rate below standard and
  (ii) 120% of piece rate at or above standard.

In a day of 9 hours, Mr. A produces 70 units and Mr. B produce 75 units.

Solution

In this problem, normal piece rate is not given. However, normal time rate and normal production per hour are given. Hence, normal piece rate may be calculated as follows:

$$\text{Normal piece rate} = \frac{\text{Normal time rate}}{\text{Normal (or Standard) production}}$$

$$= \frac{₹80 \text{ per hour}}{8 \text{ units per hour}} = \textbf{₹10 per unit}$$

Calculation of Earnings of Mr. A and Mr. B

		Mr. A	Mr. B
I	Under Straight Piece Rate System (No. of Units Produced × Piece Rate)	70 × 10 = ₹700	75 × 20 = ₹750
II	Under Taylor's Differential Piece Rate System (No. of Units Produced × Differential Piece Rate)	70 × 8[1] = ₹560	75 × 12[2] = ₹900

Notes:

1. Standard production per day is 72 units (i.e., 8 units per hour × 9 hours). Mr. A has produced only 70 units in a day. Hence his performance is below standard. He will be paid at the rate of 80% of piece rate. Therefore, the Taylor's differential piece rate applicable for Mr. A is **₹8 per unit** (i.e., ₹10 per unit × 80%).
2. Standard production per day is 72 units (i.e., 8 units per hour × 9 hours). Mr. B has produced 75 units in a day. Hence his performance is above standard. He will be paid at the rate of 120% of piece rate. Therefore, the Taylor's differential piece rate applicable for Mr. B is **₹12 per unit** (i.e., ₹10 per unit × 120%).

Problem 15 (Problem on Calculation of Wages Under Straight Piece Rate System, Flat Time Rate System and Taylor's Differential Piece Rate System)

Following details are available with respect to a job performed by two workers Mr. A and Mr. B. You are required to calculate earnings of Mr. A and Mr. B under Straight Piece Rate System, Taylor's Differential Piece Rate System and Flat Time Rate System.

(a) Time rate ₹24 per hour
(b) Standard time per unit 30 seconds
(c) Normal time per day 8 hours

(d) Production per day Mr. A 950 units and Mr. B 1,200 units.
(e) Differential piece rate to be applied:
  (i) 80% of piece rate below standard and
  (ii) 120% of piece rate at or above standard

Solution

In this problem, normal piece rate is not given. However, normal time rate and normal (or standard) time per unit is given.
Standard production for 1 hour is calculated as follows:
Standard production for 30 seconds (i.e., 0.5 of a minute) is 1 unit.
So, Standard production for 1 hour (i.e., 60 minutes) is 120 units
Hence, normal piece rate may be calculated as follows:

$$\text{Normal piece rate} = \frac{\text{Normal time rate}}{\text{Normal (or Standard) production}}$$

$$= \frac{₹24 \text{ per hour}}{120 \text{ units per hour}} = \textbf{₹0.20 per unit}$$

Calculation of Earnings of Mr. A and Mr. B

		Mr. A	Mr. B
I	Under Straight Piece Rate System (No. of Units Produced × Piece Rate)	950 × 0.20 = ₹190	1,200 × 0.20 = ₹240
II	Under Taylor's Differential Piece Rate System (No. of Units Produced × Differential Piece Rate)	950 × 0.16[1] = ₹152	1,200 × 0.24[2] = ₹288
III	Under Flat Time Rate System (No. of Hours Worked × Hourly Rate)	8 × 24 = ₹192	8 × 24 = ₹192

Notes:

1. Standard production per day is 960 units (i.e., 120 units per hour × 8 hours). Mr. A has produced only 950 units in a day. Hence his performance is below standard. He will be paid at the rate of 80% of piece rate. Therefore, the Taylor's differential piece rate applicable for Mr. A is **₹0.16 per unit** (i.e., ₹0.20 per unit × 80%)
2. Standard production per day is 960 units (i.e., 120 units per hour × 8 hours). Mr. B has produced 1,200 units in a day. Hence his performance is above standard. He will be paid at the rate of 120% of piece rate. Therefore, the Taylor's differential piece rate applicable for Mr. B is **₹0.24 per unit** (i.e., ₹0.20 per unit × 120%).

Problem 16 (Problem on Calculation of Wages Under Straight Piece Rate System, Taylor's Differential Piece Rate System and Merrick's Multiple Piece Rate System)

Following particulars are available with respect to the performance of three workers Mr. A, Mr. B and Mr. C. You are required to calculate the wages of these workers under Straight Piece Rate System, Taylor's Differential Piece Rate System and Merrick's Multiple Piece Rate System.
(a) Normal piece rate ₹12 per piece
(b) Standard production 960 units
(c) Actual production: Mr. A 970 units; Mr. B 950 units and Mr. C 790 units.

Solution

Calculation of Earnings of Mr. A, Mr. B and Mr. C

		Mr. A	Mr. B	Mr. C
I	Under Straight Piece Rate System Earnings = (No. of Units Produced × Piece Rate)	970 × 12 = ₹11,640	950 × 12 = ₹11,400	790 × 12 = ₹9,480
II	Under Taylor's Differential Piece Rate System Earnings = (No. of Units Produced × Differential Piece Rate)	970 × 14.40[1] = ₹13,968	950 × 9.60[2] = ₹9,120	790 × 9.60[2] = ₹7,584
III	Under Merrick's Multiple Piece Rate System Earnings = (No. of Units produced × Differential Piece Rate)	970 × 14.40[3] = ₹13,968	950 × 13.20[4] = ₹12,540	790 × 12[5] = ₹9,480

Notes:

1. Standard production per day is 960 units. Mr. A has produced 970 units in a day. Hence his performance is above standard. He will be paid at the rate of 120% of piece rate. Therefore, the Taylor's differential piece rate applicable for Mr. A is **₹14.40 per unit** (i.e., ₹12 per unit × 120%)
2. Standard production per day is 960 units. Mr. B and Mr. C have produced 950 units and 790 units in a day. Hence their performance is below standard. They will be paid at the rate of 80% of piece rate. Therefore, the Taylor's Differential Piece Rate applicable for Mr. B and Mr. C is **₹9.6 per unit** (i.e., ₹12 per unit × 80%).
3. Standard production per day is 960 units. Mr. A has produced 970 units in a day. His performance rate is 101.04% {i.e., $\left(\frac{970}{960}\right) \times 100$. Since the rate of performance lies at or above 100%, the Merrick's Multiple Piece Rate applicable for Mr. A is **₹14.40 per unit** (i.e., ₹12 per unit × 120%).
4. Standard production per day is 960 units. Mr. B has produced 950 units in a day. His performance rate is 98.95% {i.e., $\left(\frac{950}{960}\right) \times 100$. Since the rate of performance lies above 83.33% but below 100%, the Merrick's Multiple Piece Rate applicable for Mr. B is **₹13.20 per unit** (i.e., ₹12 per unit × 110%).
5. Standard production per day is 960 units. Mr. B has produced 790 units in a day. His performance rate is 82.29% {i.e., $\left(\frac{790}{960}\right) \times 100$. Since the rate of performance lies below 83.33%, the Merrick's Multiple Piece Rate applicable for Mr. B is normal piece rate **₹12 per unit**.

Problem 17 (Problem on Calculation of Wages Under Time Rate System, Piece Rate System, Halsey Plan and Rowan Plan)

From the following information, calculate the total earnings of a worker under Time Rate System, Piece Rate System, Halsey Plan and Rowan Plan.

(a) Wage rate per hour ₹20
(b) DA per hour ₹10
(c) Standard hours 80
(d) Actual time taken 50 hours.

Solution

In this problem number of units produced and rate per unit is not given. Hence standard hours shall be assumed as number of units produced and time rate shall be assumed as piece rate.
Thus earnings under piece rate system will be Standard hours × Time rate.

	Wage System	Total Wages (₹)
I	Time Rate System Earnings = (Time taken × Rate per hour)	50 hours × (₹20 + ₹10) = **₹1,500**
II	Piece Rate System Earnings = (Standard hours × Time rate)	80 hours × (₹20 + ₹10) = **₹2,400**
III	Halsey Plan Total Earnings = (Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)	(50 hours × ₹30) + [50% of (80 hours – 50 hours) × ₹30] = ₹1,500 + ₹450 = **₹1,950**
IV	Rowan Plan Total Earnings = (Time Taken × Time Rate) + (Time Taken × Time Rate × Time Saved/Standard Time)	(50 hours × ₹30) + (50 hours × ₹30) × [(80 hours – 50 hours)/80 hours] = ₹1,500 + ₹562.50 = **₹2062.50**

Problem 18 (Problem on Calculation of Wages Under Halsey Plan and Rowan Plan)

From the following information calculate the total earnings and effective rate of earnings of two workers Mr. A and Mr. B under Halsey Plan and Rowan Plan.

(a) Standard time for producing 100 articles 50 hours
(b) Wage rate ₹15 per hour
(c) Actual time taken for producing 100 articles – Mr. A 42 hours; Mr. B 32 hours.

Solution

Calculation of Total Earnings and Effective Rate of Earnings:

	Incentive Plan	Total Earnings (₹)	Effective Rate of Earnings per Hour (Total Earnings/Time Taken) (₹)
I	Halsey Plan Total Earnings = (Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)	**For Mr. A** (42 hours × ₹15) + [50% of (50 hours – 42 hours) × ₹15] = ₹630 + ₹60 = **₹690** **For Mr. B** (32 hours × ₹15) + [50% of (50 hours – 32 hours) × ₹15] = ₹480 + ₹135 = **₹615**	**For Mr. A** ₹690/42 hours = **₹16.428** **For Mr. B** ₹615/32 hours = **₹19.218**
II	Rowan Plan Total Earnings = (Time Taken × Time Rate) + (Time Taken × Time Rate × Time Saved/Standard Time)	**For Mr. A** (42 hours × ₹15) + [(42 hours × ₹15) × [(50 hours – 42 hours)/50 hours] = ₹630 + ₹100.80 = **₹730.80** **For Mr. B** (32 hours × ₹15) + (32 Hours × ₹15) × [(50 hours – 32 hours)/50 hours] = ₹480 + ₹172.80 = **₹652.80**	**For Mr. A** ₹730.80/42 hours = **₹17.40** **For Mr. B** ₹652.80/32 hours = **₹20.40**

Problem 19 (Problem on Calculation of Wages Under Halsey Plan and Rowan Plan)

From the following data calculate the total earnings and effective rate of earnings of a worker under Halsey Plan and Rowan Plan.

(a) Standard time 48 hours
(b) Time rate ₹20 per hour
(c) Actual time taken 40 hours

Solution

Calculation of Total Earnings and Effective Rate of Earnings

	Incentive Plan	Total Earnings (₹)	Effective Rate of Earnings per Hour (Total Earnings/ Time Taken) (₹)
I	Halsey Plan Total Earnings = (Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)	(40 hours × ₹20) + [50% of (48 hours – 40 hours) × ₹20] = ₹800 + ₹80 = **₹880**	₹880/40 hours = **₹22**
II	Rowan Plan Total Earnings = (Time Taken × Time Rate) + (Time Taken × Time Rate × Time Saved/Standard Time)	(40 hours × ₹20) + (40 hours × ₹20) × [(48 hours – 40 hours)/48 hours] = ₹800 + ₹133.36 = **₹933.36**	₹933.36/40 hours = **₹23.33**

Problem 20 (Problem on Calculation of Wages Under Halsey Plan and Rowan Plan)

From the following information calculate the total earnings and effective rate of earnings of a worker under Halsey Plan and Rowan Plan.

(a) Standard time per unit 30 minutes
(b) Time rate per hour ₹24
(c) Time worked 18 hours
(d) Actual output obtained 48 units

Solution

In this problem Standard Time per unit is given but Standard Time for producing 48 units is not given. It is arrived at as follows:

Standard time for 1 unit = 30 minutes (i.e., 0.5 Hours)

Therefore, to produce 48 units standard time required will be $\frac{48}{0.5}$ = 24 Hours.

	Incentive Plan	Total Earnings (₹)	Effective Rate of Earnings per Hour (Total Earnings/Time Taken) (₹)
I	Halsey Plan (Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)	(18 hours × ₹24) + [50% of (24 hours – 18 hours) × ₹24] = ₹432 + ₹72 = **₹504**	₹504/18 hours = **₹28**

	Incentive Plan	Total Earnings (₹)	Effective Rate of Earnings per Hour (Total Earnings/Time Taken) (₹)
II	Rowan Plan Total Earnings = (Time Taken × Time Rate) + (Time Taken × Time Rate × Time Saved/Standard Time)	(18 hours × ₹24) + (18 hours × ₹24) × [(24 hours – 18 hours)/24 hours] = ₹432 + ₹108 = **₹540**	₹540/18 hours = **₹30**

Problem 21 (Problem on Calculation of Wages Under Rowan Plan)

A worker is allowed 10 hours to complete a job. His hourly rate is ₹16. He gets ₹12 as bonus under Halsey Plan. Calculate his earnings under Rowan Plan.

Solution

In this problem, bonus received by the employee under Halsey Plan is given as ₹12 but actual time taken or actual time saved is not given. Actual time saved can be calculated as under:

Under Halsey Plan, Bonus is calculated as $\left(\frac{\text{Time Saved} \times \text{Time Rate} \times 50}{100}\right)$

Bonus received by the worker is ₹12.

So, $\left(\frac{\text{Time Saved} \times \text{Time Rate} \times 50}{100}\right) = ₹12$

That is, $\left(\frac{\text{Time Saved} \times ₹16 \times 50}{100}\right) = ₹12$

Time Saved × ₹8 = ₹12

So, Time Saved = $\frac{₹12}{₹8}$ = **1.5 hours**

Standard Time was 10 hours, Time saved is 1.5 hours. So, Time taken is 10 – 1.5 = **8.5 hours**

Calculation of earnings under Rowan Plan

Total Earnings = (Time Taken × Time Rate) + $\left(\frac{\text{Time Taken} \times \text{Time Rate} \times \text{Time Saved}}{\text{Standard Time}}\right)$

= (8.5 hours × ₹16) + $\left(\frac{8.5 \text{ hours} \times ₹16 \times 1.5 \text{ hours}}{10 \text{ hours}}\right)$

= ₹136 + ₹20.40 = **₹156.40**

Problem 22 (Problem on Calculation of Wages Under Halsey Plan and Rowan Plan)

The details of a job performed by three workers Mr. A, Mr. B and Mr. C are as under. You are required to calculate the total earnings of each worker, effective rate per hour for each worker.

(a) Time allowed 30 hours
(b) Hourly rate ₹18
(c) Time taken- Mr. A 30 hours; Mr. B 20 hours and Mr. C 14 hours.

Solution

Calculation of Total Earnings and Effective Rate of Earnings

	Incentive Plan	Total Earnings (₹)	Effective Rate of Earnings per Hour (Total Earnings/Time Taken) (₹)
I	Halsey Plan Total Earnings = (Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)	**For Mr. A** (30 hours × ₹18) + [50% of (30 hours – 30 hours) × ₹18] = ₹540 + ₹0 = **₹540** **For Mr. B** (20 hours × ₹18) + [50% of (30 hours – 20 hours) × ₹18] = ₹360 + ₹90 = **₹450** **For Mr. C** (14 hours × ₹18) + [50% of (30 hours – 14 hours) × ₹18] = ₹252 + ₹144 = **₹396**	**For Mr. A** ₹540/30 hours = **₹18** **For Mr. B** ₹450/20 hours = **₹22.50** **For Mr. C** ₹396/14 hours = **₹28.29**
II	Rowan Plan Total Earnings = (Time Taken × Time Rate) + (Time Taken × Time Rate × Time Saved/Standard Time)	**For Mr. A** (30 hours × ₹18) + (30 hours × ₹18) × [(30 hours – 30 hours)/30 hours] = ₹540 + ₹0 = **₹540** **For Mr. B** (20 hours × ₹18) + (20 hours × ₹18) × [(30 hours – 20 hours)/30 hours] = ₹360 + ₹120 = **₹480** **For Mr. C** (14 hours × ₹18) + (14 hours × ₹18) × [(30 hours – 14 hours)/30 hours] = ₹252 + ₹134.40 = **₹386.40**	**For Mr. A** ₹540/30 hours = **₹18** **For Mr. B** ₹480/20 hours = **₹24.00** **For Mr. C** ₹386.40/14 hours = **₹27.60**

Problem 23 (Problem on Calculation of Wages Under Time Rate System, Halsey Plan and Rowan Plan)

A worker's wages for a guaranteed 44 hours a week is ₹25 per hour. The estimated time to produce one unit is 30 minutes and under an incentive plan, the time allowed is increased by 20%. During a week, a worker produced 100 units. Calculate the wages under the following methods:

(a) Time Rate System
(b) Halsey Plan and
(c) Rowan Plan.

[*BU BBM, May 2013, B.Com, May (2014)*]

Solution

In this problem, standard time per unit is given. Standard time per week is calculated as under:

Standard time per unit	= 30 minutes
Add: Extra time allowed under incentive plan at 20%	= 6 minutes
Total time allowed under incentive plan	= 36 minutes per unit

Therefore, Standard time for producing 100 units is 3,600 minutes or 60 hours.

Calculation of Wages

	Wage System	Total Wages
I	Time Rate System Total Earnings = (Time taken × Rate per hour)	= 44 hours × ₹25 = **₹1,100**
II	Halsey Plan Total Earnings = (Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)	= (44 hours × ₹25) + [50% of (60 hours – 44 hours) × ₹25] = ₹1,100 + ₹200 = **₹1,300**
III	Rowan Plan Total Earnings = (Time Taken × Time Rate) + (Time Taken × Time Rate × Time Saved/Standard Time)	(44 hours × ₹25) + (44 hours × ₹25) × [(60 hours – 44 hours)/60 hours] = ₹1,100 + ₹293.33 = **₹1,393.33**

Problem 24 (Problem on Calculation of Wages Under Halsey Plan and Rowan Plan)

SK Ltd. has a factory in Bengaluru. It produces a standard product. Presently, only male workers are engaged in the production department. As there is an acute shortage of male workers, it is now proposed to employ female workers in addition to or replacement of the male labour force.

The standard time allowed in case of male worker is 8 hours per unit and the rate of pay is ₹40 per hour plus a bonus based on the Rowan Premium Plan. In a test period, it was found that a male worker takes 6 hours to produce one unit.

The standard time allowed in case of female worker is 10 hours per unit and the rate of pay is ₹30 per hour plus a bonus based on the Rowan Premium Plan. In a test period, it was found that a female worker takes 9 hours to produce one unit.

You are required to calculate the labour cost per unit, if it is made by (a) Male worker and (b) Female worker. If 600 male workers are required to produce the number of units required to meet the estimated monthly demand, how many female workers would be required to produce the same number of units in the same time, if all the male workers are replaced by female workers.

Solution

Calculation of Labour Cost Per Unit

Particulars	Male Worker	Female Worker
Standard time allowed	8	10
Actual time taken	6	9
Time saved	2	1
Wage rate per hour	₹40	₹30
Total wages (Time taken × Wage Rate per hour) (₹)	₹240	₹270
Bonus under Rowan Premium Plan (See Note)	₹60	₹27
Total Labour Cost (Total wages + Bonus)	₹300	₹297

Note: Calculation of Bonus under Rowan Premium Plan

$$\text{Bonus} = \left(\frac{\text{Time Taken} \times \text{Rate per hour} \times \text{Time Saved}}{\text{Standard Time}}\right)$$

(a) Male Worker:

$$\left(\frac{6 \text{ hours} \times ₹40 \times 2 \text{ hours}}{8 \text{ hours}}\right) = ₹60$$

(b) Female Worker:

$$\left(\frac{9 \text{ hours} \times ₹30 \times 1 \text{ hour}}{10 \text{ hours}}\right) = ₹27$$

Calculation of number of female workers required to replace male workers:

One male worker takes 6 hours to produce one unit, whereas one female worker takes 9 hours to produce one unit. Therefore, in terms of production capacity based on time taken, 1.5 female workers are equal to 1 male worker (i.e., $\frac{9 \text{ hours}}{6 \text{ hours}}$)

So, for replacing 600 male workers, the number of female workers required would be **900** (i.e., 600×1.5).

SUMMARY

- 'Labour' refers to the manpower engaged in manufacture or processing of finished goods. They refer to those engaged in converting raw material into finished goods and further processing until they are ready for sale.
- Labour are of two types viz., Direct Labour and Indirect Labour
- 'Direct Labour' or Operating Labour or Productive Labour refers to those who are directly engaged in the production process like foremen, machine operators etc. 'Indirect Labour' refers to those who are not directly engaged in the production process like packers, loaders, cleaners etc.
- 'Labour cost' refers to the payment made to the labour force of the organisation. It is the payment made to employees, permanent or temporary, for their services.
- Labour cost includes Monetary Wages and Non-monetary Wages and are of two types viz., Direct Labour Cost and Indirect Labour Cost.
- Labour cost control means control over cost incurred on labour. Control over labour costs does not imply control over the size of the wage bill and it also does not imply that wages of each worker should be kept as low as possible. It means aiming to keep the wages cost per unit of output as low as possible.
- Scope of Labour Cost Control
- Departments involved in control of labour costs.
- Time Analysis – Time and Motion Study.
- Time Keeping and Time Booking.
- Pay-roll Procedure.
- Idle-time and Overtime.
- Labour Turnover.
- Wage and Incentive Systems.
- Job Evaluation and Merit Rating.
- Labour Productivity.
- The Departments involved in control of labour costs are – Personnel Department, Engineering and Works Study Department, Time-Keeping Department, Pay-roll Department and Cost Accounting Department.

- Time Analysis or Work Study is a technique of cost reduction, which seeks to reduce labour cost by reducing unnecessary movements during the course of work and by determining the standard time to be spent on a job. It is conducted by carrying out Time Study and Motion Study.
- Time Study refers to "a work measurement technique consisting of careful time measurement of the task with a time measuring instrument, adjusted for any observed variance from normal effort or pace and to allow adequate time for such items as foreign elements, unavoidable or machine delays, rest to overcome fatigue, and personal needs." Time study is undertaken to determine the standard time required to carry out a job more efficiently.
- Motion study is the study of the motions or movements made by the workers with the object of eliminating unnecessary motions or movements and simplifying the method of doing the work.
- Time-keeping means keeping a record of the total time spent by a worker inside a factory. It refers to correct recording of the employees' attendance time. Time-keeping can be carried out by various methods which are broadly classified into manual methods and mechanical methods.
- Time-booking means analyzing the total time spent on various jobs for each day and each employee.
- Pay-roll Procedures involves the following steps: Gathering Attendance and Time details, Collating List of employees and other details, Computation of wages and other incentives, Payment to employees and deposit of all statutory liabilities.
- Idle time refers to unproductive time. It is the time during which no production is carried out because the workers remain idle even though payment is made. Idle time is total time (as per time keeping records) *minus* Productive time (as per time booking records). Idle time is of two types – normal idle time and abnormal idle time.
- Work done beyond normal working hours is called overtime work
- 'Labour turnover' in an organisation is the rate of change in the composition of labour force during a specified period measured against suitable index. It is expressed as a percentage.
- Labour turnover is associated with two types of costs viz., Preventive Cost and Replacement Cost.
- Remedial steps for minimizing labour turnover include Exit interviews, Job Analysis and Evaluation, Scientific System of Recruitment, Placement or Promotion and Enlightened Attitude of Management.
- Different systems of wage payment and incentives for the labour force exist, and all such systems are classified as Time Rate Systems, Payment by Results and Profit-sharing and Co-partnership Schemes.
- Time Rate Systems include Simple Time Rate System, High Wage Plan, Measured Day Work, and Differential Time Rate.
- Payment by Results include **Piece Work System** comprising of Straight Piece Rate, Differential Piece Rate (Taylor System, Merrick System) , **Combination of Time and Piece Work** comprising of Gantt Task and Bonus System, Emerson's Efficiency System and Points Scheme (Bedaux System, Haynes System, Accelerated Premium System) and **Premium Bonus Methods** comprising of Halsey System, Halsey Weir System, Rowan System Barth system.
- Profit-sharing and Co-partnership Schemes include Group System of Wage Payment and System Incentive Schemes for Indirect Workers.
- Job evaluation' is a process by which the following aspects of a job are analyzed and evaluated-
  - ✓ Nature and importance of tasks to be performed.
  - ✓ Skill requirements of job holder like technical background, experience etc.
  - ✓ Responsibilities of the job holder, superior-subordinate reporting relationships, etc.
  - ✓ Importance of the job in relation to other jobs.
- 'Merit Rating' is the systematic evaluation of the performance of each employee. Performance Evaluation i.e., Merit Rating may be done by the supervisor or any other authorized person.
- 'Labour productivity' refers to the ability of labour force in generating output. It is an index of efficiency of workers.

SNAPSHOT OF FORMULAE

Measurement of Labour Turnover

Calculation of Labour Turnover Rate when there is no expansion:

Separation Method:

$$\textbf{Labour Turnover Rate} = \frac{S}{L}$$

Where,

S = Number of employees separated (i.e., left or discharged) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of Employees at the beginning of the period} + \text{Number of Employees at the end of the period}]}{2}$$

Replacement Method:

$$\textbf{Labour Turnover Rate} = \frac{R}{L}$$

Where,

R = Number of employees replaced (i.e., substituted) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of Employees at the beginning of the period} + \text{Number of Employees at the end of the period}]}{2}$$

Flux Method or Mixed Method:

$$\textbf{Labour Turnover Rate} = \frac{(S + R)}{L}$$

Where,

S = Number of employees separated (i.e., left or discharged) during the period.

R = Number of employees replaced (i.e., substituted) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of Employees at the beginning of the period} + \text{Number of Employees at the end of the period}]}{2}$$

Calculation of Labour Turnover Rate when there is expansion:

Separation Method:

$$\textbf{Labour Turnover Rate} = \frac{S}{L}$$

Where,

S = Number of employees separated (i.e., left or discharged) during the period.

$$L = \text{Average Labour Force} = \frac{[\text{Number of Employees at the beginning of the period} + \text{Number of Employees at the end of the period}]}{2}$$

Accession Method:

$$\textbf{Labour Turnover Rate} = \frac{\mathbf{A}}{\mathbf{L}}$$

Where,

A = Number of accessions during the period = Number of employees replaced during the period + Number of employees newly recruited during the period

Or,

A = [Number of employees at the end of the period *plus* Number of separations during the period *minus* Number of employees at the beginning of the period]

$$\text{L = Average Labour Force} = \frac{\text{[Number of Employees at the beginning of the period + Number of Employees at the end of the period]}}{2}$$

Flux Method:

$$\textbf{Labour Turnover Rate} = \frac{\mathbf{S + A}}{\mathbf{L}}$$

Where,

S = Number of employees separated (i.e., left or discharged) during the period.

A = Number of accessions during the period = Number of employees replaced during the period + Number of employees newly recruited during the period

Or,

A = [Number of employees at the end of the period *plus* Number of separations during the period *minus* Number of employees at the beginning of the period]

$$\text{L = Average Labour Force} = \frac{\text{[Number of Employees at the beginning of the period + Number of Employees at the end of the period]}}{2}$$

$$\text{L = Average Labour Force} = \frac{\text{[Number of Employees at the beginning of the period + Number of Employees at the end of the period]}}{2}$$

Note: Where the period for which employee data is given, is not annual – then the labour turnover rate must be annualized using the following formula:

$$\left(\frac{\text{Labour Turnover Rate}}{\text{No. of days in the given period}}\right) \times 365$$

Wage and Incentive System

Differential Time Rate Method:

Let N denote Normal Rate Per Hour

Then, differential time rate is fixed as follows:

Level of Efficiency	Wage Rate per hour
Up to 75%	N
76% to 80%	1.1 × N
81% to 90%	1.2 × N
91% to 100%	1.3 × N
Above 100%	1.4 × N

Straight Piece Rate System:

Wages = Number of units produced × Piece Rate per unit

Taylor's Differential Piece Rate System:

Less than 100% level of Efficiency — 83.33% of Normal Piece Rate

100% or more than 100% level of Efficiency — 125% of Normal Piece Rate

Merrick's Differential Piece Rate System:

Level of Efficiency	Rate per Piece
Up to 83.33%	Normal Piece Rate
83.33% to 100%	1.1 × Normal Piece Rate
Above 100%	1.2 (or) 1.3 × Normal Piece Rate

Gantt Task and Bonus System:

Output	Wage Rate
Output below Standard	Guaranteed Time Rate
Output at Standard	1.2 × Time Rate
Output above Standard	High Piece Rate (inclusive of bonus)

Emersons's Efficiency System:

Level of Efficiency	Wage Rate
Up to 66.67%	Guaranteed Time Rate
66.67% to 100%	Time Rate + Bonus ranging from 0.01% to 20% of time rate, based on actual efficiency
Above 100%	1.2 × Time Rate + 1% of Time Rate for every 1% increase in efficiency above 100%

Points Scheme or Bedaux System:

Wages for a worker = Basic Wages + Bonus.

Basic Wages = Hours Worked × Rate per Hour.

Bonus = 75% × Points Earned × Rate per Point.

Hayne's System:

Wages for a worker = Basic Wages + Bonus.

Basic Wages = Hours Worked × Rate per Hour.

Bonus is calculated in the following manner:

For Repetitive work – $\frac{5}{6}$ × Points Earned × Rate per Point.

For Non-repetitive work – 50% × Points Earned × Rate per Point.

Halsey Method:

Wages = (Time Taken × Time Rate) + (Time Saved × Time Rate × 50%)

Halsey Weir Method:

Wages = (Time Taken × Time Rate) + (Time Saved × Time Rate × 30%)

Rowan System:

$$\text{Wages} = (\text{Time Taken} \times \text{Time Rate}) + \left(\frac{\text{Time Taken} \times \text{Time Rate} \times \text{Time Saved}}{\text{Standard Time}}\right)$$

Barth System:

$$\text{Wages} = \text{Hourly Rate} \times \sqrt{(\text{Standard Hours} \times \text{Actual Hours worked})}$$

Measurement of Labour Productivity

$$\text{Efficiency} = \frac{\text{Standard Time Allowed for Actual Output}}{\text{Actual Time Taken}}$$

$$\text{Efficiency} = \frac{\text{Actual Output produced}}{\text{Standard Output for Actual Time Worked}}$$

EXERCISES

Section B Type Problems

Problem 1

From the following calculate the earnings of workers A, B and C under Halsey Plan and Rowan scheme of payment.

Worker	A	B	C
Standard time (hours)	3	4	5
Actual (hours)	5	3	4
Basic wages per hour (₹)	2	2	2

[*BU B.Com, May (2017)*]

(Ans: Under Halsey Plan- A ₹10, B ₹8 and C ₹10; Under Rowan Plan – A ₹10, B ₹7.50 and C ₹9.60)

Problem 2

Standard time allowed for a job is 30 hours at the rate of ₹100 per hour. Actual time saved by a worker is 5 hours. Calculate the earning under Halsey system and Rowan system.

[*BU B.Com, May (2016)*]

(Ans: ₹2750 and ₹2916.67)

Problem 3

Following information is available with respect to a particular type of labour

(a) Monthly salary
  (i) Basic pay ₹2,000
  (ii) Dearness Allowance (DA)75% of Basic Pay
(b) House rent allowance ₹400 per month
(c) Leave salary earned ₹3,500
(d) City Compensatory Allowance ₹200 per month
(e) Interim relief 10% of Basic + DA
(f) Employer's contribution to PF 5% of Basic + DA

(g) Pro-rata expenses on amenities ₹25 per month
(h) Number of working hours in a month 200

Calculate the cost of labour per day of 8 hours.

[*BU B.Com, May (2015)*]
(Ans: Labour cost per month – ₹8150, per day of 8 hours – ₹326)

Problem 4

Calculate wages under Halsey Plan (50%)
Wage rate per hour ₹40
Standard time 110 hours
Time taken 80 hours

[BU BBM, May (2015), B.Com, May (2011)]
(Ans: ₹3800)

Problem 5

A worker produced 200 units in a week's time. The guaranteed weekly wage payment for 45 hours is ₹81. The expected time to produce one unit is 15 minutes which is raised further by 20% under the incentive scheme. What will be earnings per hour of that worker under Halsey (50% sharing) and Rowan bonus schemes?

[*BU BBM, May (2015)*]
(Ans: Under Halsey Plan – ₹94.50 and Under Rowan Plan – ₹101.25)
(Hint: Standard Time is 60 hours)

Problem 6

A worker works with a 44 hours guaranteed wages. Rate per hour is ₹50. Time allowed to produce one unit is 30 minutes and under incentive scheme, time allowed to produce one unit is increased by 20%. During a week the worker produces 100 units. Calculate the wages of the worker under Halsey Plan (50 : 50) and Rowan Plan.

[*BU B.Com, May (2014)*]
(Ans: Under Halsey Plan – ₹2600 and Under Rowan Plan – ₹2786.67)
(Hint: Standard Time is 60 hours)

Problem 7

Ram's wages for a guaranteed 44 hours a week is ₹20 per hour. The estimated time to produce an article is 30 minutes. During one week, Ram manufactured 100 articles. Calculate his wages under (a) Halsey premium plan and (b) Rowan premium plan.

[BU B.Com, May (2014), May (2013) (modified)]
(Ans: Under Halsey Plan – ₹940 and Under Rowan Plan – ₹985.60)
(Hint: Standard Time is 50 hours)

Problem 8

On the basis of following information, calculate the earnings of a worker on – (i) Straight piece basis and (ii) Taylor's differential piece rate system
Standard production 8 units per hour
Normal time rate ₹4 per hour
Differentials to be applied:
(a) 80% of piece rate below standard
(b) 120% of piece rate above standard

In a 9 hour day the worker produced 54 units.

[*BU B.Com, May (2014)*]
[Ans: (i) ₹27 and (ii) ₹21.60]

Problem 9

Calculate the wages due to a worker under Halsey plan and Rowan plan from the following details:
Standard time 9 hours
Time taken 6 hours
Normal rate ₹0.75 per hour

[*BU B.Com, May (2014)*]
(Ans: Under Halsey Plan – ₹5.625 and Under Rowan Plan – ₹5.25)

Problem 10

Mr. A works in a factory where the following particular apply:

Normal rate per hour	₹1.50
Normal piece rate	20% more of time rate
Expected output	20 units per hour.

Mr. A produces 157 units in an 8-hour day. Calculate his wages for the day on (i) Time Basis and (ii) Piece Basis.

[*BU BBM, May (2011)*]
(Ans: Under Halsey Plan – ₹5.625 and Under Rowan Plan – ₹5.25)

Section C Type Problems

Problem 1

From the following you are required to calculate the earnings of a worker for a week under:
(a) Straight piece rate system
(b) Taylor's differential piece rate system
(c) Halsey premium plan and
(d) Rowan premium plan

Weekly working hours	48
Hourly wage rate	₹30
Piece rate per unit	₹12
Normal time allowed per piece	12 minutes
Normal output per week	240 pieces
Actual output for the week	300 pieces

Differential piece rate: 80% of piece rate when output is below normal and 120% of piece rage when output is above normal.

[*BU B.Com, May (2017)*]
[Ans: (a) ₹3600 (b) ₹4,320 (c) ₹1620 (d) ₹1728]
(Hint: For Taylor's System – the performance is above standard; For Halsey and Rowan Systems – Standard time is 60 hours)

Problem 2

From the following particulars, calculate earnings of a worker under:
(i) Straight piece rate
(ii) Differential piece rate

(iii) Halsey bonus plan (50% sharing) and
(iv) Rowan premium scheme

Weekly working hours	40
Piece rate per piece	₹6
Hourly rate of wages	₹15
Normal time taken per piece	20 minutes
Normal output per week	120 pieces
Actual output of the worker per week	150 pieces

Differential piece rate:
(a) 80% of piece rate for output below normal output
(b) 120% of piece rate for output above normal output

[*BU BBM, May (2015), B.Com May (2011)*]
[Ans: (a) ₹900 (b) ₹1,080 (c) ₹675 (d) ₹720]
(Hint: For Taylor's System – the performance is above standard; For Halsey and Rowan Systems – Standard time is 50 hours)

Problem 3

On the basis of the following information, calculate the earnings of worker 'X' and worker 'Y' under:
(a) Taylor's differential piece rate system
(b) Halsey premium plan and
(c) Rowan premium plan

Standard production 10 units per hour
Hourly rate ₹5
Piece rate per unit ₹0.50
Differential piece rate – 80% of piece rate when output is below the standard performance and 110% of piece rate when output is above the standard performance.
Worker 'X' produced 90 units in a day of 10 hours
Worker 'B' produced 120 units in a day of 10 hours

[*BU B.Com, May (2013)*]
[Ans: (a) X – ₹36 and Y – ₹66 (b) X – ₹50 and Y – ₹55 (c) X – ₹50 and Y – ₹53.33)
(Hint: For Taylor's System – the performance is X is below standard and Y is above standard; For Halsey and Rowan Systems – Standard time is 9 hours for X and 12 Hours for Y)

CHAPTER 6

Overhead Cost Control

CHAPTER OUTLINE

6.1 INTRODUCTION

Overheads are the expenditure, which cannot be traced to or identified with any particular cost unit. They are expenses, which are not directly identifiable or allocable to a Cost Object. They include Indirect Materials, Indirect Wages and other Employee Costs and any other Indirect Expenses. Overheads, in short, are sum total of all Indirect Costs. They are also called On-costs.

THEORY QUESTIONS

Section A Type Questions

1. What are Overheads? [*BU BBM, May (2011); B.Com, May (2013), May (2015)*]
2. What is On-cost? [*BU B.Com, May (2016)*]

6.2 CLASSIFICATION OF OVERHEADS

Indirect Costs or On-costs or Overheads, incurred by a business entity, are of different types. The following are the bases on which Overhead Costs are classified:

- On the basis of function
- On the basis of element of cost
- On the basis of controllability
- On the basis of behaviour

The types of Overheads under each criterion are explained as follows:

6.2.1 On the Basis of Function

Following are different types of Overhead Costs, on the basis of the function performed or the function to which they belong:

1. Factory Overheads or Manufacturing Overheads or Production Overheads
2. Office and Administrative Overheads
3. Selling and Distribution Overheads
4. Research and Development Overheads

Factory Overheads

They refer to Indirect Costs incurred for manufacturing or production activity in a factory. They include all Indirect Expenses from procurement of material to the completion of the end-product. Examples of Factory Overheads are: Repairs and Maintenance of Plant, Storage Expenses, Factory Lighting, Factor Power, Factory Water, Depreciation on Factory Building, Depreciation on Plant and Machinery, Insurance of Factory Building, Insurance on Plant and Machinery, Salary paid to workers and supervisors working at the factory (other than wages paid for conversion of raw material into finished goods), Packing Expenses, etc.

Office and Administration Overheads

They refer to the expenses incurred to run and maintain the office, and to administer the business. Examples of Office and Administration Overheads are: Salaries paid to Management Personnel, Accounting Expenses, Audit Expenses, Rent of Office Building and Equipment, Depreciation of Office Building and Equipment, Insurance on Office Building and Equipment, Printing and Stationery, Postage and Telegram, Staff Welfare Expenses, Office Electricity, Office Water Expenses, etc.

Selling and Distribution Overheads

They refer to the expenses incurred to market the goods or services of the entity and to reach the same to customers/clients. Examples of Selling and Distribution Expenses are: Advertisement Expenses, Sales Promotion Expenses, Commission to Sales Personnel, Salaries to Marketing Personnel, Delivery Expenses, Depreciation on Delivery Vehicles, Warehousing Expenses, Secondary Packaging Costs, Transit Insurance, etc.

Research and Development Overheads

They refer to the expenses incurred on conducting research for creation of new products, processes, technologies, and for the improvement of existing products, processes, technologies and systems.

6.2.2 On the Basis of Elements of Cost

Elements of Cost refer to the factors or aspects due to which the cost is incurred. Based on the elements of cost, Overheads are classified into the following:

1. Indirect Material
2. Indirect Labour
3. Indirect Expenses

Indirect Material

It refers to the material, which does not form a part of the finished product. Examples of Indirect Materials are: Stores used in Maintenance of Machinery, like Lubricants, Cotton Waste, etc., Stores used by Service Departments like Power House, Boiler House, Canteen, etc.

Indirect Labour

It refers to the Wages or Salaries paid for all purposes, other than for conversion of raw material into finished goods. Examples of Indirect Labour are: Wages paid for loading and unloading, Wages paid for Maintenance Personnel, Supervisor's Salary, Salary of office staff, Salary of Accountant, Salary of Drivers, Salary of Watchman, Salary and Commission to Salesmen, etc.

Indirect Expenses

They refer to the expenses other than Direct Expenses i.e., expenses that cannot be directly or conveniently allocated to Cost Centres. Examples of Indirect Expenses are: Rent, Rates, Insurance, Depreciation, Advertisement Expenses, etc.

6.2.3 On the Basis of Controllability

On the basis of the ability to control costs, Overheads are classified into the following:

1. Controllable Costs
2. Uncontrollable Costs

Controllable Costs

They are those costs, which can be controlled, managed and reduced by implementation of appropriate policies and systems. Examples of Controllable Costs are: Material Costs, Wages and Salary, Power and Fuel, etc.

Uncontrollable Costs

They are those costs, which cannot be controlled or managed or reduced even with implementation of control measures. Examples of Uncontrollable Costs are: Depreciation, Rates, Insurance, Interest on borrowings, etc.

6.2.4 On the Basis of Behaviour of Costs

Behaviour of costs refers to how cost behaves for a particular change in production. On this basis, Overheads are classified into the following:

1. Fixed Costs
2. Variable Costs
3. Semi-variable Costs

Fixed Cost

It refers to the cost, which remains the same in total, but varies inversely per unit, with production. For example, let us assume that the monthly rent for a factory building is ₹10,000. The Total Rent remains the same each month, irrespective of the quantum of production. However, the Rent per unit will vary inversely with production. For a production of 1 unit in a month, the Rent per unit would be ₹10,000. For a production of 100 units in a month, the Rent per unit would be ₹100. For a production of 1000 units in a month, the Rent per unit would be ₹10 and so on.

Variable Cost

It refers to the cost, which remains the same per unit, but the total varies proportionately with the production or sales. For example, let us assume that the Raw Material Requirement per unit of a finished product is 2 kg and each kilogram costs ₹5. So, the Per-unit Raw Material Cost is ₹10. For producing 10 units, the Total Raw Material Cost would be ₹100. For producing 1000 units, the Total Raw Material Cost would be ₹10,000 and so on.

Semi-variable Cost

It refers to the cost, which is partly fixed in nature and partly variable with production or sales. For example, Electricity Bills, Water Bills, Internet Bills, etc., have a fixed charge for the period and additional charges based on usage.

THEORY QUESTIONS

Section A Type Questions

1. State the functional classification of Overheads.
2. State the classification of Overheads on the basis of elements of cost. **[*BU BBM, May (2013); B.Com, May (2016)*]**
3. List the different types of Overheads on the basis of controllability.
4. List the different types of Overheads on the basis of behaviour.
5. What are Factory Overheads? Give four examples. **[*BU BBM, May (2013)*]**
6. What are Office and Administration Overheads? Give four examples. **[*BU BBM, May (2015); May (2017)*]**
7. What are Selling and Distribution Overheads? Give four examples. **[*BU B.Com, May (2011); May (2017)*]**
8. What are Research and Development Overheads?
9. What are Indirect Materials? Give examples.
10. What is Indirect Labour? Give examples.
11. What are Indirect Expenses? Give examples.
12. Explain the meaning of the term Controllable Costs. Give examples. **[*BU B.Com, May (2015)*]**

13. Explain the meaning of the term Uncontrollable Costs. Give examples.
14. What are Fixed Costs? What are its features?
15. What are Variable Costs? What are its features? **[*BU BBM, May (2013), May (2014); B.Com, May (2015)*]**
16. Differentiate between Fixed Costs and Variable Costs. **[*BU B.Com, May (2013)*]**
17. What are Semi-variable/Semi-fixed Costs? Give examples. **[*BU B.Com, May (2011), May (2017)*]**

Section B Type Questions

1. Briefly explain the different types of Overheads, classified on the basis of the functions performed by them.
2. Which are the different types of Overheads on the basis of elements of cost? Explain in brief. **[*BU BBM, May (2011)*]**
3. Explain the meaning of Controllable and Uncontrollable Overheads, along with examples.
4. Explain the different types of Overheads, classified on the basis of their behaviour, clearly explaining the features.

Section C Type Question

1. What are Overheads? Explain, in detail, the classification of Overheads.

6.3 SCOPE OF OVERHEAD COSTING

Following are the broad areas covered under Overhead Costing:

- Accounting and Control of Manufacturing Overheads
- Accounting and Control of Office and Administration Overheads
- Accounting and Control of Selling and Distribution Overheads
- Accounting of Research and Development Expenses

6.4 ACCOUNTING AND CONTROL OF MANUFACTURING OVERHEADS

Manufacturing Overheads form a substantial portion of Total Overheads. These Overheads require special attention and maximum efforts to be controlled and reduced. The Accounting and Control of Manufacturing Overheads include the following stages:

1. Estimation and collection of Manufacturing Overheads
2. Cost Allocation
3. Cost Apportionment
4. Cost Re-apportionment
5. Absorption
6. Treatment for over-absorption and under-absorption of Overheads

Each of them have been explained in detail in the following paragraphs:

6.4.1 Estimation and Collection of Manufacturing Overheads

The first stage in accounting for Overheads is to estimate the amount of Overheads, on the basis of past figures and adjustments for future. The major sources for collection of Manufacturing or Production or Factory Overheads are:

1. Invoices
2. Stores Requisition
3. Wage Analysis Book
4. Journal Entries

6.4.2 Cost Allocation

Allocation of Overheads refers to assigning a whole item of cost directly to a particular Cost Centre or Cost Unit. It implies relating Overheads directly to the various departments. Cost Allocation is possible only if the Overhead is specifically related to a particular Cost Centre or Cost Unit. For example, salary paid to a supervisor who is in charge of a particular product or department, can be allocated to that specific product or department; where, separate power meters are installed for each department, the Electricity Cost of that department is allocated to that department alone.

However, where the Overhead Cost is a general expenditure and not relating to a particular Cost Centre or Cost Unit, then Cost Allocation is not possible. In such cases, we must resort to Cost Apportionment.

6.4.3 Cost Apportionment

Overheads, which are not directly related to a particular Cost Centre or Cost Unit, cannot be directly allocated to the various departments or Cost Centres. Such un-allocable expenses are to be spread over the various departments or Cost Centres or Cost Units, on an appropriate basis. This is called Cost Apportionment. So, Cost Apportionment is the allotment of proportion of cost to Cost Centres or Cost Units, on some appropriate basis.

The following are the differences between Cost Allocation and Cost Apportionment:

Criterion	Cost Allocation	Cost Apportionment
Meaning	It refers to assigning the entire cost directly to a Cost Centre or a Cost Unit.	It refers to distribution of cost to more than one Cost Centre or Cost Unit on some equitable basis.
Nature of Expenditure	Specific to the Cost Centre or identifiable with the Cost Centre or directly related to the Cost Centre.	General expenditure, not directly relatable to any Cost Centre; or Common Expenses
Number of Cost Centres involved	One	Many
Amount of Overhead charged to Cost Centre	Entire Cost	Proportionate Cost, on some appropriate basis.

The following is the list of some of the Common Expenses and a suitable or appropriate basis of apportionment:

Type of Overhead	Basis of Apportionment
Purchase Department Expenses	Number of Purchase Orders or Value of Purchases
Material Handling Expenses	Value of Materials Consumed or Weight of Materials or Volume of Materials
Rent/Maintenance/Insurance on Building/ Air-conditioning/Fire precaution service	Floor Space occupied
Depreciation and Insurance of Assets	Value of Assets
Factory Lighting Expenses	Number of Light Points or Floor Space
Power Cost of Machinery	Horsepower rating of the machines or the Machine Hours operated
Indirect Wages	Direct Wages
Supervision	Time spent on Number of Employees or Direct Wages
Power and Steam Consumption/Internal Transport/Management Salaries	Technical Estimates
Miscellaneous Production Expenses	Direct Wages

Criteria for determining the basis of apportionment

The basis of Apportionment of Overhead Costs to various Cost Centres can be determined with the help of the following criterion:

1. Benefits received: This is the foremost criterion for determining the basis of apportionment. The benefit received by each Cost Centre from the cost is the most appropriate basis for apportionment. Work Manager's salary will be apportioned to different departments on the basis of the time spent by the manager for each department.

2. Analysis of survey of conditions: In case the benefits received are not measurable or ascertainable, the next best criterion would be the analysis of existing conditions. For example, it is highly difficult to measure the extent of benefit received by each department from Factory Lighting Expenses. Hence, it is distributed on the basis of the Number of Light Points in each department, rather than on the basis of usage.

3. Ability to Pay: In case the expenditure incurred leads to generation of any income or revenue, then the criteria for apportionment would be the ability to pay, i.e., in the proportion of revenues of the department or the Cost Centre. For example, Production Commission is apportioned on the basis of value of production of each department.

4. Cause and Effect: When it is possible to identify the cause of expenditure and its effect, then the basis of apportionment will be the parameter based on cause. For example, the Power Cost of each department is apportioned on the basis of the Horsepower of the Machines used in the department, since higher the horsepower, higher the Power Consumption.

5. Efficiency or Incentives: In this method, Distribution of Overheads is made on the basis of pre-determined levels of production or sales. When distribution of Overhead Cost is made on this basis, and if the level of production exceeds the pre-determined level of production, the incidence of Overhead Cost gets reduced and the Total Cost per unit of production or of sales, is reduced.

6.4.4 Cost Re-apportionment

After apportioning Cost to various Cost Centres, the next phase in Overhead Accounting is Cost Re-apportionment. Where the entity has Service Departments, then the costs allocated and apportioned to the Service Departments must be re-distributed or re-apportioned to Production Departments, since Service Departments do not generate revenues for self-sustenance. While Cost Apportionment is called Primary Distribution of Overheads, Cost Re-apportionment is called Secondary Distribution of Overheads.

Methods of Cost Re-apportionment

Situation	Method
When there is only one Service Department	Direct Re-distribution Method
When there is more than one Service Department, but all of them provide service only to Production Departments (i.e., No Service Department provides service to other Service Departments)	Direct Re-distribution Method
When there is more than one Service Department, and one or few Service Departments provide service to other Service Departments, but does not receive service from those departments (i.e., when there is no reciprocity of services between Service Departments)	Step-Ladder Method or Step Method or Non-reciprocal Services Method

Situation	Method
When there is more than one Service Department, and there is reciprocity of services between Service Departments (i.e., each Service Department provides service to other Service Departments and receives services from those departments)	• Repeated Distribution Method (or Trial and Error Method) • Simultaneous Equation Method

Each of the aforementioned methods has been explained in detail, in the following paragraphs.

1. Direct Re-distribution Method

Under this method, the Overheads allocated and apportioned to Service Departments will be apportioned to Production Departments (and only to Production Departments), on some suitable basis.
The usual bases adopted for re-apportionment are:

Service Department	Basis of Re-apportionment
Maintenance and Repair Shop	Direct Labour Hours or Machine Hours
Tool Room	Hours worked
Canteen and Welfare	Number of Employees
Hospital and Dispensary	Number of Employees
Personnel Department	Number of Employees
Computer Section	Computer Hours or specific allocation to Production Departments
Stores Department	Number of Requisitions, or Value of Materials Issued
Transport Department	Truck Tonnage (for goods transported) Number of Employees (for passenger vehicles)
Inspection	Inspection Hours

2. Step-Ladder Method or Step Method or Non-reciprocal Method

This method of Cost Re-apportionment is used when one Service Department renders service to other Service Department/s along with Production Departments, but does not received any service from the other Service Department/s. For example, personnel from all the departments use the company canteen, including Transport Department Workers, but the Canteen Employees do not use the services of Transport Department. In this case, the cost of the canteen should be apportioned to all departments, including Transport Department. However, the Transport Department expenses must be apportioned only to Production Departments.
Under this method, the sequence in which Service Department Costs must be re-apportioned to Production Departments should be identified. The Service Department that renders service to the maximum number of other Service Departments should be considered first, followed by the next Service Department rendering service to other Service Departments, etc. The Service Department, which does not render service to other Service Departments, must be considered last and its cost should be apportioned only to Production Departments.

3. Repeated Distribution Method

When the Service Departments of the company render services to and receive service from other Service Departments, Repeated Distribution Method is used for Re-apportionment of Service Department Costs to Production Departments.

Under this method, one Service Department Cost will be distributed to other departments on appropriate basis, including the Service Departments to which it is rendering service. Then, the next Service Department Costs will be distributed to other departments, on appropriate basis, including the first Service Department. Then again, the first Service Department Costs will be distributed and so on, till the amount distributed to Service Department becomes negligible. Since the costs of Service Departments are distributed repeatedly, it is called Repeated Distribution Method.

4. Simultaneous Equation Method

When the Service Departments of the company render services to and receive service from other Service Departments, Repeated Distribution Method is used for re-apportionment of Service Department Costs to Production Departments. However, there is another alternative method for the same – Simultaneous Equation Method.

Under this method, mathematical equations are formed to ascertain the amount of Overheads of each Service Department, along with its share of other Service Departments. Then, such amount is distributed to Production Departments on a suitable basis.

6.4.5 Absorption of Manufacturing or Factory Overheads

After estimation of Manufacturing Overheads, allocating or apportioning them to different Cost Centres and re-apportioning Overhead Costs of Service Centres to Production Departments, it is essential to express the Overhead Cost of each Cost Centre in terms of some parameter. Such expression of Overhead on some parameter and showing Overhead Rate is called Absorption.

Absorption of Overhead Costs i.e., expressing Overhead Costs on some basis is essential for future estimations, and for estimating Overhead Cost of each individual job.

The following are some of the methods of absorbing Overheads:

1. Direct Method: Rate per unit of Output
2. Indirect Methods:
   - Percentage of Direct Materials
   - Percentage of Prime Cost
   - Percentage of Direct Labour Cost
   - Labour Hour Rate
   - Machine Hour Rate

An explanation of these methods is given in the following table:

Method	Formula for Overhead Recovery Rate	Comments
Direct Method – Based on Output	Total Overheads/Units produced	Suitable when only one product is produced.
Percentage of Direct Material Cost	Total Overheads/Direct Material Cost	Suitable for absorption of Material Cost-related Expenses like Material Handling, Stores Overheads, Indirect Materials, etc. However, this method could lead to fluctuations in Overhead Rate due to change in Material Prices. Further, it ignores time spent by labour on the job, skills of workers, use of machines, etc., rendering the basis insufficient and inappropriate.

Method	Formula for Overhead Recovery Rate	Comments
Percentage of Direct Labour Cost	Total Overheads/Direct Labour Cost	Simple and economical method. No fluctuations in Overhead Rate, since Wages paid are fairly stable. However, it ignores time spent by labour on the job, skill of workers, use of machines, etc., rendering the basis insufficient and inappropriate.
Percentage of Prime Cost	Total Overheads/Prime Cost	This method is rarely used, and it has all the limitations of absorbing Overheads on the basis of Direct Material Cost and Direct Labour Cost.
Labour Hour Rate	Total Overheads/Direct Labour Hours	This method is highly suitable when the conversion process is labour-intensive. It is simple and economical to apply. Further, it considers the time spent by workers on the job and makes the rate highly reliable. However, this method is not suitable when the conversion process is mechanized and capital-intensive.
Machine Hour Rate	Total Overheads/Machine Hours	Ideal method for capital-intensive departments, where Labour Hours are not spent much. It helps in identifying machine's idle capacity and it is very useful when a worker attends to two or more machines at a time, and Labour Hours spent per unit cannot be accurately determined. However, this method might not be effective when the data relating to operation time of machines may not be readily available and when all departments are not capital-intensive.

Note:

Machine Hour Rate is of three types, viz.,

- Direct Machine Hour Rate
- Simple Machine Hour Rate
- Comprehensive Machine Hour Rate

Direct Machine Hour Rate is the rate calculated when Total Overheads include only Overheads directly or immediately connected with the machine, like Power, Depreciation, Insurance, etc.

Simple Machine Hour Rate is the rate calculated when Total Overheads include Overheads directly or immediately connected with the machine and share of General Expenses, like Rent, Supervision, Indirect Labour, etc.

Comprehensive Machine Hour Rate is the rate calculated when Total Overheads include Overheads directly or immediately connected with the machine, General Overheads apportioned and Wages of operator for the machine.

The following is the format for calculation of Machine Hour Rate:

Standing Charges	
Rent and Rates	XXX
Heating and Lighting	XXX
Lubricating Oil	XXX
Consumable Stores	XXX
Insurance	XXX
Other Periodical Expenses	XXX
Total Standing Charges	XXX

Standing Charges Per Machine Hour	
(Total Standing Charges/Total Machine Hours)	XXX
Add: **Variable Charges Per Machine Hour**	
Depreciation	XXX
Power Consumed	XXX
Repair and Maintenance Charges	XXX
Machine Hour Rate	XXX

Standing Charges refer to the charges, which remain fixed or constant, irrespective of usage and extent of usage of machinery.

Variable Charges refer to the charges, which vary with the usage of the machinery.

6.4.6 Treatment for Over-absorption and Under-absorption of Production Overheads

On the basis of absorption of Overheads, Production Overheads for various jobs are estimated and included in the cost. When the actual Overheads are incurred, there is a possibility of difference between Overheads absorbed (i.e., Overheads estimated and included in the cost of job or product, based on Overhead Rate) and the actual Overheads.

When the Overheads absorbed (i.e., estimated) are more than Actual, it is a case of over-absorption; whereas, when the Overheads absorbed are less than Actual, it is a case of under-absorption.

The treatment for over and under-absorption of Overheads, in costing records, is explained as follows:

1. Accounting treatment for over-absorption of Production Overheads

- Where the amount of over-absorption is small, it can be credited to Costing Profit and Loss Account.
- Alternatively, it can be carried over to the next year, by transferring the amount of over-absorption to Overhead Reserve Account or Suspense Account.
- Where the amount of over-absorption is small, the cost of the job may be reduced or adjusted.

2. Accounting treatment for under-absorption of Production Overheads

- Where the amount of under-absorption is small and immaterial, it can be completely debited to Costing Profit and Loss Account.
- Where the amount of under-absorption is significant, and if such under-absorption is due to normal reasons like genuine planning errors, changes in assumptions, etc., then the extent of under-absorption must be treated as increase in Costs and added to the cost of job or product.
- Where the amount of under-absorption is significant, and if such under-absorption is due to abnormal reasons like strikes, obsolescence of stores and equipment, etc., then the extent of under-absorption must be treated as loss and debited to Costing Profit and Loss Account.

THEORY QUESTIONS

Section A Type Questions

1. State the sources for collection of Manufacturing Overheads.
2. What is Cost Allocation?
3. What is Cost Apportionment? **[*BU B.Com, May (2015)*]**

4. State the basis of apportionment of the following:
   (a) Labour Welfare Expenses
   (b) Motive Power
   (c) Insurance of Plant and
   (d) Indirect Wages **[*BU B.Com, May (2011); May (2014); BBM, May (2015)*]**
5. Mention the basis of apportionment of the following expenses:
   (a) Rent
   (b) Depreciation
   (c) Electricity Charges
   (d) Canteen Expenses **[*BU BBM, May (2015)*]**
6. What are Service Departments? Give two examples. **[*BU B.Com, May (2011)*]**
7. What is Cost Re-apportionment?
8. List out the various methods of Cost Re-apportionment.
9. What is Secondary Distribution of Overheads? **[*BU BBM, May (2014)*]**
10. What is the meaning of Absorption of Overheads? **[*BU BBM, May (2014)*]**
11. List the different methods of absorbing Manufacturing Overheads.
12. How is Overhead Rate calculated under Percentage of Direct Material Method?
13. How is Overhead Rate calculated under Percentage of Direct Labour Method?
14. How is Overhead Rate calculated under Percentage of Prime Cost Method?
15. How is Overhead Rate calculated on the basis of Labour Hours?
16. What is Machine Hour Rate? **[*BU BBM, May (2015)*]**
17. List the different types of Machine Hour Rate?
18. What is Direct Machine Hour Rate?
19. What is Simple Machine Hour Rate?
20. What is Comprehensive Machine Hour Rate?
21. State the accounting treatment for over-absorption of Manufacturing Overheads.
22. State the accounting treatment for under-absorption of Manufacturing Overheads.

Section B Type Questions

1. What is Cost Apportionment? List out the various bases on which Factory Overheads are apportioned.
2. What is Cost Apportionment? Bring out the differences between Cost Allocation and Cost Apportionment.
3. Explain briefly, the various criteria for selection of a suitable basis for apportionment of Manufacturing Overheads.
4. What is Cost Re-apportionment? State the different methods of Cost Re-apportionment, clearly indicating the suitability of each method.
5. List out the common bases for Re-apportionment of Service Department Overheads, under Direct Re-distribution Method.
6. What is Absorption of Overheads? Explain briefly the different methods for absorption of Production Overheads, along with its merits or suitability.
   [*BU B.Com, May (2011), BBM May (2011), B.Com, May (2013)*]
7. What is Machine Hour Rate? Explain briefly the different types of Machine Hour Rate.
8. Explain briefly the accounting treatment for over-absorption and under-absorption of Production Overheads.

Section C Type Questions

1. Explain briefly the accounting treatment for Manufacturing Overheads.
2. What are Cost Apportionment and Cost Re-apportionment, in case of Factory Overheads? Explain in detail.

6.5 ACCOUNTING AND CONTROL OF OFFICE AND ADMINISTRATION OVERHEADS

Administration Overheads constitute the expenses incurred in connection with the formulation of policy directing the organisation and controlling the operations of an undertaking. These Overheads are also collected and classified in the same way as Factory Overheads.

6.5.1 Accounting for Office and Administration Overheads

There are three distinct methods for accounting Administrative Overheads, which are explained as follows:

Method One: Apportioning Administrative Overheads between Production and Sales Departments

In this method, Administrative Overheads lose their identity and get merged with Production and Selling Department Overheads. Administrative Overheads are apportioned over Production and Sales Departments, since they are considered for the benefit of both these departments.

While this method makes some sense, it is not justified since there are other departments in the organisation, like finance, etc., which also use the service of administration. Further, finding a suitable basis for apportionment among Production and Sales Departments is difficult.

Method Two: Charging Administrative Overheads to Profit and Loss Account

In this method, the Office and Administrative Overheads are completely charged to Costing Profit and Loss Account, instead of charging them to the jobs or products or Cost Centres. This is because Administrative Overheads are concerned with formulation of policies and not directly related to production or sales. Further, they are fixed in nature.

While the argument is logical, this treatment is not completely acceptable since the cost of products will be understated.

Method Three: Treating Administrative Overheads as a separate addition to Cost of Production/Cost of Sales

In this method, Administrative Overheads are separately recognised and charged to the Cost Centres on some appropriate basis. The following are the usual bases of apportionment of Administrative Overheads:

Overhead	Basis of Apportionment
General Administration Expenses	Works Cost
Personnel Department Expenses/Staff Welfare Expenses/Time keeping/Perquisites	Number of Employees

Among the different methods explained, Method Three is the most acceptable and frequently found in practice.

6.5.2 Control of Office and Administrative Overheads

The basic purpose of accounting for any expense is to keep it in control and minimise it. Administrative Overheads are fixed in nature. Being fixed, they are generally not controllable. However, if neglected, they can grow disproportionately making every product and entire entity unfeasible. Hence, it is essential to exercise control on Office and Administrative Overheads. There are three methods for exercising control on Administrative Overheads, which are explained as follows:

1. Comparing the current-year Office and Administrative Overheads with those of the preceding year and ascertaining the major variations, reasons for such variations and take corrective actions for any controllable factors.
2. Comparing the actual Office and Administrative Overheads with budgeted figures, ascertaining variances, analysing those variances, identifying the reasons for variance and taking corrective actions, if need be.
3. Comparing the actual Office and Administrative Overheads with standards set, and ensuring that the Actual meet the Standards, thereby controlling Costs.

THEORY QUESTIONS

Section A Type Questions

1. List out the different methods for accounting Office and Administration Overheads.
2. List out the different methods for controlling Office and Administration Overheads.
3. List out the different bases for apportionment of Office and Administration Overheads.

Section B Type Questions

1. Explain briefly the different methods of accounting Office and Administration Overheads.
2. Explain briefly the different methods of controlling Office and Administration Overheads.

6.6 ACCOUNTING AND CONTROL OF SELLING AND DISTRIBUTION OVERHEADS

6.6.1 Accounting for Selling and Distribution Overheads

The following points outline the accounting for Selling and Distribution Overheads:

1. The collection and accumulation of Selling and Distribution Overheads is made from the books of accounting – Journal Entries, Cash Book, etc.
2. These expenses are apportioned among various Cost Centres or Cost Units, on appropriate bases. The following are some of the bases for apportionment of Selling and Distribution Overheads:

Overhead	Basis of Apportionment
Credit Department Expenses	Value of Credit Sales
Carriage outwards/Delivery Expenses	Number of units sold or Weight or Distance
Advertisement Expenses, Sales Promotion Expenditure, Sales Commission and any other Selling Overheads	Actual Sales
Salaries to Sales Personnel	Time devoted for each product

3. The total of these expenses is absorbed on the basis of units sold. That is, the Selling and Distribution Overhead Rate is calculated in the following manner:

$$\frac{\text{Total Selling and Distribution Overheads}}{\text{Number of units sold}}$$

4. Accounting Treatment for Packing Expenses

   The following is the accounting treatment for Packing Expenses:

   - Primary Packing, which is necessary to protect the product or for convenience in handling, must be included in Prime Cost.

- Secondary Packing, which is required to facilitate the transportation of the product from the factory to the customer, must be included in Distribution Overheads.
- Fancy Packing, which is required to attract the customers, should be considered as Selling Overheads (Advertisement Expenses).
- Special Packing, made according to request of customer, must be directly charged to the specific work or job.

5. Accounting Treatment for Advertisement Expenses
   The following is the accounting treatment for Advertising Expenses in Cost Accounts:
   - Specific or Product Advertising, which is done for a specific product routinely, should be charged to the specific product.
   - General or Company Advertising, which is done for all products sold by the company, must be apportioned to various products on the basis of sales revenue generated by each product or any other suitable basis.
   - Launch Advertising or New Product Advertising, which is done to launch a new product to be sold in future, should be carried forward and charged to the product when it is actually sold in the market.
   - When the expenditure incurred on advertising is substantial and where the benefits are expected to accrue over a business cycle of 4 to 5 years, the Advertisement Cost must be treated as deferred Revenue Expenditure and written off over the expected period of benefit.
6. Accounting for Bad Debt Losses
   Where Bad Debt Losses arise in the normal course of trading, they should form a part of Selling and Distribution Overheads. However, where they arise on account of ineffective receivables management, they are considered as Financial Losses. In such case, they must not form a part of Cost of the Product, but must be charged to Costing Profit and Loss Account.

6.6.2 Control of Selling and Distribution Overheads

There are three methods for exercising control on Selling and Distribution Overheads, which are explained as follows:

1. Comparing the current-year Selling and Distribution Overheads with those of the preceding year and ascertaining the major variations, reasons for such variations and taking corrective actions for any controllable factors.
2. Comparing the actual Selling and Distribution Overheads with budgeted figures, ascertaining variances, analysing those variances, identifying the reasons for variance and taking corrective actions, if need be.
3. Comparing the actual Selling and Distribution Overheads with standards set, and ensuring that the Actual meet the Standards, thereby controlling Costs.

THEORY QUESTIONS

Section A Type Questions

1. List out the different bases of apportionment of Selling and Distribution Overheads.
2. How is Overhead Rate calculated for Selling and Distribution Overheads?
3. Explain the accounting treatment for Bad Debt Losses.
4. List out the different methods for controlling Selling and Distribution Overheads.

Section B Type Questions

1. Explain briefly the accounting treatment for Selling and Distribution Overheads.
2. Explain the accounting treatment for Packing Expenses.
3. Explain the accounting treatment for Advertising Expenses.

6.7 ACCOUNTING OF RESEARCH AND DEVELOPMENT OVERHEADS

The meaning and accounting treatment for Research and Development Overheads is summarised in the following points:

1. Research Expenses refer to the expenditure incurred for designing new or improved products, production methods or techniques.
2. The research conducted by an entity could be of two types, viz., Basic and Applied.
   - Basic Research refers to the research, which is general and not directed towards any specific practical aim.
   - Applied Research refers to the research directed towards a specific practical aim or objective.
3. Accounting Treatment for Basic Research Expenditure:
   - Where the research is a continuous activity, the expenditure is recognised as a separate function, and charged to the Product or Cost Centre.
   - Where the research is not continuous, the expenditure is spread over a number of years.
4. Accounting Treatment for Applied Research Expenditure:
   - Where the research is conducted for specific existing products, the expenditure is directly charged to the product.
   - Where the research is conducted for all existing products, the expenditure is treated as a Manufacturing Overhead, apportioned on appropriate basis and absorbed over all the products.
   - Where the research is conducted for new products:
     - If the research is successful, the expenditure is charged to the Cost of the Product.
     - If the research is not successful, the expenditure is charged to the Costing Profit and Loss Account.
5. Development Expenses refer to the expenditure incurred for implementation of the decision to produce a new or improved product or to employ a new or improved method. The accounting treatment for Development Expenses is the same as that of Applied Research.

THEORY QUESTIONS

Section A Type Questions

1. What is Research Expenditure?
2. What is Development Expenditure?
3. What are the different types of Research?
4. What is the accounting treatment for expenditure on Basic Research?
5. What is the accounting treatment for expenditure on Applied Research?
6. What is the accounting treatment for Development Expenditure?

Section B Type Questions

1. Explain the accounting treatment for Research and Development Expenditure.

Section C Type Questions

1. Explain the accounting treatment for:
   (a) Office and Administration Overheads
   (b) Selling and Distribution Overheads
   (c) Research and Development Expenditure

PROBLEMS

Problems on Accounting for Production (i.e., Factory or Works) Overheads

Problem 1 (Problem on Apportionment of Manufacturing Overheads)

A company manufactures Building Bricks and Fire Bricks. Both products require two processes: (a) Brick Formation and (b) Heat Treatment. The time required for the two bricks and other particulars are given as follows:

Particulars	Building Bricks	Fire Bricks
Forming per 100 bricks	3 Hours	2 Hours
Heat Treatment per 100 bricks	2 Hours	5 Hours
Production during the month	1,30,000 units	70,000 units

The Total Costs of the two departments for the month were as follows:

Forming: ₹21,200
Heat Treatment: ₹48,800
Prepare a Statement of Manufacturing Costs for the two varieties of bricks.

Solution

From the information provided, the basis for apportioning Forming and Heat Treatment Cost is the time taken for each variety of brick.

The following table gives the time taken for each activity:

Particulars	Building Bricks	Fire Bricks
Forming (given for 100 units, converted for number of units produced)	3,900 Hours (3 × 1,30,000/100)	1,400 Hours (2 × 70,000/100)
Heat Treatment (given for 100 units, converted for number of units produced)	2,600 Hours (2 × 1,30,000/100)	3,500 Hours (5 × 70,000/100)

Apportionment of Costs

Statement Showing Manufacturing Cost

Element of Cost	Amount (₹)	Basis of Apportionment	Ratio	Building Bricks (₹)	Fire Bricks (₹)
Brick-Formation Cost	21,200.00	Time Taken	39:14	15,600.00	5,600.00
Heat Treatment	48,800.00	Time Taken	26:35	20,800.00	28,000.00
				36,400.00	33,600.00
Number of units produced				1,30,000	70,000
Cost per unit (Total Cost/Number of units)				0.28	0.48

Problem 2 (Problem on Re-apportionment of Production Overheads under Direct Distribution Method)

X Ltd. has three Production Departments and four Service Departments. The expenses for these departments, as per Primary Distribution Summary, are as follows:

Production Departments:

	₹
A	30,000
B	26,000
C	24,000

Service Departments:

	₹
Stores	4,000
Time-keeping and Accounts	3,000
Power	1,600
Canteen	1,000

The following information is also available with respect to the Production Departments:

	Dept. A	Dept. B	Dept. C
Horsepower of Machine	300	300	200
Number of Workers	20	15	15
Value of Stores Requisition (₹)	2,500	1,500	1,000

Apportion the Costs of Service Departments over the Production Departments.

Solution

Statement Showing Re-apportionment of Overheads

Item of Cost	Basis of Apportionment	Amount (₹)	Ratio	Production Departments		
				Dept. A (₹)	Dept. B (₹)	Dept. C (₹)
Cost as per Primary Distribution Summary	Given	80,000		30,000	26,000	24,000
Cost of Service Departments						
	Requisitions	4,000	5:3:2	2,000	1,200	800
- Stores	Workers	3,000	4:3:3	1,200	900	900
- Time-keeping	H.P. of Machine	1,600	3:3:2	600	600	400
- Power	Workers	1,000	4:3:3	400	300	300
- Canteen		89,600		34,200	29,000	26,400

Note:

1. Cost of Stores Departments has been distributed in the ratio of value of stores requisitions.
2. Time-keeping and Canteen Costs have been distributed in the ratio of number of workers.
3. Power Department Cost has been distributed in the ratio of Horsepower of the Machine used in Production Departments.

Problem 3 (Problem on Re-apportionment of Production Overheads under Direct Distribution Method)

Chaithra Ltd. has thee Production and four Service Departments. For the year ending 31 March 2014, the expenses of these departments, as per Primary Distribution Summary, shows the following totals:

Production Departments:

	₹
A	40,000
B	35,000
C	25,000

Service Departments:

	₹
Stores	8,100
Time-keeping	6,000
Power	4,500
Canteen	2,500

The following additional information is available:

Particulars	A	B	C
Value of stores requisitioned (₹)	8,000	6,000	4,000
Number of workers	25	15	10
H.P. of Machine	600	500	400

Prepare a Statement showing the Redistribution of Service Department Expenses to Production Departments under Direct Re-distribution Method.

Solution

Statement Showing Re-apportionment of Overheads

Item of Cost	Basis of Apportionment	Amount (₹)	Ratio	Production Departments		
				Dept. A (₹)	Dept. B (₹)	Dept. C (₹)
Cost as per Primary Distribution Summary	Given	1,00,000		40,000	35,000	25,000
Cost of Service Departments						
- Stores	Requisitions	8,100	4:3:2	3,600	2,700	1,800
- Time-keeping	Workers	6,000	5:3:2	3,000	1,800	1,200
- Power	H.P. of Machine	4,500	6:5:4	1,800	1,500	1,200
- Canteen	Workers	2,500	5:3:2	1,250	750	500
		1,21,100		49,650	41,750	29,700

Note:

1. Cost of Stores Departments has been distributed in the ratio of value of stores requisitions.
2. Time-keeping and Canteen Costs have been distributed in the ratio of number of workers.
3. Power Department Cost has been distributed in the ratio of Horsepower of the Machine used in Production Departments.

Problem 4 (Problem on Re-apportionment of Production Overheads under Direct Distribution Method)

Akash Ltd. has four departments viz., A, B, C and D. Departments A, B and C are Production Departments and Department D is Service Department. The actual expenses for the month of April 2014 are as follows:

	₹
Rent	10,000
Depreciation of Machinery	4,500
Supervision Charges	15,000
Electric Power	9,000
Repairs of Machinery	6,000
Contribution to ESI	1,500
Fire Insurance on building	5,000
Lighting	1,200
Indirect Materials	
A	1,200
B	1,000
C	750
D	500

The following information is available regarding the departments mentioned:

Particulars	Production			Service
	A	B	C	D
Area	1,500	1,100	900	500
Number of Employees	20	15	10	15
Direct Wages (₹)	60,000	40,000	3,000	20,000
Value of Plant (₹)	2,40,000	1,80,000	1,20,000	60,000
Value of Stock (₹)	1,50,000	90,000	60,000	-
Horsepower of Machinery	24	18	12	6

Apportion the expenses to various departments on the most equitable basis and re-apportion the Service Department Expenses to the Production Departments in the ratio of 3:2:1.

Solution

Statement Showing Apportionment of Overheads

(Primary Distribution Statement)

Particulars	Basis	Total (₹)	Production Depts.			Service Dept.
			A (₹)	B (₹)	C (₹)	D (₹)
Direct Wages	Only of D		-	-	-	20,000
Rent	Area	10,000	3,750	2,750	2,250	1,250
Depreciation on Machinery	Value of Plant	4,500	1,800	1,350	900	450
Supervision	Number of Employees	15,000	5,000	3,750	2,500	3,750
Electric Power	Horsepower	9,000	3,600	2,700	1,800	900
Repairs of Machinery	Value of Plant	6,000	2,400	1,800	1,200	600
Contribution to ESI	Number of Employees	1,500	500	375	250	375
Fire Insurance on Building	Area	5,000	1,875	1,375	1,125	625
Lighting	Area	1,200	450	330	270	150
Indirect Materials (given)	Actual	3,450	1,200	1,000	750	500
Total			20,575	15,430	11,045	28,600

Notes:

1. Since this Statement is prepared to show the Distribution of Overheads, the Direct Wages of Production Departments have not been shown. However, since the Service Department Costs have to be re-apportioned, the Direct Wages of that department have been shown.
2. Rent, Fire Insurance on Building and Lighting has been apportioned in the ratio of area of each department. The ratio of area is 15:11:9:5.
3. Depreciation on Machinery and Repairs of Machinery has been apportioned in the ratio of Value of Plant used by each department. The ratio of Value of Plant is 4:3:2:1.
4. Supervision Cost and Contribution to ESI has been apportioned in the ratio of Number of Employees in each department. The ratio of Number of Employees is 4:3:2:3.
5. Electric Power has been apportioned in the ratio of Horsepower of the Machines used in each department. The ratio of horsepower is 4:3:2:1.

Statement Showing Re-apportionment of Overheads

(Secondary Distribution Statement)

Particulars	Basis	Total (₹)	Production Depts.			Service Dept.
			A	B	C	D
Total Overheads as per Primary Distribution			20,575	15,430	11,045	28,600
Re-distribution of Service Department Overheads to Production Departments	3:2:1		14,300	9,533	4,767	(28,600)
			34,875	24,963	15,812	NIL

Problem 5 (Problem on Re-apportionment of Production Overheads under Direct Distribution Method)

Bhuvana Ltd. supplies the following information for the half-year ending 30 September 2013 and requests you to apportion the expenses to various departments on the most equitable basis and re-apportion the Service Department Costs to Production Departments as follows:

Service Department X to Production Departments in the ratio of 3:2:1, and

Service Department Y to Production Departments in the ratio of 4:3:2

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Direct Wages	7,000	6,000	5,000	1,000	1,000
Direct Materials	3,000	2,500	2,000	1,500	1,000
Number of Employees	200	150	150	50	50
Electricity (KW)	8,000	6,000	6,000	2,000	3,000
Number of Light Points	10	15	15	5	5
Asset Value	50,000	30,000	20,000	10,000	10,000
Area	800	600	600	600	200

The expenses for the period are as follows:

	₹
Stores Overhead	4,000
Motive Power	1,500
Electric Light	2,000
Labour Welfare	3,000
Depreciation	3,000

Repairs and Maintenance	12,000
General Overhead	10,000
Rent and Taxes	6,000

Solution

Statement Showing Apportionment of Overheads

(Primary Distribution Statement)

Particulars	Basis	Total (₹)	Production Depts.			Service Dept.	
			A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Direct Wages	Only of X and Y	2,000	-	-	-	1,000	1,000
Direct Materials	Only of X and Y	2,500	-	-	-	1,500	1,000
Stores Overhead	Direct Materials	4,000	1,200	1,000	800	600	400
Motive Power	Electricity (KW)	1,500	480	360	360	120	180
Electric Light	Light Points	2,000	400	600	600	200	200
Labour Welfare	Number of Employees	3,000	1,000	750	750	250	250
Depreciation	Asset Value	3,000	1,250	750	500	250	250
Repairs and Maintenance	Asset Value	12,000	5,000	3,000	2,000	1,000	1,000
General Overhead	Direct Wages	10,000	3,500	3,000	2,500	500	500
Rent and Taxes	Area	6,000	1,713	1,286	1,286	1,286	429
		46,000	14,543	10,746	8,796	6,706	5,209

Notes:

1. Since this Statement is prepared to show the Distribution of Overheads, the Direct Materials and Direct Wages of Production Departments have not been shown. However, since the Service Department Costs have to be re-apportioned, the Direct Costs of that department have been shown.
2. Stores Overheads have been apportioned on the basis of Direct Materials consumed by each department. The ratio of Direct Materials is 6:5:4:3:2.
3. Motive Power Cost has been apportioned on the basis of electricity consumed in each department, given in KWs. The ratio of Electricity KWs is 8:6:6:2:3.
4. Electricity Light Charges are apportioned on the basis of Number of Light Points in each department. The ratio of Number of Light Points is 2:3:3:1:1.
5. Labour Welfare Expenses have been apportioned in the ratio of Number of Employees in each department. The ratio of Number of Employees is 4:3:3:1:1.
6. Depreciation and Repairs and Maintenance have been apportioned on the basis of Asset Value in each department. The ratio of Asset Value is 5:3:2:1:1.
7. General Overheads have been apportioned in the ratio of Direct Wages of each department. The ratio of Direct Wages is 7:6:5:1:1. Alternatively, General Overheads can be charged to Costing Profit and Loss Account, instead of apportioning them to each department. It is always advisable to apportion them instead of directly charging them to Costing Profit and Loss Account.
8. Rent and Rates has been apportioned on the basis of area occupied by each department. The ratio of area occupied is 4:3:3:3:1.

Statement Showing Re-apportionment of Overheads

(Secondary Distribution Statement)

Particulars	Basis	Production Depts.			Service Dept.	
		A	B	C	X	Y
Total Overheads as per Primary Distribution		14,543	10,746	8,796	6,706	5,209
Re-distribution of Service department Overheads to Production Departments						
X	3:2:1	3,353	2,235	1,117	(6,705)	
Y	4:3:2	2,315	1,736	1,158	-	(5,209)
		20,211	14,717	11,071	Nil	Nil

Problem 6 (Problem on Re-apportionment under Step-Ladder Method)

The expenses of two Production Departments A and B and two Service Departments X and Y are as under:

Department	Amount (₹)	Apportionment Basis		
		Y	A	B
X	2,000	25%	40%	35%
Y	1,500	--	40%	60%
A	3,000			
B	3,200			

Show the Secondary Distribution Statement based on the given table.

Solution

From the given information, it is evident that Service Department X renders service to all departments, including Service Department Y. However, Service Department Y does not render service to Service Department X. In such cases, the Cost Re-apportionment must be made under Step-Ladder Method.

Since Service Department X is rendering services to maximum number of departments, it is considered first, followed by Service Department Y.

Statement Showing Re-apportionment of Overheads

Cost	Ratio (given)	X (₹)	Y (₹)	A (₹)	B (₹)
Cost as per Primary Distribution		2,000	1,500	3,000	3,200
Costs of Department X Re-apportioned	25:40:35	(–)2,000	500	800	700
Costs of Department Y Re-apportioned	40:60	--	(–)2,000	800	1,200
		Nil	Nil	4,600	5,100

Problem 7 (Problem on Re-apportionment under Step-Ladder Method)

Evergreen Ltd. has three Production and three Service Departments. For the half-year ending 30 September 2017, the expenses of these departments, as per Primary Distribution Summary, show the following totals:

Production Departments:

A	₹32,000
B	₹26,000
C	₹23,000

Service Departments

Labour Welfare	₹7,000
Stores	₹6,375
Power	₹4,625

The following additional information is available.

Particulars	A	B	C	Labour Welfare	Stores	Power
Value of Stores Requisitioned (₹)	8,000	6,000	4,000	-	-	9,000
Number of Workers	30	25	20	10	15	10
Horsepower of Machines	600	500	400	-	-	-

Prepare a Statement showing the Redistribution of Service Department Expenses to Production Departments under Step-Ladder Method.

Solution

From the information given in the problem, it can be ascertained that Labour Welfare Department renders service to all departments, including other Service Departments. Since value of Stores Requisitions for Power Department is given, it indicates that Power Department is taking service from Stores.

However, the Power Department renders service only to Production Departments, since there are no machines in Labour Welfare and Stores.

Hence, for apportionment of Service Department Overheads, first Labour Welfare Department is considered, followed by Stores Department, and Power Department is considered the last.

Statement Showing Re-apportionment of Overheads

Cost	Ratio (given)	Production Departments			Service Departments		
		A (₹)	B (₹)	C (₹)	Labour Welfare (₹)	Stores (₹)	Power (₹)
Cost as per Primary Distribution		32,000	26,000	23,000	7,000	6,375	4,625
Costs of Labour Welfare Department apportioned on the basis of number of workers	6:5:4:3:2	2,100	1,750	1,400	(7,000)	1,050	700
Costs of Stores Department apportioned on the basis of Value of Stores Requisition	8:6:4:9	2,200	1,650	1,100	--	(1,050)	2,475
Costs of Power Department apportioned on the basis of Horsepower of Machines	6:5:4	3,120	2,600	2,080	--	--	(7,800)
		39,420	32,000	27,580	Nil	Nil	Nil

Problem 8 (Problem on Cost Re-apportionment under Repeated Distribution Method and Absorption of Overhead)

Disha Ltd. has three Production and two Service Departments. For the half-year ending 30 September 2017, the Departmental Distribution Summary shows the following totals:

Production Departments:

A	₹8,000
B	₹7,000
C	₹5,000

Service Departments:

X	₹2,340
Y	₹3,000

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

Departments	A	B	C	X	Y
X	20%	40%	30%	-	10%
Y	40%	20%	20%	20%	-

Prepare a Statement showing the Apportionment of Service Department Expenses to Production Departments under Repeated Distribution Method.

Solution

Statement Showing Re-apportionment of Overheads

(Secondary Distribution Statement)

Cost	Production Departments			Service Departments	
	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Cost according to Primary Distribution Statement	8,000	7,000	5,000	2,340	3,000
Re-apportionment of Dept. X Costs	468	936	702	(2,340)	234
Re-apportionment of Dept. Y Costs	1,294	647	647	646	(3,234)
Re-apportionment of Dept. X Costs	129	258	194	(646)	65
Re-apportionment of Dept. Y Costs	26	13	13	13	(65)
Re-apportionment of Dept. X Costs	3	5	4	(13)	1
Re-apportionment of Dept. Y Costs	–	1	–	–	(1)
	9,920	8,860	6,560	Nil	Nil

Notes:

1. Costs of Department X have been apportioned in the given ratio of 20:40:30:10 to Departments A, B, C and Y respectively.
2. Costs of Department Y have been apportioned in the given ratio of 40:20:20:20 to Departments A, B,C and X respectively.
3. The re-apportionment has been rounded off to the nearest Rupee value.
4. When Service Department Y's cost is ₹1, it has been apportioned only to Production Department B, since the share of Service Department Y and other Production Departments is very negligible.

Problem 9 (Problem on Cost re-apportionment under Repeated Distribution Method and Absorption of Overhead)

PH Ltd. is a manufacturing company having three Production Departments – A, B and C, and two Service Departments – X and Y. The following is the budget for the month of December 2017:

Particulars	Amount (₹)	A	B	C	X	Y
Direct Material		₹1,000	2,000	4,000	2,000	1,000
Direct Wages		₹5,000	2,000	8,000	1,000	2,000
Factory Rent	4,000					
Power	2,500					
Depreciation	1,000					
Other Overheads	9,000					
Additional Information						
Area (sq. ft.)		500	250	500	250	500
Capital Value of Assets (in lakh)		20	40	20	10	10
Machine Hours		1,000	2,000	4,000	1,000	1,000
H.P of Machines		50	40	20	15	25

A technical assessment of the apportionment of expenses of Service Departments is given as follows:

	A	B	C	X	Y
Service Department X (%)	45	15	30	--	10
Service Department Y (%)	60	35	--	5	--

Required:

(a) A Statement showing Distribution of Overheads to various departments.

(b) A Statement showing Re-distribution of Service Department Expenses to Production Departments.

(c) Machine Hour Rates of the Production Departments A, B and C.

Solution

Statement Showing Apportionment of Overheads
(Primary Distribution Statement)

Cost	Basis	Amount (₹)	Production Departments			Service Departments	
			A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Direct Material	Given					2,000	1,000
Direct Wages	Given					1,000	2,000
Factory Rent	Area	4,000	1,000	500	1,000	500	1,000
Power	Horsepower	2,500	500	800	800	150	250
Depreciation	Value	1,000	200	400	200	100	100
Other Overheads	Hours	9,000	1,000	2,000	4,000	1,000	1,000
		16,500	2,700	3,700	6,000	4,750	5,350

Notes:

1. Since this Statement is prepared to show the distribution of Overheads, the Direct Costs of Production Departments have not been shown. However, since the Service Department Costs have to be re-apportioned, the Direct Costs of those departments have been shown.
2. Factory Rent has been apportioned in the ratio of area occupied by each department, given in square feet. The ratio of area occupied is 2:1:2:1:2.
3. Power Cost has been apportioned in the ratio of Horsepower of the Machines used in each department. The ratio of Horsepower of Machines is 10:8:4:3:5.
4. Depreciation on Assets has been apportioned in the ratio of Capital Value of Assets, given in Lakh. The ratio of Value of Assets is 2:4:2:1:1.
5. Other Overheads have been apportioned in the ratio of Machine Hours. The ratio of Machine Hours is 1:2:4:1:1.

Statement Showing Re-apportionment of Overheads
(Secondary Distribution Statement)

Cost	Production Departments			Service Departments	
	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Cost according to Primary Distribution Statement	2,700	3,700	6,000	4,750	5,350
Re-apportionment of Dept. X Costs	2,138	712	1,425	(–) 4,750	475
Re-apportionment of Dept. Y Costs	3,495	2,039	--	291	(–) 5,825
Re-apportionment of Dept. X Costs	131	44	87	(–) 291	29
Re-apportionment of Dept. Y Costs	17	10	--	2	(–) 29
Re-apportionment of Dept. X Costs	1	--	1	(–) 2	--
	8,482	6,505	7,513	Nil	Nil

Notes:

1. Costs of Department X has been apportioned in the given ratio of 45:15:30:10 to Departments A, B, C and Y respectively.
2. Cost of Department Y has been apportioned in the given ratio of 60:35:5 to Departments A, B and X, respectively.
3. The re-apportionment has been rounded off to the nearest Rupee value.
4. When Service Department X's cost is ₹2, it has been apportioned only to Production Departments, since the share of Service Department Y is very negligible.

Calculation of Machine Hour Rate

	Department A	Department B	Department C
Total Overheads as per Secondary distribution Statement	₹8,482.00	₹6,505.00	₹7,513.00
Number of Machine Hours	1,000	2,000	4,000
Rate per Machine Hour	₹8.48	₹3.25	₹1.88

Problem 10 (Problem on Cost Re-apportionment under Repeated Distribution Method and Absorption of Overhead)

Karavali Ltd. has three Production and two Service Departments. From the following figures, prepare the Overhead Distribution Summary, using Repeated Distribution Method for Secondary Distribution and calculate the Overhead Rate per Labour Hour.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Direct Materials (₹)	45,000	30,000	15,000	12,000	9,000
Direct Wages (₹)	30,000	22,500	15,000	6,000	4,500
Value of Machines (₹)	60,000	45,000	30,000	-	-
Floor Space (sq. ft.)	30,000	20,000	15,000	10,000	5,000
Horsepower of Machines	240	200	160	-	-
Number of Light Points	120	90	60	30	20
Number of Labour Hours	8,000	6,000	4,000	-	-

Other details are as follows

	₹
Indirect Materials	22,200
Indirect Wages	15,600
Depreciation on Machinery	27,000
Depreciation on Buildings	12,000
Rent, Rates and Taxes	9,000
Electric Power	33,750
Lighting	2,400
General Expenses	7,800

The service rendered by each Service Department to other departments is as follows:

Departments	A	B	C	D	E
X	30%	40%	20%	-	10%
Y	10%	20%	50%	20%	-

Solution

Statement Showing Apportionment of Overheads

(Primary Distribution Statement)

Particulars	Basis	Total (₹)	Production Depts.			Service Dept.	
			A	B	C	X	Y
Direct Materials	Only of X and Y	21000	-	-	-	12000	9000
Direct Wages	Only of X and Y	10500	-	-	-	6000	4500
Indirect Materials	Direct Materials	22200	9000	6000	3000	2400	1800
Indirect Wages	Direct Wages	15600	6000	4500	3000	1200	900
Depreciation on Machinery	Value of Machinery	27000	12000	9000	6000	-	-
Depreciation on Building	Floor Area	12000	4500	3000	2250	1500	750
Rent, Rates and Taxes	Floor Area	9000	3375	2250	1688	1125	562
Electric Power	Horsepower of Machines	33750	13500	11250	9000	-	-
Lighting	Light Points	2400	900	675	450	225	150
General Expenses	Direct Wages	7800	3000	2250	1500	600	450
		161250	52275	38925	26888	25050	18112

Notes:

1. Since this Statement is prepared to show Distribution of Overheads, the Direct Costs of Production Departments have not been shown. However, since the Service Department Costs have to be re-apportioned, the Direct Costs of those departments have been shown.
2. Indirect Material Cost has been apportioned in the ratio of Direct Material Cost of each department. The ratio of Direct Material Cost is 15:10:5:4:3.
3. Indirect Wages and General Expenses have been apportioned in the ratio of Direct Wages of each department. The ratio of Direct Wages is 20:15:10:4:3. General Expenses can alternatively be charged completely to Costing Profit and Loss Account, instead of apportioning to each department.
4. Depreciation of Machinery has been apportioned on the basis of Value of Machinery used in each department. The ratio of Value of Machinery is 4:3:2.
5. Depreciation on Buildings, and Rent, Rates and Taxes, have been apportioned in the ratio of Floor Area occupied by each department, given in square feet. The ratio of Floor Area is 6:4:3:2:1.
6. Electric Power Cost has been apportioned on the basis of Horsepower of the Machines used in each department. The ratio of Horsepower of the Machines is 6:5:4.
7. Lighting Expenses have been apportioned on the basis of Number of Light Points in each department. The ratio of Number of Light Points is 12:9:6:3:2.

Statement Showing Re-apportionment of Overheads
(Secondary Distribution Statement)

Cost	Production Departments			Service Departments	
	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Cost according to Primary Distribution Statement	52,275	38,925	26,888	25,050	18,112
Re-apportionment of Dept. X Costs	7,515	10,020	5,010	(–)25,050	2,505
Re-apportionment of Dept. Y Costs	2,062	4,123	10,309	4,123	(–)20,617
Re-apportionment of Dept. X Costs	1,237	1,649	825	(–)4,123	412
Re-apportionment of Dept. Y Costs	41	82	207	82	(–)412
Re-apportionment of Dept. X Costs	25	33	16	(–)82	8
Re-apportionment of Dept. Y Costs	1	1	4	2	(–) 8
Re-apportionment of Dept. X Costs	1	1	--	(–) 2	--
	63,157	54,834	43,259	Nil	Nil

Notes:

1. Costs of Department X have been apportioned in the given ratio of 30:40:20:10 to Departments A, B, C and Y respectively.
2. Costs of Department Y have been apportioned in the given ratio of 10:20:50:20 to Departments A, B, C and X respectively.
3. The re-apportionment has been rounded off to the nearest Rupee value.
4. When Service Department X's cost is ₹2, it has been apportioned only to Production Departments, since the share of Service Department Y is negligible.

Calculation of Labour Overhead Rate Per Hour

	Department A	Department B	Department C
Total Overheads as per Secondary Distribution Statement	₹63,157	₹54,834	₹43,259
Number of Labour Hours	8000	6000	4000
Rate per Labour Hour	₹7.89	₹9.14	₹10.81

Problem 11 (Problem on Cost Re-apportionment under Simultaneous Equation Method)

Following are the Overhead Costs of two Service Departments:

Boiler House: ₹3,000

Pump Room: ₹ 600

The basis for apportionment is given as follows:

	Production Departments		Service Departments	
	A	B	Boiler House	Pump Room
Boiler House	60%	35%	--	5%
Pump Room	10%	40%	50%	--

Show the apportionment of Service Department Costs to Production Departments under Simultaneous Equation Method.

Solution

Let 'X' be the Total Cost of Boiler House (including the share of Pump Room)

Let 'Y' be the Total Cost of Pump Room (including the share of Boiler House)

Then,

$$X = 3000 + 0.5Y$$
$$Y = 600 + 0.05X$$

That is,

$$X - 0.5Y = 3000 \quad (1)$$
$$0.05X - Y = (-)\ 600 \quad (2)$$

Multiplying Eq. (1) with 2, we get,

$$2X - Y = 6000 \quad (3)$$
$$0.05X - Y = (-)600 \quad (2)$$

By subtracting Eq. (2) from Eq. (3), we get, $1.95X = 6600$. Therefore, X = ₹3384. 62 (rounded off to ₹3385)

Substituting value of X in Eq. (1), we get, Y = ₹770.

Secondary Distribution Statement

Cost	Amount (₹)	Ratio	Department A (₹)	Department B (₹)
Cost of Boiler House	3,385.00	60% : 35%	2031.00	1185.00
Cost of Pump Room	770.00	10% : 40%	77.00	307.00
			2108.00	1492.00

Note: The Total Cost re-apportioned is ₹3,600 (₹2108 + ₹1492), which is the total of the Service Department Costs (₹3000 + ₹600).

Problem 12 (Problem on Cost Re-apportionment under Simultaneous Equation Method)

Fortune Ltd. has three Production and two Service Departments. The expenses of Production Departments P1, P2 and P3 are ₹12,500, ₹13,000 and ₹15,000, respectively, and Service Departments S1 and S2 are ₹6,300 and ₹5,100, respectively, as per Primary Distribution Summary. The services rendered by each Service Department to other departments are as follows:

Departments	P1	P2	P3	S1	S2
S1	30%	40%	20%	-	10%
S2	10%	20%	50%	20%	-

Re-apportion the expenses of Service Departments to the Production Departments using Simultaneous Equation Method.

Solution

Let X be the Total Cost of S1 (including the share of S2)
Let Y be the Total Cost of S2 (including the share of S1)
Then,

$$X = 6300 + 0.2Y$$
$$Y = 5100 + 0.1X$$

That is,

$$X - 0.2Y = 6300 \quad (1)$$
$$0.1X - Y = (-)\ 5100 \quad (2)$$

Multiplying Equation (2) with 0.2, we get,

$$X - 0.2Y = 6300 \quad (1)$$
$$0.02X - 0.2Y = (-)1020 \quad (3)$$

By subtracting Equation (3) from Equation (1), we get, 0.98X = 7320 Therefore, X = ₹7,469 (rounded off). Substituting value of X in Equation (1), we get, Y = ₹5,847.

Secondary Distribution Statement

Cost	Amount (₹)	Ratio	P1 (₹)	P2 (₹)	P3 (₹)
Cost of S1	7469.00	30% : 40% : 20%	2241	2988	1494
Cost of S2	5847.00	10% : 20% : 50%	585	1169	2923
			2826	4157	4417

Note: The Total Cost re-apportioned is ₹11,400 (₹2826 + ₹4157 + ₹4,417), which is the total of the Service Department Costs (₹6,300 + ₹5,100).

Problem 13 (Problem on Cost Re-apportionment under Simultaneous Equation Method and Absorption of Overheads)

Greenworld Ltd. has three Production and two Service Departments. From the following information, prepare the Overhead Distribution Summary and calculate the Overhead Rate per Labour Hour, using Simultaneous Equation Method.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Direct Materials (₹)	20,000	10000	19000	6000	5000
Direct Wages (₹)	15,000	15000	4000	2000	4000
Value of Machines (₹)	60,000	100000	40000	25000	25000
Floor Area (Sq. mts.)	15,000	10000	10000	5000	10000
Horsepower of Machines	50	60	30	5	5
Number of Light Points	15	10	10	5	10
Labour Hours	5,000	4000	3000	-	-

Other expenses are as follows

Indirect Materials	₹15,000
Indirect Wages	₹10,000
Depreciation on Machinery	₹25,000
Depreciation on Buildings	₹15,000
Rent, Rates and Taxes	₹10,000
Electric Power	₹15,000
Lighting	₹ 500
General Expenses	₹15,000

The expenses of each Service Department to other departments are to be re-apportioned as follows:

Departments	A	B	C	X	Y
X	30%	40%	20%	-	10%
Y	10%	20%	50%	20%	-

Solution

Statement Showing Apportionment of Overheads

(Primary Distribution Statement)

Particulars	Basis	Total (₹)	Production Depts.			Service Dept.	
			A	B	C	X	Y
Direct Materials	Only of X and Y	11000	-	-	-	6000	5000
Direct Wages	Only of X and Y	6000	-	-	-	2000	4000
Indirect Materials	Direct Material	15000	5000	2500	4750	1500	1250
Indirect Wages	Direct Wages	10000	3750	3750	1000	500	1000
Depreciation on Machinery	Value of Machinery	25000	6000	10000	4000	2500	2500
Depreciation on Building	Floor Area	15000	4500	3000	3000	1500	3000
Rent and Taxes	Floor Area	10000	3000	2000	2000	1000	2000
Electric Power	Horsepower of Machinery	15000	5000	6000	3000	500	500
Lighting	Light Points	500	150	100	100	50	100
General Overheads	Direct Wages	15000	5625	5625	1500	750	1500
		122500	33025	32975	19350	16300	20850

Notes:

1. Since this Statement is prepared to show Distribution of Overheads, the Direct Costs of Production Departments have not been shown. However, since the Service Department Costs have to be re-apportioned, the Direct Costs of those departments have been shown.

2. Indirect Material Cost has been apportioned in the ratio of Direct Material Cost of each department. The ratio of Direct Material Cost is 20:10:19:6:5**.**
3. Indirect Wages and General Overheads have been apportioned in the ratio of Direct Wages of each department. The ratio of Direct Wages is 15:15:4:2:4. General Overheads, can alternatively be charged completely to Costing Profit and Loss Account, instead of apportioning to each department.
4. Depreciation of Machinery has been apportioned on the basis of Value of Machinery used in each department. The ratio of Value of Machinery is 12:20:8:5:5**.**
5. Depreciation on Buildings, and Rent, rates and Taxes, have been apportioned in the ratio of Floor Area occupied by each department, given in square feet. The ratio of Floor Area is 3:2:2:1:2.
6. Electric Power Cost has been apportioned on the basis of Horsepower of the Machines used in each department. The ratio of Horsepower of the Machines is 6:5:4.
7. Lighting Expenses have been apportioned on the basis of Number of Light Points in each department. The ratio of Number of Light Points is 3:2:2:1:2.

Secondary Distribution (Simultaneous Equation Method)

Let X be the Total Cost of Department X (including the share of Department Y)
Let Y be the Total Cost of Department Y (including the share of Department X)
Then,

$$X = 16300 + 0.2Y$$
$$Y = 20850 + 0.1X$$

That is,

$$X - 0.2Y = 16300 \quad (1)$$
$$0.1X - Y = (-)\ 20850 \quad (2)$$

Multiplying Eq. (2) with 0.2, we get,

$$X - 0.2Y = 16300 \quad (1)$$
$$0.02X - 0.2Y = (-)\ 4170 \quad (3)$$

By subtracting Eq. (3) from Eq. (1), we get, 0.98X = 20,470. Therefore, X = ₹20,888 (rounded off).
Substituting value of X in Eq. (1), we get, Y = ₹22,939.

Statement Showing Re-apportionment of Overheads

(Secondary Distribution Statement)

Cost	Amount (₹)	Ratio	A (₹)	B (₹)	C (₹)
Cost according to Primary Distribution Summary			33,025	32,975	19,350
Cost of Service Department X	20,888	30% : 40% : 20%	6,266	8,355	4,178
Cost of Service Department Y	22,939	10% : 20% : 50%	2,294	4,588	11,469
			41,585	45,918	34,997

Note: The Total Cost re-apportioned is ₹37,150 (₹6,266 + ₹8,355 + ₹4,178 + ₹2,294 + ₹4,588 + ₹11,469), which is the total of the Service Department Costs (₹16,300 + ₹20,850).

Calculation of Labour Overhead Rate Per Hour

	Department A	Department B	Department C
Total Overheads as per Secondary Distribution Statement	₹41,585	₹45,918	₹34,997
Number of Labour Hours	5,000	4,000	3,000
Rate per Labour Hour	₹8.32	₹11.48	₹11.67

Problem 14 (Problem on Cost Re-apportionment under Repeated Distribution Method, Simultaneous Equation Method and Absorption of Overheads)

Jayanth Ltd. has three Production and two Service Departments. From the following figures, prepare Overhead Distribution Summary and calculate Overhead Rate per Labour hour. Use Simultaneous Equation Method for Secondary Distribution.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Direct Materials (₹)	30,000	20,000	10,000	8,000	6,000
Direct Wages (₹)	20,000	15,000	10,000	4,000	3,000
Value of Machines (₹)	80,000	60,000	40,000	-	-
Floor Area (sq. ft.)	15,000	10,000	7,500	5,000	2,500
Horsepower of Machines	60	50	40	-	-
Number of Light Points	60	45	30	15	10
Number of Labour Hours	5,000	4,000	3,000	-	-

Other details are as follows:

Indirect Materials:	₹29,600
Indirect Wages:	₹20,800
Depreciation on Machinery:	₹36,000
Depreciation on Buildings:	₹16,000
Rent, Rates and Taxes:	₹12,000
Electric Power:	₹45,000
Lighting:	₹ 3,200
General Expenses:	₹10,400

The expenses of Service Departments X and Y shall be apportioned as follows:

Departments	A	B	C	X	Y
X	30%	40%	20%	-	10%
Y	10%	20%	50%	20%	-

Solution

Statement Showing Apportionment of Overheads

(Primary Distribution Statement)

Particulars	Basis	Total (₹)	Production Depts.			Service Dept.	
			A	B	C	X	Y
Direct Materials	Only of X and Y	14,000	-	-	-	8,000	6,000
Direct Wages	Only of X and Y	7,000	-	-	-	4,000	3,000
Indirect Materials	Direct Materials	29,600	12,000	8,000	4,000	3,200	2,400
Indirect Wages	Direct Wages	20,800	8,000	6,000	4,000	1,600	1,200
Depreciation on Machinery	Value of Machine	36,000	16,000	12,000	8,000	-	-
Depreciation on Building	Floor Area	16,000	6,000	4,000	3,000	2,000	1,000
Rent, Rates and Taxes	Floor Area	12,000	4,500	3,000	2,250	1,500	750
Electric Power	Horsepower of Machines	45,000	18,000	15,000	12,000	-	-
Lighting	Light Points	3,200	1,200	900	600	300	200
General Expenses	Direct Wages	10,400	4,000	3,000	2,000	800	600
		1,94,000	69,700	51,900	35,850	21,400	15,150

Notes:

1. Since this Statement is prepared to show Distribution of Overheads, the Direct costs of Production Departments have not been shown. However, since the Service Department Costs have to be re-apportioned, the Direct Costs of those departments have been shown.
2. Indirect Material Cost has been apportioned in the ratio of Direct Material Cost of each department. The ratio of Direct Material Cost is 30:20:10:8:6**.**
3. Indirect Wages and General Expenses have been apportioned in the ratio of Direct Wages of each department. The ratio of Direct Wages is 20:15:10:4:3. General Expenses can alternatively be charged completely to Costing Profit and Loss Account, instead of apportioning to each department.
4. Depreciation of Machinery has been apportioned on the basis of Value of Machinery used in each department. The ratio of Value of Machinery is 4:3:2**.**
5. Depreciation on Buildings, and Rent, Rates and Taxes, have been apportioned in the ratio of Floor Area occupied by each department, given in square feet. The ratio of Floor Area is 6:4:3:2:1.
6. Electric Power Cost has been apportioned on the basis of Horsepower of the Machines used in each department. The ratio of Horsepower of the Machines is 6:5:3**.**
7. Lighting Expenses have been apportioned on the basis of Number of Light Points in each department. The ratio of Number of Light Points is 12:9:6:3:2.

Secondary Distribution (Under Repeated Distribution Method)

Statement Showing Re-apportionment of Overheads

(Secondary Distribution Statement)

Cost	Production Departments			Service Departments	
	A (₹)	B (₹)	C (₹)	X (₹)	Y (₹)
Cost according to Primary Distribution Statement	69,700	51,900	35,850	21,400	15,150
Re-apportionment of Dept. X Costs	6,420	8,560	4,280	(–)21,400	2,140
Re-apportionment of Dept. Y Costs	1,729	3,458	8,645	3,458	(–) 17,290
Re-apportionment of Dept. X Costs	1,037	1,383	692	(–)3,458	346
Re-apportionment of Dept. Y Costs	35	69	173	69	(–)346
Re-apportionment of Dept. X Costs	21	28	14	(–) 69	6
Re-apportionment of Dept. Y Costs	1	1	3	1	(–) 6
Re-apportionment of Dept. X Costs	--	1	--	(–) 1	--
	78,943	65,400	49,657		

Notes:

1. Costs of Department X have been apportioned in the given ratio of 30:40:20:10 to Departments A, B, C and Y respectively.
2. Costs of Department Y have been apportioned in the given ratio of 10:20:50:20 to Departments A, B, C and X respectively.
3. The re-apportionment has been rounded off to the nearest Rupee value.
4. When Service Department X's cost is ₹1, it has been apportioned only to production Department B, since the share of Service Department Y and other production departments is negligible.

Under Simultaneous Equation Method

Let X be the Total Cost of Department X (including the share of Department Y)

Let Y be the Total Cost of Department Y (including the share of Department X)

Then,

$$X = 21400 + 0.2Y$$

$$Y = 15150 + 0.1X$$

That is,

$X - 0.2Y = 21400$ (1)

$0.1X - Y = (-)\ 15150$ (2)

Multiplying Equation (2) with 0.2, we get,

$X - 0.2Y = 21400$ (1)

$0.02X - 0.2Y = (-)\ 3030$ (3)

By subtracting Equation (3) from Equation (1), we get, $0.98X = 24,430$. Therefore, X = ₹24,929 (rounded off).

Substituting value of 'X; in Equation (1), we get, Y = ₹17,643.

Statement Showing Re-apportionment of Overheads
(Secondary Distribution Statement)

Cost	Amount (₹)	Ratio	A (₹)	B (₹)	C (₹)
Cost according to Primary Distribution Summary			69,700	51,900	35,850
Cost of Service Department X	24,929	30% : 40% : 20%	7,479	9,971	4,986
Cost of Service Department Y	17,643	10% : 20% : 50%	1,764	3,529	8,821
			78,943	65,400	49,657

Calculation of Labour Overhead Rate Per Hour

	Department A	Department B	Department C
Total Overheads as per Secondary Distribution Statement	₹78,943	₹65,400	₹49,657
Number of Labour Hours	5000	4000	3000
Rate per Labour Hour	₹15.79	₹16.35	₹16.55

Problem 15 (Problem on Absorption of Production Overheads under Different Methods)

The following figures have been extracted from the books of a manufacturing company. All jobs pass through the company's two departments:

Particulars	Welding Department	Finishing Department
Material Used (₹)	60,000	50,000
Direct Labour (₹)	30,000	15,000
Factory Overheads (₹)	18,000	12,000
Direct Labour Hours	12,000	5,000
Machine Hours	10,000	2,000
The following information relates to Job 27:		
- Material	₹1,200	₹100
- Direct Labour	₹650	₹250
- Direct Labour Hours	265 hours	70 hours
- Machine Hours	255 hours	25 hours

(i) List the different methods of absorbing Factory overheads by jobs, showing the rates for each department under the methods; and

(ii) Prepare a statement showing the different cost results for Job 27 under each of the methods referred to.

Solution

Method	Welding Department	Finishing Department
Percentage of Direct Material	₹18,000/₹60,000 = 30%	₹12,000/₹50,000 = 24%
Percentage of Direct Labour	₹18,000/₹30,000 = 60%	₹12,000/₹15,000 = 80%
Percentage of Prime Cost	₹18,000/(₹60,000 + ₹30,000) = 20%	₹12,000/(₹50,000 + ₹15,000) = 18.46%
Labour Hour Rate	₹18,000/12000 Hours = ₹1.50 per hour	₹12,000/5000 Hours = ₹2.40 per hour
Machine Hour Rate	₹18,000/10000 Hours = ₹1.80 per hour	₹12,000/2000 Hours = ₹6 per hour

Statement of Cost for Job Number 27

Particulars	% of Direct Material (₹)	% of Direct Labour (₹)	% of Prime Cost (₹)	Labour Hour Rate (₹)	Machine Hour Rate (₹)
Welding:					
Materials	1200	1200	1200	1200.00	1200
Labour	650	650	650	650.00	650
Factory O/H	360	390	370	397.50	459
	2210	2240	2220	2247.50	2309
Finishing:					
Materials	100	100	100.00	100	100
Labour	250	250	250.00	250	250
Factory O/H	24	200	64.61	168	150
	374	550	414.61	518	500
Total	**2584**	**2790**	**2634.61**	**2765.50**	**2809**

Note: The Factory Overheads for Job 27 have been estimated for Welding and Finishing Departments as follows:

Method	Welding Department	Finishing Department
Percentage of Direct Material	30% of ₹1200 = ₹360	24% of ₹100 = ₹24
Percentage of Direct Labour	60% of ₹650 = ₹390	80% of ₹250 = ₹200
Percentage of Prime Cost	20% of ₹1850 = ₹370	18.46% of ₹350 = ₹64.61
Labour Hour Rate	265 Hours × ₹1.50 per hour = ₹397.50	70 Hours × ₹2.40 per hour = ₹168
Machine Hour Rate	255 Hours × ₹1.80 per hour = ₹459	25 Hours × ₹6.00 per hour = ₹150

Problem 16 (Problem on Absorption of Production Overheads – Labour Hour Rate)

Nischal Ltd. provides you the following information for the month of December, 2013.

	₹
Rent and Rates	40,000
Lighting	7,000
Supervision	80,000
Oil and Cotton Waste	3,000
Expected Man Hours in the month	5,200
Expected Power Consumption per man hour	1
Depreciation of Tools per Man Hour	6

You are required to calculate Labour Hour Rate from the given data and find out the works cost of an article adopting Labour Hour Rate for the purpose of recovering the Factory Overheads. The cost of material required is ₹5,000 and Labour Cost per hour is ₹150. Time taken by a worker to complete the job is 20 hours.

Solution

Calculation of Labour Hour Rate

Particulars	₹
Rent and Rates per man hour (₹40,000/5,200)	7.69
Lighting per man hour (₹7,000/5,200)	1.35
Supervision per man hour (₹80,000/5,200)	15.38
Oil and Cotton Waste per man hour (₹3,000/5,200)	0.58
Power Consumption	1.00
Depreciation of tools	6.00
Labour Hour Rate	32.00

Calculation of Works Cost

Particulars	₹
Direct Material	5,000
Direct Labour (₹150 per hour × 20 hours)	3,000
Prime Cost	8,000
Add: Factory Overheads (₹32 per hour × 20 hours)	640
Works Cost	8,640

Problem 17 (Problem on Absorption of Production Overheads – Labour Hour Rate)

Apoorva Ltd. provides you the following information for a particular department. You are required to calculate Labour Hour Rate and find out the works cost of an article adopting Labour Hour Rate for the purpose of recovering the Factory Overheads. The cost of Direct Material is ₹10,000 and Direct Labour is ₹6,000. The time required to complete the job is 600 Labour Hours.

- Annual Rent of the factory, having an area of 10,000 sq. ft. is ₹2,75,000. This department has 4,000 sq. ft. of area.
- Annual Rates ₹24,000
- Annual Lighting of the factory having 80 Light Points is ₹40,000. This department has 60 Light Points.
- Annual Meeting Charges of the department are ₹7,500.
- Sundry Materials used in the department during the year cost ₹6,500.
- One foreman looks after the department, who is paid a salary of ₹7,000 per month.
- The department has 28 workers and on an average, 3 workers will be on leave. The department works for 2,000 hours in a year, on average.

Solution

Calculation of Labour Hours per annum

Number of Labour Hours per annum = (Number of Workers on actual work) × (Average Number of working hours in a year)

= (28 – 3) × 2,000

= 50,000 hours

Calculation of Labour Hour Rate

Particulars	₹
Rent (₹1,10,000/50,000) – See Note 1	2.20
Rates (₹24,000/50,000)	0.48
Lighting (₹30,000/50,000) – See Note 2	0.60

(*Contd.*)

Particulars	₹
Meeting Charges (₹7,500/50,000)	0.15
Sundry Materials (₹6,500/50,000)	0.13
Foreman's Salary[(7,000 × 12)/50,000]	1.68
Labour Hour Rate	5.24

Notes:

1. Rent for the department is calculated as follows:
$$\left(\frac{₹2,75,000}{10,000}\right) \times 4,000 = ₹1,10,000$$
2. Lighting for the department is calculated as follows:
$$\left(\frac{₹40,000}{80}\right) \times 60 = ₹30,000$$

Calculation of Works Cost

Particulars	₹
Direct Material	10,000
Direct Labour	6,000
Prime Cost	16,000
Add: Factory Overheads (₹5.24 per hour × 600 hours)	3,144
Works Cost	19,144

Problem 18 (Problem on Absorption of Production Overheads – Machine Hour Rate)

Work out the Machine Hour Rate for the following machine whose scrap value is nil.

Cost of Machine	₹ 90,000
Other charges for freight and installation of the machine	₹ 10,000
Working Life of the Machine	10 years
Working Hours per annum	2,000
Repair Charges	50% of depreciation
Power Consumption	10 units per hour at ₹5 per unit
Lubricating Oil	₹ 120 per day of 8 hours
Consumable Stores	₹ 100 per day of 8 hours
Wages of Machine Operators	₹ 400 per day of 8 hours

Solution

Calculation of Machine Hour Rate

Particulars	₹
Standing Charges Per Annum	
Lubricating Oil (₹120/8) × 2,000	30,000
Consumable Stores (₹100/8) × 2,000	25,000
Wages (₹400/8) × 2,000	1,00,000
Total Standing Charges per Annum	1,55,000
Standing Charges Per Machine Hour (₹1,55,000/2,000)	77.50
Add: **Variable Charges Per Machine Hour**	
Depreciation (₹10,000/2,0000) – See Note 2	5.00
Repair Charges (50% of Depreciation)	2.50
Power consumed (10 units × ₹5)	50.00
Machine Hour Rate	135.00

Notes:

1. Since the Machine Hours are given per annum, the Standing Charges are calculated per annum.
2. Depreciation is calculated using Straight Line Method, as follows:

$$\text{Annual Depreciation} = \frac{(\text{Cost of Machine} + \text{Installation Charges} - \text{Scrap Value})}{\text{Number of years of life of Machine}}$$

$$= \frac{(₹90,000 + ₹10,000 - \text{Nil})}{10 \text{ Years}}$$

$$= ₹10,000$$

Problem 19 (Problem on Absorption of Production Overheads – Machine Hour Rate)

From the following information, calculate the Machine Hour Rate.

Rent of the Department:	₹78,000 per annum
(Space occupied by machine: 1/5th of the department)	
Lighting:	₹28,800 per annum
(Number of Light Points in the department: 12; there are 2 Light Points at the place of machine)	
Insurance:	₹3,600 per annum
Cotton Waste, Oil, etc.:	₹6,000 per annum
Salary of Foreman:	₹60,000 per annum
(1/4th of his time is devoted on this machine and the remainder, equally upon the other 2 machines)	
Cost of Machine:	₹9,20,000
Estimated Scrap Value:	₹20,000

It is assumed from the past experience that:

(a) The machine will work for 1,800 hours per annum.
(b) It will incur an expenditure of ₹1,12,500 per annum for repairs and maintenance.
(c) It consumes 5 units of power per hour at a cost of ₹5 per unit and
(d) The working life of the machine is 10 years.

Solution

Calculation of Machine Hour Rate

Particulars	₹
Standing Charges Per Annum	
Rent (₹78,000/5)	15600
Lighting (₹28,800/12) × 2	4800
Insurance	3600
Cotton Waste, Oil, etc.	6000
Salary of Foreman (₹60,000/4)	15000
Total Standing Charges	45,000
Standing Charges per Machine Hour (₹45,000/1,800)	25.00
Add: **Variable Charges per Machine Hour**	
Depreciation (₹90,000/1,800)	50.00
Repair and Maintenance (₹1,12,500/1,800)	62.50
Power Consumed (5 units × ₹5)	25.00
Machine Hour Rate	162.50

Notes:

1. Since the Machine Hours are given per annum, the Standing Charges are calculated per annum.
2. Depreciation is calculated using Straight Line Method, as follows:

$$\text{Annual Depreciation} = \frac{(\text{Cost of Machine} + \text{Installation Charges} - \text{Scrap Value})}{\text{Number of years of life of Machine}}$$

$$= \frac{(₹9,20,000 + \text{Nil} - ₹20,000)}{10 \text{ Years}}$$

$$= ₹90,000$$

Problem 20 (Problem on Absorption of Production Overheads – Machine Hour Rate)

From the following data calculate Machine Hour Rate.

Particulars	₹
Cost of Machine	5,00,000
Installation Expenses	50,000
Estimated Scrap Value after 15 years	25,000
Rent and Rates per annum	10,000
General lighting per annum	15,000
Insurance of Machine per annum	48,000
Repair and Maintenance of Machine per annum	50,000
Supervisor's Salary per month	30,000

The machine consumes 10 units of electric power per hour and the Rate of Power per 10 units is ₹100. Estimated Working Hours per annum is 2,200, which includes Maintenance and Setting-up Time of 200 hours. The machine occupies ¼ of the floor area and the supervisor devotes 1/5th of his time on this machine.

Solution

Calculation of Machine Hour Rate

Particulars	₹
Standing Charges per Annum	
Rent and Rates (₹10,000/4)	2,500
General Lighting (₹15,000/4)	3,750
Insurance	48,000
Supervisor's Salary (₹30,000/5) × 12	72,000
Total Standing Charges	1,26,250
Standing Charges per Machine Hour (₹1,26,250/2,000 Hours) – See Note 2	63.13
Add: **Variable Charges per Machine Hour**	
Depreciation (₹35,000/2,000)	17.50
Repair and Maintenance (₹50,000/2,000)	25.00
Power Consumed (10 units × ₹10)	100.00
Machine Hour Rate	205.63

Notes:

1. Since the Machine Hours are given per annum, the Standing Charges are calculated per annum.
2. Number of Machine Hours for the year = Estimated Working Hours (Less) Set-up Time
   = 2,200 – 200 Hours
   = **2,000 Hours**.
3. Depreciation is calculated using Straight Line Method, as follows:

$$\text{Annual Depreciation} = \frac{(\text{Cost of Machine} + \text{Installation Charges} - \text{Scrap Value})}{\text{Number of years of life of Machine}}$$

$$= \frac{(₹5,00,000 + ₹50,000 - ₹25,000)}{15 \text{ Years}}$$

$$= ₹35,000$$

Problem 21 (Problem on Absorption of Production Overheads – Machine Hour Rate)

Calculate the Machine Hour Rate from the following particulars.

Cost of Machine	₹ 12,50,400
Estimated Life of Machine	1,50,000 Hours
Estimated Scrap Value of the Machine	₹ 50,400
Estimated Working Hours	200 per month
Estimated Hours required for Maintenance	20 per month
Setting-up Time	5%
Power consumption	3 units per hour at ₹5.73 per unit
Cost of Repairs and Maintenance per annum	₹ 15,000
Number of Operators (looking after 3 other machines also)	2
Wages per operator per month	₹ 15,000
Chemicals required for operating this machine per month	₹ 1,000
Other Overheads chargeable to this machine per month	₹ 2,000

Insurance Premium per annum is 1% of the cost of the machine.

Solution

Calculation of Machine Hour Rate

Particulars	₹
Standing Charges Per Month	
Wages of Operators (₹15,000 × 2)/4	7,500
Chemicals required	1,000
Other Overheads	2,000
Insurance Premium (₹12,50,400 × 1%) /12	1,042
Total Standing Charges	11,542
Standing Charges per Machine Hour (₹11542/171) – See Note 2	67.50
***Add:* Variable Charges per Machine Hour**	
Depreciation – See Note 3	8.00
Repair and Maintenance (₹15,000/12) /171	7.31
Power Consumed (3 units × ₹5.73 per unit)	17.19
Machine Hour Rate	100.00

Notes:

1. Since the Machine Hours are given per month, the Standing Charges are calculated per month.
2. **Number of Machine Hours for the Month:**

Estimated Working Hours per month	200
Less Maintenance Hours per month	20
Balance Hours per month	180
Less Setting-up Time 5% of balance hours	9
Effective Working Hours per month	171

3. **Depreciation**
   Life of the machine is given in hours. Hence, Depreciation becomes a Variable Charge and it can be calculated in the following manner:

$$\text{Depreciation per hour} = \frac{(\text{Cost of the Machine} - \text{Scrap Value})}{\text{Life of Machine (hours)}}$$

$$= \frac{(₹12,50,400 - ₹50,400)}{1,50,000 \text{ hours}} = \textbf{₹8 per hour}$$

Problem 22 (Problem on Absorption of Production Overheads – Machine Hour Rate)

Following data is available regarding Machine A and Machine B. Calculate Machine Hour Rate.

Particulars	₹
Consumable Stores: Machine A	3,000
Machine B	5,000
Repair Expenses: Machine A	2,574
Machine B	5,616
Depreciation	18,000
Insurance: Machineries	15,000
Buildings	12,000
Room Services	3,000
General Expenses	2,000
Power Consumed: Machine A	26,800
Machine B	18,600

Additional Information:

Particulars	Machine A	Machine B
Number of Working Hours	2,200	1,800
Area Occupied (sq. ft.)	3,000	5,000
Book Value (₹)	40,000	60,000

Note:
Apportion General Expenses equally between Machine A and Machine B.

Solution

Calculation of Machine Hour Rate

Particulars	Basis of Apportionment	Machine A (Number of Hours: 2,200) (₹)	Machine B (Number of Hours: 1,800) (₹)
Standing Charges Per Annum			
Consumable Stores	Direct	3,000	5,000
Insurance of Machineries	Book Value (4:6)	1,125	1,875
Insurance of Buildings	Area (3:5)	6000	9,000
Room Services	Area (3:5)	4,500	7,500
General Expenses	As per instruction	1,000	1,000
Total Standing Charge		15,625	24,375

Particulars	Basis of Apportionment	Machine A (Number of Hours: 2,200) (₹)	Machine B (Number of Hours: 1,800) (₹)
Standing Charges Per Machine Hour		7.10	13.54
Add: **Variable Charges Per Machine Hour**			
Depreciation (₹7,200/2,200) and (₹10,800/1,800)		3.27	6.00
Repair Expenses (₹2,574/2,200) and (₹5,616/1,800)		1.17	3.12
Power Consumed (₹26,800/2,200) and (₹18,600/1,800)		12.18	10.33
Machine Hour Rate		23.72	32.99

Note:
Depreciation is apportioned between Machine A and Machine B in the ratio of Book Value.

$$\text{Depreciation of Machine A} = \frac{₹18{,}000 \times 4}{10} = 7{,}200$$

$$\text{Depreciation of Machine B} = \frac{₹18{,}000 \times 6}{10} = 10{,}800$$

Problem 23 (Problem on Absorption of Production Overheads – Machine Hour Rate)

A department has three machines. From the following figures of Departmental Expenses, you are required to calculate Machine Hour Rate with respect to these machines.

	₹
Lighting	10,000
Insurance of the Building	21,000
Rent of the Building	60,000
Insurance of Machine	36,900
Indirect Labour	46,000
General Expenses	1,84,800
Depreciation	1,44,000
Repair Expenses	1,80,000
Power Consumption	2,20,000

The necessary data for apportionment of expenses is as follows:

Particulars	Machine 1	Machine 2	Machine 3
Horsepower	25	20	10
Area Occupied (sq. ft.)	80	120	40
Value of Machines (In lakh)	24	32	16
Number of Light Points	8	24	48
Machine Hours	2,000	2,200	1,800
Direct Labour (₹)	1,200	2,400	2,400

[*BU B.Com, May (2017) (modified)*]

Solution

Calculation of Machine Hour Rate

Particulars	Basis of Apportionment	Machine 1 (2,000 Hours) (₹)	Machine 2 (2,200 Hours) (₹)	Machine 3 (1,800 Hours) (₹)
Standing Charges per Annum				
Lighting (8:24:48)	Number of Light Points	1,000	3,000	6,000
Insurance of Building (80:120: 40)	Area of Building	7,000	10,500	3,500
Rent of Building (80:120:40)	Area of Building	20,000	30,000	10,000
Insurance of Machine (24:32:16)	Value of Machine	12,300	16,400	8,200
Indirect Labour (12:24:24)	Direct Labour	9,200	18,400	18,400
General Expenses (12:24:24)	Direct Labour	36,960	73,920	73,920
Direct Labour	Actual	1,200	2,400	2,400
Total Standing Charges		87,660	1,54,620	1,22,420
Standing Charges per Machine Hour Add				
Variable Charges per Machine Hour		43.83	70.28	68.01
Depreciation – See Note 1		24.00	29.09	17.78
Repair Expenses – See Note 2		30.00	36.36	22.22
Power consumed – See Note 3		50.00	36.36	22.22
Machine Hour Rate		147.83	172.09	130.23

Notes:

1. **Calculation of Depreciation per hour**

Particulars	Total	Machine 1	Machine 2	Machine 3
Amount of Depreciation – apportioned on the basis of Value of Machines (Ratio – 3:4:2)	₹1,44,000	₹48,000	₹64,000	₹32,000
Number of Machine Hours		2,000	2,200	1,800
Depreciation per hour		₹24	₹29.09	₹17.78

2. **Calculation of Repair Expenses per hour**

Particulars	Total	Machine 1	Machine 2	Machine 3
Amount of Repair Expenses – apportioned on the basis of Value of Machines (Ratio – 3:4:2)	₹1,80,000	₹60,000	₹80,000	₹40,000
Number of Machine Hours		2,000	2,200	1,800
Depreciation per hour		₹30	₹36.36	₹22.22

3. **Calculation of Power consumed per hour**

Particulars	Total	Machine 1	Machine 2	Machine 3
Amount of Power Cost – apportioned on the basis of Value of Machines (Ratio – 5:4:2)	₹2,20,000	₹1,00,000	₹80,000	₹40,000
Number of Machine Hours		2,000	2,200	1,800
Depreciation per hour		₹50	₹36.36	₹22.22

Problems on Accounting for Selling and Distribution Overheads

Problem 24 (Problem on Apportionment of Selling and Distribution Overheads)

A company is making a study of the relative profitability of two products – A and B. In addition to Direct Costs, Indirect Selling and Distribution Costs to be allocated between the two products are as follows:

	₹
Insurance Charges for finished inventory	78,000
Storage Costs	1,40,000
Packing and Forwarding Charges	7,20,000
Salesmen Salaries	8,50,000
Salesmen Commission	6,50,000
Invoicing Costs	4,50,000

Other details are given as follows:

Particulars	Product A	Product B
Selling Price per unit	₹500	₹1,000
Cost per unit (exclusive of Indirect Selling and Distribution Costs)	₹300	₹600
Actual Sales in units	10,000 units	8,000 units
Average Inventory	1,000 units	800 units
Number of Invoices	2,500	2,000

One unit of product A requires storage space that is twice as much as product B. The Cost to pack and forward one unit is the same for both the products. Salesmen are paid Salary plus Commission at the rate of 5% on Sales and equal amount of efforts are put forth on the sales of each of the products.

Required:

(a) Set up a Schedule showing apportionment of Indirect Selling and Distribution Costs between the two products.

(b) Prepare a Statement showing the relative profitability of the two products.

Solution

Statement showing Apportionment of Indirect Selling and Distribution Overheads

Element of Cost	Amount (₹)	Basis of Apportionment	Ratio	Product A (₹)	Product B (₹)
Insurance	78,000	Average Value of inventory (See W.N. (i))	5:8	30,000.00	48,000.00
Storage Costs	1,40,000	Storage Space (See W.N (ii))	5:2	1,00,000.00	40,000.00
Packing and Forwarding	7,20,000	Annual Sales in Units	5:4	4,00,000.00	3,20,000.00
Salesmen Salaries	8,10,000	Salesmen Efforts (See: W.N. (iii))	5:4	4,50,000.00	3,60,000.00
Salesmen Commission	6,50,000	Value of Sales (See W.N. (iv))	5:8	2,50,000.00	4,00,000.00
Invoicing Costs	4,50,000	Number of Invoices	5:4	2,50,000.00	2,00,000.00
	28,48,000			14,80,000.00	13,68,000.00

Notes:

(i) Average Sales Value Inventory Ratio

Particulars	Product A	Product B
Number of units of Inventory	1,000	800
Selling Price per unit	₹500	₹1,000
Value of Inventory (at Selling Price)	₹5,00,000	₹8,00,000
Ratio based on Value of Inventory	5	8

Hence, the ratio is 5:8

(ii) Storage Space Ratio

Particulars	Product A	Product B
Number of units of Inventory	1,000	800
Inventory Ratio	5	4
Storage Space Ratio	2	1
Compound Ratio	10	4

Hence, the ratio is 10:4 or 5:2

(iii) Salesmen Efforts Ratio

Particulars	Product A	Product B
Number of Units sold	10,000	8,000
Sales Ratio	5	4
Salesmen Effort Ratio	1	1
Compound Ratio	5	4

Hence, the ratio is 5:4

(iv) Sales Value Ratio

Particulars	Product A	Product B
Number of Units sold	10,000	8,000
Selling Price per unit	₹500	₹1,000
Annual Sales Value	₹50,00,000	₹80,00,000
Annual Sales Value Ratio	5	8

Hence, the ratio is 5:8

Statement Showing Profitability

Particulars	Product A (10,000 Units)		Product B (8,000 Units)		TOTAL
	Total (₹)	P.U (₹)	Total (₹)	P.U (₹)	(₹)
Sales	50,00,000.00	500.00	80,00,000.00	1000.00	130,00,000.00
Less: Cost of Sales	30,00,000.00	300.00	48,00,000.00	600.00	78,00,000.00
	20,00,000.00	200.00	32,00,000.00	400.00	52,00,000.00
Less: Selling and Distribution Overheads (See Previous Statement)	14,80,000.00		13,68,000.00		28,48,000.00
	5,20,000.00		18,32,000.00		23,52,000.00
Profits as a Percentage of Sales	**10.4%**		**22.9%**		**18.09%**

Problem 25 (Problem on Apportionment of Selling and Distribution Overheads)

A company that sells four products–some of them unprofitable–proposes discontinuing the sale of one of them. The following information is available regarding the Income, Costs, and Activity for the year ended 31 March 2018:

	Products			
	A	**B**	**C**	**D**
Sales (₹)	3,00,000	5,00,000	2,50,000	4,50,000
Cost of Sales (₹)	2,00,000	4,50,000	2,10,000	2,25,000
Area of Storage (sq. ft.)	50,000	40,000	80,000	30,000
Number of Parcels Sent	1,00,000	1,50,000	75,000	1,75,000
Number of Invoices Sent	80,000	1,40,000	60,000	1,20,000

Selling and Distribution Overheads and the basis of allocation are:

Overhead	₹	Basis of Apportionment
Fixed Costs:		
Rent and Insurance	30,000	Square Feet
Depreciation	10,000	Parcel
Salesmen's Salaries and Expenses	60,000	Sales Volume
Administrative Wages and Salaries	50,000	Number of invoices
Variable Costs:		
Packing wages and materials		₹0.20 per parcel
Commission		4% of Sales
Stationery		₹0.10 per invoice

You are required to prepare a Statement showing profits and profitability of each product.

Solution

Statement of Profits

	Total	Products			
	(₹)	A (₹)	B (₹)	C (₹)	D (₹)
Sales	15,00,000	3,00,000	5,00,000	2,50,000	4,50,000
Costs					
Cost of Sales	10,85,000	2,00,000	4,50,000	2,10,000	2,25,000
Rent and Insurance	30,000	7,500	6,000	12,000	4,500
Depreciation	10,000	2,000	3,000	1,500	3,500
Administrative Wages and Salaries	50,000	10,000	17,500	7,500	15,000
Stationery	40,000	8,000	14,000	6,000	12,000
Salesmen's Salaries and Expenses	60,000	12,000	20,000	10,000	18,000
Commission on Sales	60,000	12,000	20,000	10,000	18,000
Packing Wages and Materials	1,00,000	20,000	30,000	15,000	35,000
Total Cost	14,35,000	2,71,500	5,60,600	2,72,000	3,31,000
Profits	65,000	28,500	(–) 60,500	(–) 22,000	1,19,000
Percentage of Profits on Sales	4.3%	9.5%	(–) 12.1%	(–) 8.8%	26.4%

Notes:

1. In the given Statement, the costs are shown in the order of functions, i.e., Production, Administration, and Selling and Distribution. Alternatively, the Statement can be prepared by classifying the Overheads on the basis of behaviour, as Variable and Fixed.

2. Cost of Sales for each product is given in the problem.
3. Rent and Insurance is apportioned on the basis of Area of Storage for each product, which is in the ratio of 5:4:8:3.
4. Depreciation is apportioned on the basis of Number of Parcels for each product, which is in the ratio of 4:6:3:7.
5. Administrative Wages and Salaries are apportioned on the basis of Number of Invoices for each product, which is in the ratio of 4:7:3:6.
6. Stationery for each product is calculated at the rate of ₹0.10 per Invoice.
7. Salesmen Salaries and Expenses are apportioned on the basis of Sales Value, which is in the ratio of 6:10:5:9. (Although, the problem specifies Sales Volume as the basis of apportionment for this expenditure, since the volume of sales is not available, the apportionment is made on the basis of Value of Sales).
8. Commission on Sales is calculated at the rate of 4% of Sales of each product.
9. Packing Wages and Materials is calculated at the rate of ₹0.20 per Parcel.

SUMMARY

- **Overheads** are the expenditure, which cannot be traced to or identified with any particular Cost Unit. They are expenses, which are not directly identifiable or allocable to a Cost Object. They include Indirect Materials, Indirect Wage and other Employee Costs and any other Indirect Expenses.
- Overheads are of different types, classified on different bases.
- On the basis of the functions the Overheads perform, they are classified as Factory Overheads, Office and Administration Overheads, Selling and Distribution Overheads and Research and Development Overheads.
- On the basis of the elements on which cost is incurred, Overheads are classified as Indirect Materials, Indirect Labour and Indirect Expenses.
- On the basis of their controllability, Overheads are classified as Controllable and Uncontrollable Overheads.
- On the basis of their behaviour, Overheads are classified as Fixed Overheads, Variable Overheads and Semi-variable Overheads.
- Overhead Costing involves accounting and control of each Overhead.
- Accounting and Control of Factory or Manufacturing Overheads involves Estimation and Collection of Manufacturing Overheads, Cost Allocation, Cost Apportionment, Cost Re-apportionment, Absorption and Treatment for over-absorption and under-absorption of Overheads.
- Allocation of Overheads refers to assigning a whole item of Cost, directly to a particular Cost Centre or Cost Unit.
- Cost Apportionment is the allotment of proportion of cost to Cost Centres or Cost Units, on some appropriate basis.
- Cost Re-apportionment refers to the apportionment of Service Department Overheads to Production Departments. It can be made either using Direct Re-distribution Method or Step-Ladder Method or Repeated Distribution Method or Simultaneous Equation Method.
- Expression of Overhead on some parameter and showing Overhead Rate is called Absorption. Absorption of Overheads may be done using Direct Method (Rate per unit of Output), or Indirect Methods (Percentage of Direct Materials, Percentage of Prime Cost, Percentage of Direct Labour Cost, Labour Hour Rate, Machine Hour Rate)
- Machine Hour Rate is of three types, viz., Direct Machine Hour Rate, Simple Machine Hour Rate and Comprehensive Machine Hour Rate. Direct Machine Hour Rate is the rate calculated when Total Overheads include only Overheads directly or immediately connected with the machine, like Power, Depreciation, Insurance, etc. Simple Machine Hour Rate is the rate calculated when Total Overheads include Overheads directly or immediately connected with the machine and share of general expenses, like Rent, Supervision, Indirect Labour, etc. Comprehensive Machine Hour Rate is the rate calculated when Total Overheads include Overheads directly or immediately connected with the machine, General Overheads apportioned and Wages of operator for the machine.
- When the Overheads absorbed (i.e., estimated) are more than Actual, it is a case of over-absorption; whereas, when the Overheads absorbed are less than Actual, it is a case of under-absorption.

- There are three methods for accounting Office and Administration Overheads, which are Apportioning Administrative Overheads between Production and Sales Departments, Charging Administrative Overheads to Profit and Loss Account, and Treating Administrative Overheads as a separate addition to Cost of Production/ Cost of Sales.
- Accounting for Selling and Distribution Overheads involves the following: collection and accumulation of Selling and Distribution Overheads from the Books of Accounting – Journal Entries, Cash Book, etc., apportionment of these expenses among various Cost Centres or Cost Units on appropriate bases, and absorption of these expenses on the basis of number of units sold.
- There are three methods for exercising control on Selling and Distribution Overheads viz., Comparing current-year Selling and Distribution Overheads with those of the preceding year and ascertaining the major variations, reasons for such variations and taking corrective actions for any controllable factors; Comparing the actual Selling and Distribution Overheads with budgeted figures, ascertaining variances, analysing those variances, identifying the reasons for variance and taking corrective actions, if need be; and Comparing the actual Selling and Distribution Overheads with standards set, and ensuring that the Actual meet the Standards, thereby controlling Costs.
- Research Expenses refer to the expenditure incurred for designing new or improved products, production methods or techniques. Development Expenses refer to the expenditure incurred for implementation of the decision to produce a new or improved product or to employ a new or improved method. The accounting treatment for Development Expenses is the same as that of Applied Research.

EXERCISES

Section B Type Questions

Problem 1 (Problem on Calculation of Machine Hour Rate)

From the following particulars, compute Machine Hour Rate:

Cost of Machine	₹ 1,14,800
Installation Charges	₹ 5,400
Anticipated Life of Machine	10 years
Scrap Value at the end of 10 years	₹ 5,000
Rent and Rates per annum	₹ 12,000
Power Cost	5 units per hour at 40 Paisa per unit

There are 300 working days of 8 hours each in a year.

[*BU B.Com, May (2017)*)]

[Ans: ₹11.80]

Problem 2 (Problem on Calculation of Machine Hour Rate)

Compute the Machine Hour Rate from the following:

Cost of Machine	₹ 11,000
Scrap Value	₹ 680
Repairs for Effective Working Life	₹ 1,500
Standing charges for a 4-week period	₹ 1,600
Effective Working Life	10,000 hours
Power Used	6 units per hour at 5 Paisa per unit
Hours worked in 4-week period	120 hours

[*BU B.Com, May (2014)*]

[Ans: ₹14.815]

Problem 3 (Problem on Calculation of Machine Hour Rate)

Calculate Machine Hour Rate from the following:

Cost of Machine	₹ 78,000
Cost of Installation	₹ 2,000
Scrap Value after 10 years	₹ 2,000
Rent, Rates and Lighting of the shop per year	₹ 3,600
Supervisor's Salary per annum	₹ 13,600
Power	2 units per hour at ₹5 per unit
Estimated Working Hours of Machine	2,000 per annum

[*BU B.Com, May (2013), May (2011)*]

[Ans: ₹22.50]

Problem 4 (Problem on calculation of Machine Hour Rate)

From the following data relating to a machine, calculate Machine Hour Rate.

Purchase Cost of the machine	₹ 2,00,000
Scrap value after 10 years of life	₹ 20,000
Yearly Working Hours	2,000
Charge 50% of Depreciation as repairs	
Power Cost	5 units per hour, at ₹5 per unit
Oil Expenses	₹ 20 per day of 8 hours
Consumable Stores	₹ 100 per day of 8 hours

[*BU B.Com, May (2011)*]

[Ans: ₹53.50]

Problem 5 (Problem on Overhead Distribution – Simultaneous Equation Method)

Distribute the Service Department expenses to Production Departments using Simultaneous Equation Method.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Total Departmental Overheads	15,100	14,400	19,300	9,250	3,150
Distribution of Service Department Expenses:					
X	20%	30%	40%	-	10%
Y	40%	20%	30%	10%	-

[*BU B.Com, May (2011)*]

[Ans: A: ₹18,679; B: ₹17,721 and C: ₹24,400]

Problem 6 (Problem on Overhead Distribution – Repeated Distribution Method)

A manufacturing concern has three Production Departments and two Service Departments. In July 2012, the Departmental Expenses are as follows:

Production Departments	Service Departments
A: ₹16,000 B: ₹13,000 C: ₹14,000	X: ₹4,000 Y: ₹6,000
Total: ₹43,000	Total: ₹10,000

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

Particulars	A	B	C	X	Y
Expenses of Department X	20%	25%	35%	-	20%
Expenses of Department Y	25%	25%	40%	10%	-

Prepare a Statement showing the apportionment of Service Department Expenses to Production Departments under Repeated Distribution Method.

[*BU BBM, May (2013)*]

[Ans: A: ₹18,673; B: ₹15,008 and C: ₹18,418]

Section C Type Questions

Problem 1 (Problem on Calculation of Machine Hour Rate)

From the following figures, compute Machine Hour Rate for machines X, Y and Z for a four-week period. Each machine is expected to work for 216 hours.

Rent and Rates	₹ 30,000
Lighting	₹ 4,000
Depreciation	₹ 20,000
Indirect Wages	₹ 20,000
Power	₹ 12,000
Sundries	₹ 30,000
Canteen Expenses	₹ 2,000
Repairs	₹ 8,000
Total	₹ 1,26,000

Other details:

Particulars	X	Y	Z
Area Occupied (sq. ft.)	200	400	600
Number of Light Points	20	60	120
Cost of Machine (₹)	2,50,000	1,50,000	1,00,000
Number of Workers	20	40	40
Power Actual (₹)	5,000	3,000	4,000
Direct Wages (₹)	40,000	60,000	50,000

[*BU B.Com, May (2017)*]

[Ans: Machine X: ₹176.55; Machine Y: ₹200.93 and Machine Z: ₹205.87]

Problem 2 (Problem on Calculation of Machine Hour Rate)

Compute Machine Hour Rate from the following:

Cost of Machine	₹ 1,00,000
Installation Charges	₹ 10,000
Estimated Scrap Value (after 15 years)	₹ 5,000
Rent and rates for the shop	₹ 200 per month
Insurance for the Machine	₹ 960 per annum
Lighting for the Shop	₹ 300 per month
Repairs and Maintenance for the Machine	₹ 1,000 per annum
Power Consumption (10 units per hour)	₹ 2 per hour
Estimated Working Hours	167 per month
Shop Supervisor Salary	₹ 600 per month

The machine occupies $1/4^{th}$ of the total area of the shop. The supervisor is expected to devote $1/5^{th}$ of his time for this machine.

[*BU B.Com, May (2015)*]

[Ans: ₹25.4966]

Problem 3 (Problem on Calculation of Machine Hour Rate)

A product plant works with two machines X and Y. From the following information, compute Machine Hour Rate of machines X and Y.

Particulars	Machine X (₹)	Machine Y (₹)
Cost of Machine	80,000	1,00,000
Cost of Installation	20,000	10,000
Scrap Value	10,000	-
Estimated Life (years)	10	10
Working Hours per year	2,000	1,800

Following expenses are incurred in the production plant.

Rent per month	₹ 3,000
General lighting per month	₹ 200
Supervisor salary per month	₹ 6,000
Power	2 units per hour by each machine at ₹2 per unit
Canteen Expenses per annum	₹ 10,000
Repairs per annum	₹ 20,000 per machine

Other details:

Particulars	Machine X	Machine Y
Area Occupied (sq. ft.)	300	600
Number of Light Points	12	6
Number of Workers	10	8
Time devoted by supervisor	1/3	2/3

[*BU B.Com, May (2013)*]

[Ans: Machine X: 40.08 and Machine Y: 64.13]

Problem 4 (Problem on Overhead Distribution)

X Co. is having three Production Departments – A, B and C and one Service Department – D. The Actual Costs for a certain period are given as follows:

Rent	₹ 20,000
Supervision	₹ 30,000
Repairs	₹ 12,000
Insurance on Materials	₹ 10,000
Depreciation	₹ 9,000
Employees Insurance	₹ 3,000
Lighting	₹ 2,000
Power	₹ 18,000

Following data is also available:

Particulars	A	B	C	D
Area (sq. ft.)	150	110	90	50
Number of Workers	24	16	12	8
Total Wages (₹)	8,000	6,000	4,000	2,000
Value of Plant (₹)	24,000	18,000	12,000	6,000
Value of Stock (₹)	15,000	9,000	6,000	-

Apportion the Cost to various departments on the most equitable basis and Service Department Cost to Production Departments in 4:4:2 ratio.

[*BU B.Com, May (2017), May (2016)*]

[Ans: A: ₹47,270; B: ₹34,770 and C: ₹23,960]

Note: Power is allocated in the ratio of Value of Plant. Alternatively, it can be allocated in the ratio of Total Wages.

Problem 5 (Problem on Overhead Distribution)

India Company Ltd. has three Production Departments and two Service Departments. The following figures, for a certain period, has been made available:

Rent and Rates	₹ 10,000
Lighting	₹ 1,200
Indirect Wages	₹ 3,000
Power	₹ 3,000
Depreciation	₹ 20,000
Insurance of Stock	₹ 5,000
Indirect Materials	₹ 4,000
Sundry Charges	₹ 20,000

The following information is also available:

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Floor Area (sq. ft.)	2,000	2,500	3,000	2,000	500
Number of Light Points	20	30	40	20	10
Horsepower of Machines	120	60	100	20	-
Cost of Machines	24,000	32,000	40,000	2,000	2,000
Direct Wages	6,000	4,000	6,000	3,000	1,000
Stock Value	4,000	3,000	2,000	600	400
Direct Materials	5,000	6,000	4,000	3,000	2,000
Working Hours	4,670	3,020	3,050	-	-

The expenses of Service Departments are to be charged as follows:

Departments	A	B	C	X	Y
Service Department X	20%	30%	40%	-	10%
Service Department Y	40%	20%	30%	10%	-

You are required to calculate the Overhead Absorption Rate per hour with respect to the three Production Departments, by preparing Primary and Secondary Distribution Summary.

[*BU B.Com, May (2016), May (2015)*]

[Ans: A: ₹23,727; B: ₹22,686 and C: ₹28,787]

Note: Sundry Charges are allocated in the ratio of Direct Wages.

Problem 6 (Problem on Overhead Distribution)

A factory has three Production Departments and two Service Departments. The Overhead Departmental Distribution Summary shows the following:

Departments	Amount (₹)
A	3,00,000
B	3,50,000
C	2,00,000
P	80,000
Q	60,000

The Service Departmental Expense of P and Q are to be allotted on a percentage basis as follows:

Particulars	Production Departments			Service Departments	
	A	B	C	P	Q
Service Department P	30%	20%	30%	-	20%
Service Department Q	40%	30%	20%	10%	-

Prepare a Secondary Overhead Distribution Statement under:
(a) Repeated Distribution Method
(b) Simultaneous Equation Method

[*BU B.Com, May (2016)*]
[Ans: A: ₹3,57,347; B: ₹3,90,816 and C: ₹2,41,837]

Problem 7 (Problem on Overhead Distribution)

Modern company has four departments. A, B and C are Production Departments and D is Servicing Department. The Actual Costs of a certain period were given as follows:

Rent	₹ 2,000
Repairs	₹ 1,200
Depreciation	₹ 900
Light	₹ 200
Supervision	₹ 3,000
Insurance of Stock	₹ 1,000
Employees Insurance	₹ 300
Power	₹ 1,800

The following data is also available with respect to the four departments.

Particulars	A	B	C	D
Area (sq. ft.)	150	110	90	50
Number of Workers	24	16	12	8
Total Wages (₹)	8,000	6,000	4,000	2,000
Value of Plant (₹)	24,000	18,000	12,000	6,000
Value of Stock (₹)	15,000	9,000	6,000	-

Apportion the Cost to various departments on the most equitable basis and Service Department Cost to Production Departments in 2:2:1 ratio.

[*BU B.Com, May (2015)*]
[Ans: A: ₹5,447; B: ₹4,197 and C: ₹2,756]

Problem 8 (Problem on Overhead Distribution)

A firm has three Production Departments A, B and C and two Service Departments X and Y. The following figures are extracted from the books of the firm.

Depreciation	₹ 4,000
Indirect Wages	₹ 600
Lighting	₹ 24
Power	₹ 600
Rent	₹ 2,000
Other Expenses	₹ 4,000

Other particulars:

Particulars	A	B	C	X	Y
Floor Space (sq. ft.)	400	500	600	400	100
Direct Wages (₹)	900	600	900	900	700
Number of Light Points	20	30	40	20	10
Horsepower of Machines	75	30	25	10	-
Value of Machinery	12,000	16,000	20,000	1,000	1,000
Working Hours	3,113	2,014	2,033	-	-

The expenses of Service Departments X and Y are to be allocated as follows:

Service Department	A	B	C	X	Y
X	20%	30%	40%	-	10%
Y	40%	20%	20%	20%	-

Show the distribution of Service Department Expenses to the Production Departments A, B and C and calculate hourly rate of each Production Department. (Use Repeated Distribution Method).

[*BU BBM, May (2015)*]

[Ans: A: ₹3,741 and Hourly rate: ₹1.2017; B: ₹3,604 and Hourly rate: ₹1.7895; C: ₹4,594 and Hourly rate: ₹2.2597]

Note: Other expenses are allocated in the ratio of Direct Wages.

Problem 9 (Problem on Overhead Distribution)

Shivu Ltd. has three Production and two Service Departments. From the following details, prepare the Overhead Distribution Summary using Repeated Distribution Method for Secondary Distribution and calculate Overhead Rate per Labour Hour.

Particulars	Production Departments			Service Departments	
	A	B	C	D	E
Direct Materials (₹)	45,000	30,000	15,000	12,000	9,000
Direct Wages (₹)	30,000	22,500	15,000	6,000	4,500
Value of Machinery (₹)	60,000	45,000	30,000	-	-
Floor Space (sq. ft.)	30,000	20,000	15,000	10,000	5,000
Horsepower of Machines	240	200	160	-	-
Number of Light Points	120	90	60	30	30
Number of Labour Hours	5,000	5,000	5,000	-	-

Other details are as follows:

Indirect Materials	₹ 22,200
Indirect Wages	₹ 15,600
Depreciation on Machinery	₹ 27,000
Depreciation on Building	₹ 12,000
Rent, Rates and Taxes	₹ 9,000
Electric Power	₹ 33,750
Lighting	₹ 2,400
General Expenses	₹ 7,800

The services rendered by each service department to other departments is as under:

Departments	A	B	C	D	E
D	30%	40%	20%	-	10%
E	10%	20%	50%	20%	-

[*BU B.Com, May (2014)*]

[Ans: A: ₹63,138 and Overhead Rate per hour: ₹12.6276; B: ₹54,832 and Overhead Rate per hour: ₹10.9664; C: ₹43,280 and Overhead Rate per hour: ₹8.656]

Note: General Expenses are allocated in the ratio of Direct Wages.

Problem 10 (Problem on Overhead Distribution)

A factory has three Production Departments and two Service Departments. The following figures are extracted from the books:

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Overheads (₹)	15,620	25,086	9,094	8,000	5,200

The expenses of service of X and Y are to be allocated as follows:

Particulars	Production Departments			Service Departments	
	A	B	C	D	E
X	30%	40%	10%	-	20%
Y	20%	20%	50%	10%	-

Estimated Working Hours of Production Departments are as follows:

A: 500 hours
B: 1,250 hours
C: 700 hours

Prepare a Statement showing the distribution of the two Service Departments using Simultaneous Equation Method and also calculate the hourly rate for each department.

[*BU B.Com, May (2014)*]

[Ans: A: ₹19,616 and Hourly Rate: ₹39.232; B: ₹29,952 and Hourly Rate: ₹23.9616; C: ₹13,433 and Hourly Rate: ₹19.19)

Problem 11 (Problem on Overhead Distribution)

Zenith Co. Ltd. has two Production and two Service Departments. The following data relates to the year, ending 31 March 2011.

Particulars	Total (₹)	Production Departments		Service Departments	
		X	Y	P	Q
Direct Wages	28,000	10,000	8,000	6,000	4,000
Indirect Wages	14,650	4,000	3,000	2,000	5,650
Indirect Materials	5,000	1,800	700	1,000	1,500
Sundry Supplies	1,750	400	1,000	150	200
Supervisor's Salary	4,000	2,000	2,000	-	-
General Expenses	10,000	-	-	6,000	4,000
Overheads to be apportioned:					
Power	8,000				
Rent	12,000				
Heating and Lighting	6,000				
Insurance (General)	1,000				
Municipal Taxes	2,000				
Depreciation	60,000				

Further details were as follows:

Particulars	X	Y	P	Q
Floor Space (sq. ft.)	2,000	800	400	1,600
Radiator Section	45	90	30	60
Number of Employees	20	10	3	5
Investment (₹)	6,40,000	2,00,000	10,000	1,50,000
Horsepower of Machines	3,500	500	-	1,000

Expenses of service department P is apportioned to X and Y in the ratio of 2:1 and that of Q is apportioned to X and Y in the ratio of 5:3. You are required to show the Overhead Distribution Summary.

[*BU B.Com, May (2011) (modified)*]

[Ans: X: ₹91,841 and Y: ₹42,559]

Note: Insurance (General) is allocated on the basis of Number of Employees, Municipal Taxes on the basis of Floor Space and Depreciation on the basis of Investment Value.

Problem 12 (Problem on Overhead Distribution)

From the following information, you are required to calculate the Overheads of Production Departments A, B and C, after distributing Overheads of Service Department by Repeated Distribution Method.

Particulars	Total (₹)	Production Departments			Service Departments	
		A	B	C	X	Y
Rent	12,000	2,400	4,800	2,000	2,000	800
Electricity	4,000	800	2,000	500	400	300
Indirect Labour	6,000	1,200	2,000	1,000	800	1,000
Depreciation	5,000	2,500	1,600	200	500	200
Sundries	4,500	910	2,143	847	300	300
Estimated working hours	-	1,000	2,500	1,400	-	-

Expenses of Service Departments X and Y are apportioned as follows:

Service Department	A	B	C	X	Y
X	30%	40%	20%	-	10%
Y	10%	20%	50%	20%	-

[*BU BBM, May (2011)*]

[Ans: A: ₹9,500; B: ₹15,000 and C: ₹7,000]

CHAPTER 7

Reconciliation of Financial and Cost Accounts

CHAPTER OUTLINE

7.1 INTRODUCTION

For any given period of time, usually, the results shown by Financial Statements and the Cost Statement will not be the same. It is essential to identify the reasons for the difference in results and reconcile the same. For ascertaining the Reasons of Difference in Profits or Losses shown by the two different Accounting Systems, a Statement of Reconciliation or a Memorandum Reconciliation Account is prepared.

THEORY QUESTION

Section A Type Question

1. State the purpose of preparing a Reconciliation Statement. **[*BU B.Com, May (2016)*]**

7.2 CAUSES OR REASONS FOR DIFFERENCE IN RESULTS AS PER FINANCIAL ACCOUNTS AND COST ACCOUNTS

The following are the reasons or causes for the differences in results as per Financial Accounts and Cost Accounts:

- Certain items are recorded only in Financial Accounts but not in Cost Accounts
- Certain items are considered only in Cost Accounts but not recorded in Financial Accounts
- Difference on account of Treatment for Overheads
- Method of Depreciation
- Method of Stock Valuation

These factors have been explained in detail as follows:

7.2.1 Items Recorded only in Financial Accounts, but not Considered in Cost Accounts

1. Expenses and Losses

Certain items of Expenses and Losses are recorded only in Financial Accounts, but not considered while preparing a Statement of Cost. The following are some examples of Expenses or Losses considered only in Financial Accounts:

- Interest on Loans (Mortgage Loans, Debentures, etc.)
- Cash Discount allowed
- Fines, Damages and Penalties paid for Contravention of Law
- Donations
- Expenses incurred for raising Capital
- Loss on Sale of Assets
- Loss on Sale of Investments
- Loss on account of damage or destruction of asset due to fire accident, theft, etc.
- Loss due to Scrapping of Machinery
- Preliminary Expenses written off
- Intangible Assets amortized or written off

2. Incomes and Gains

Certain items of Incomes and Gains are recorded only in Financial Accounts, but not considered while preparing a Statement of Cost. The following are some of the examples of Incomes or Gains considered only in Financial Accounts:

- Interest on Bank Deposits
- Income from Investments
- Rental Income
- Transfer Fees received

- Profit on Sale of Assets
- Profit on Sale of Investments
- Interest on Loans advanced
- Cash Discount received
- Commission received
- Damages received

3. Appropriation of Profits

One of the uniqueness of Financial Accounting is providing for future by appropriating Profits and creating Reserves and Provisions. Such practice is not adopted in Cost Accounting. Some examples of Appropriations, which are found only in Financial Statements but not in Cost Statements, are:

- Provision for Tax
- Proposed Dividend
- Provision for Bad Debts
- Provision for Future Losses
- General Reserves
- Any other specific reserve like Dividend Equalisation Reserve, Redemption Reserve, etc.

7.2.2 Items Considered only in Cost Accounts, but not Recorded in Financial Accounts

Financial Accounting considers only actual expenses incurred (with the exception of Depreciation). However, in Cost Accounting, Notional Expenses (i.e., expenses, which are not incurred but are likely to be incurred) and Opportunity Cost (i.e., value of benefit lost of an alternative or course of action which is not adopted) are also recorded. Some examples of items, which are considered only in Cost Statement but not recorded in Financial Statements, are:

- Notional Salary (i.e., Salary of Proprietor or Owner)
- Notional Rent (i.e., Rent for building and premises owned by Owner)
- Interest on Capital (even if the actual liability does not exist)

7.2.3 Treatment of Overheads

In Financial Accounting, the Overheads are recorded on an actual basis. However, in Cost Accounting, Overheads are absorbed into Cost of Product or Service, based on certain relationships. For example, Factory Overheads are absorbed as a percentage of Direct Wages, Office Overheads are absorbed as a percentage of factory Cost, etc. On account of this, the Overheads considered in Costing Books might be more or less than the actual amount incurred (i.e., over-absorbed or under-absorbed). This is one of the major reasons of difference in results shown by Financial Accounting and Cost Accounting.

7.2.4 Method of Depreciation

The difference in Amount of Depreciation recorded in Financial Accounts and Cost Accounts is another Reason for Difference in results between the two systems. The difference in the Amount of Depreciation would be on account of the Method of Depreciation followed. In Financial Accounting, the method for calculating Depreciation is usually Straight Line Method or Written-Down Value Method, whereas in Cost Accounting, it is usually the Machine Hour Rate Method.

7.2.5 Method of Stock Valuation

In Financial Accounting, Stocks are valued at Cost Price or Net Realisable Value, whichever is less. However, in Cost Accounting, the Stocks are valued at Cost Price. On account of the difference in Stock Valuation Policy, the results shown by Financial Statements and Cost Statements could be different.

THEORY QUESTIONS

Section A Type Questions

1. State any two reasons for the difference in Profits as per Financial Books and Costing Books.
2. Give a few examples for expenses recorded in Financial Accounts, but not considered in Cost Accounts.
3. What is meant by Purely Financial Expenses? Give examples. **[*BU B.Com, May (2015); May (2016)*]**
4. Give a few examples for Incomes recorded in Financial Books, but not considered in Costing Books.
5. How does Treatment of Overheads affect Financial and Costing Profits?
6. Give two examples of items considered only in Costing Records, but not recorded in Financial Books. **[*BU B.Com, May (2014)*]**
7. How does Method of Depreciation result in differing Profits between Financial and Cost Books?
8. How does Method of Stock Valuation contribute to difference in Profits as per Financial Accounting and Cost Accounting?

Section B Type Question

1. Explain the various items that are recorded only in Financial Accounts, but not considered in Cost Accounts. **[*BU B.Com, May (2011); May (2014); May (2016)*]**

Section C Type Question

1. Explain in detail the causes for difference in the results shown by Financial and Costing Books. Give suitable examples.

7.3 STATEMENT OF RECONCILIATION

A Statement of Reconciliation or Reconciliation Statement is a Statement prepared to present the reasons for difference in results under the two Accounting Systems, thereby enabling the accuracy of both the systems and transparency in recording of business transactions.

THEORY QUESTION

Section A Type Question

1. What is Statement of Reconciliation? **[*BU B.Com, May (2013); BBM, May (2015); May (2016); May (2017)*]**

7.3.1 Format of Statement of Reconciliation

Statement of Reconciliation as on ————

	₹	₹
Base Profit or Source Profit		XXX
Add:		
Reasons due to which Target Profit is more than Base Profit		XXX
		XXX
Less:		
Reasons due to which Target Profit is less than Base Profit		XXX
Target Profit		XXX

Notes:

1. The Base Profit or Source Profit can be Profits of any set of Books of Accounts. When the Profit under only one Accounting System is given, it should be considered as Base Profit. For example, if only Profits as per Financial Statements are made available, they should be considered as Base Profits. However, when the Profits under both Accounting Systems are provided, then any of the Profits can be the Base Profit and the other Profit must be considered as Target Profit. For example, if Profit under Financial Accounting is considered as Base Profit, then Profits under Cost Accounting will be Target Profit.
2. On account of any given reason, if the Target Profit is more than the Base Profit, the reason must be considered under items to be added (ADD). Similarly, on account of any given reason, if the Target Profit is less than the Base Profit, the reason must be considered items to be deducted (LESS).

   So, the simple criterion for identifying the Treatment for a Reason of Difference is given as follows:

   On account of the given reason if the Base Profit is less and Target Profit is more = **Add**
   On account of the given reason if the Base Profit is more and Target Profit is less = **Less**

Base Profit	Less	**Add**	More	**Less**
Target Profit	More		Less	

3. Where the results under both the systems are Losses, then the same can be presented with negative sign (–) in the aforementioned format.

7.4 TREATMENT FOR VARIOUS ITEMS OF DIFFERENCE IN STATEMENT OF RECONCILIATION

Reason	When Financial Profit is the Base Profit and Costing Profit is Target Profit	When Costing Profit is Base Profit and Financial Profit is Target Profit
Expenses or Losses recorded only in Financial Accounts but not considered in Cost Accounts	Add	Less
Incomes or Gains recorded only in Financial Accounts but not considered in Cost Accounts	Less	Add
Appropriation of Profits found in Financial Accounts, but not made in Cost Accounts	Add	Less
Expenses considered only in Cost Accounts, but not recorded in Financial Accounts	Less	Add
Under-absorption of Overheads in Cost Accounting	Add	Less
Over-absorption of Overheads in Cost Accounting	Less	Add

(Contd.)

Reason	When Financial Profit is the Base Profit and Costing Profit is Target Profit	When Costing Profit is Base Profit and Financial Profit is Target Profit
Depreciation in Financial Accounts is more than the amount of Depreciation in Costing Books	Add	Less
Depreciation in Financial Accounts is less than the amount of Depreciation in Costing Books	Less	Add
Value of Opening Stock (of Raw Materials, Work in Progress or Finished Goods) is more in Financial Books than the value in Costing Books	Add	Less
Value of Opening Stock (of Raw Materials, Work in Progress or Finished Goods) is less in Financial Books than the value in Costing Books	Less	Add
Value of Closing Stock (of Raw Materials, Work in Progress or Finished Goods) is more in Financial Books than the value in Costing Books	Less	Add
Value of Closing Stock (of Raw Materials, Work in Progress or Finished Goods) is less in Financial Books than the value in Costing Books	Add	Less

THEORY QUESTION

Section B Type Question

1. Explain briefly the treatment for various items causing difference in Financial and Costing profits, while preparing a Statement of Reconciliation.

7.5 MEMORANDUM RECONCILIATION ACCOUNT

Memorandum Reconciliation Account is an alternative to Statement of Reconciliation. It is prepared to present the reasons for difference in the results shown by Financial Statements and Cost Statements. The account is not a part of Double Entry System. Hence, it is called Memorandum Reconciliation Account.

THEORY QUESTION

Section A Type Question

1. What is Memorandum Reconciliation Account? **[*BU, B.Com, May (2014); B.com, May (2016)*]**

7.5.1 Format of Memorandum Reconciliation Account

	₹		₹
Base Loss (if any)	XXX	Base Profit	XXX
Reasons due to which Target Profit is less than Base Profit (or Target Loss is more than Base Loss)	XXX	Reasons due to which Target Profit is more than Base Profit (or Target Loss is less than Base Loss)	XXX
Target Profit	XXX	Target Loss (if any)	XXX
	XXX		XXX

Notes:

1. The Base Profit or Source Profit can be Profits of any set of Books of Accounts. When the Profit under only one Accounting System is given, it should be considered as Base Profit. For example, if only Profits as per Financial Statements are made available, they should be considered as Base Profits. However, where the Profits under both Accounting Systems are provided, then any of the Profit can be the Base Profit and the other profit must be considered as Target Profit. For example, if Profits under Financial Accounting is considered as Base Profits, then Profits under Cost Accounting will be Target Profits.
2. On account of any given reason, if the Target Profit is more than Base Profit (or the Target Loss is less than Base Loss), the reason must be credited in the Memorandum Reconciliation Account. Similarly, on account of any given reason, if the Target Profit is less than the Base Profit (or the Target Loss is more than Base Loss), the reason must be debited in the Memorandum Reconciliation Account.

   So, the simple criterion for identifying the treatment for a Reason of Difference is given as follows:

On account of the given reason if the Base Profit is less and Target Profit is more = **Credit**
On account of the given reason if the Base Profit is more and Target Profit is less = **Debit**

BASE PROFIT	Less	**Credit**	More	**Debit**
TARGET PROFIT	More		Less	

BASE LOSS	Less	**Debit**	More	**Credit**
TARGET LOSS	More		Less	

7.6 TREATMENT FOR VARIOUS ITEMS OF DIFFERENCE IN MEMORANDUM RECONCILIATION ACCOUNT

7.6.1 In Case of Profits

Reason	When Financial Profit is the Base Profit and Costing Profit is Target Profit	When Costing Profit is Base Profit and Financial Profit is Target Profit
Expenses or Losses recorded only in Financial Accounts but not considered in Cost Accounts	Credit	Debit
Incomes or Gains recorded only n Financial Accounts but not considered in Cost Accounts	Debit	Credit

(Contd.)

Reason	When Financial Profit is the Base Profit and Costing Profit is Target Profit	When Costing Profit is Base Profit and Financial Profit is Target Profit
Appropriation of Profits found in Financial Accounts, but not made in Cost Accounts	Credit	Debit
Expenses considered only in Cost Accounts, but not recorded in Financial Accounts	Debit	Credit
Under-absorption of Overheads in Cost Accounting	Credit	Debit
Over-absorption of Overheads in Cost Accounting	Debit	Credit
Depreciation in Financial Accounts is more than the amount of Depreciation in Costing Books	Credit	Debit
Depreciation in Financial Accounts is less than the amount of Depreciation in Costing Books	Debit	Credit
Value of Opening Stock (of Raw Materials, Work in Progress or Finished Goods) is more in Financial Books than the value in Costing Books	Credit	Debit
Value of Opening Stock (of Raw Materials, Work in Progress or Finished Goods) is less in Financial Books than the value in Costing Books	Debit	Credit
Value of Closing Stock (of Raw Materials, Work in Progress or Finished Goods) is more in Financial Books than the Value in Costing Books	Debit	Credit
Value of Closing Stock (of Raw Materials, Work in Progress or Finished Goods) is less in Financial Books than the value in Costing Books	Credit	Debit

7.6.2 In case of Loss

Reason	When Financial Loss is the Base Loss and Costing Loss is Target Loss	When Costing Loss is Base Loss and Financial Loss is Target Loss
Expenses or Losses recorded only in Financial Accounts but not considered in Cost Accounts	Debit	Credit
Incomes or Gains recorded only n Financial Accounts but not considered in Cost Accounts	Credit	Debit
Appropriation of Profits found in Financial Accounts, but not made in Cost Accounts	Debit	Credit
Expenses considered only in Cost Accounts, but not recorded in Financial Accounts	Credit	Debit
Under-absorption of Overheads in Cost Accounting	Debit	Credit
Over-absorption of Overheads in Cost Accounting	Credit	Debit
Depreciation in Financial Accounts is more than the amount of Depreciation in Costing Books	Debit	Credit
Depreciation in Financial Accounts is less than the amount of Depreciation in Costing Books	Credit	Debit
Value of Opening Stock (of Raw Materials, Work in Progress or Finished Goods) is more in Financial Books than the value in Costing Books	Debit	Credit
Value of Opening Stock (of Raw Materials, Work in Progress or Finished Goods) is less in Financial Books than the value in Costing Books	Credit	Debit
Value of Closing Stock (of Raw Materials, Work in Progress or Finished Goods) is more in Financial Books than the value in Costing Books	Credit	Debit
Value of Closing Stock (of Raw Materials, Work in Progress or Finished Goods) is less in Financial Books than the value in Costing Books	Debit	Credit

THEORY QUESTION

Section C Type Question

1. What is Memorandum Reconciliation Account? Explain the treatment to various items that results in different profits in Financial and Costing Books, in the process of preparing a Memorandum Reconciliation Account.

PROBLEMS

Problem 1 (Problem on Preparation of Statement of Reconciliation)

The Net Profit of a manufacturing company appeared as ₹64,500 as per Financial Records for the year ended 31 March 2018. The Cost Books, however, showed a Net Profit of ₹86,460 for the same period. A careful scrutiny of the figures revealed the following facts:

	₹
Income Tax provided in Financial Books	20,000
Bank Interest credited in Financial Books	250
Works Overhead under-recovered	1,550
Depreciation charged in Financial Accounts	5,600
Depreciation recovered in Costing Books	6,000
Administrative Overheads over-recovered	850
Loss due to Obsolescence charged in Financial Accounts	2,800
Interest on Investments not included in Cost Accounts	4,000
Stores Adjustment (credited in Financial Books)	240
Loss due to Depreciation in Stock Values charged in Financial Books	3,350

Prepare a Reconciliation Statement **[*BU B.Com, May (2013); May (2014)*]**

Solution

Step 1: Analysis of the Transactions

Transaction	Profits on Relative Basis	
	In Financial Books	**In Costing Books**
Income Tax provided only in Financial Books	Less	More
Bank Interest credited in Financial Books, but not considered in Costing Books	More	Less
Works Overhead under-recovered in Costing Books	Less	More
Depreciation recovered in excess in Costing Books	More	Less
Administrative Overheads over-recovered in Costing Books	More	Less
Loss due to Obsolescence charged in Financial Accounts, but not considered in Cost Accounts	Less	More
Interest on Investments considered only in Financial Accounts	More	Less
Stores Adjustment credited in Financial Books, but not considered in Costing Books	More	Less
Loss due to Depreciation in Stock Values charged in Financial Accounts only, but not in Cost Accounts	Less	More

Note: While answering the question in the examination, students need not show this step. They can carry out a mental analysis of the effect of transaction and directly proceed to the next step.

Step 2: Preparation of Statement of Reconciliation

Statement of Reconciliation as on 31 March 2018

Particulars	₹	₹
Net Profits as per Financial Accounts		64,500
Add:		
Income Tax provided in Financial Accounts	20,000	
Works Overhead under-recovered	1,550	
Loss due to Obsolescence charged in Financial Accounts	2,800	
Loss due to Depreciation in Stock Values charged in Financial Accounts	3,350	(+) 27,700
		92,200
Less:		
Bank Interest credited in Financial Books	250	
Depreciation overcharged in Costing Books (₹6,000 (–) ₹5,600)	400	
Administrative Overheads over-recovered	850	
Interest on Investments not included in Cost Accounts	4,000	
Stores Adjustment credited in Financial Accounts	240	(–) 5,740
Net Profits as per Cost Accounts		86,460

Note: Where Costing Profits are taken as Base Profits and Financial Profits are taken as Target Profits, the items added in the given format must be deducted and the items deducted must be added.

In case students are asked to prepare a Memorandum Reconciliation Account, instead of a Reconciliation Statement, it must be prepared in the following manner:

Memorandum Reconciliation Account as on 31 March 2018

	₹		₹
To Bank Interest credited in Financial Books	250	By Net Profit as per Financial Accounts	64,500
To Depreciation over recovered in Costing Books	400	By Income Tax provided in Financial Books	20,000
To Administrative Overheads over-recovered	850	By Works Overhead under-recovered	1,550
To Interest on Investments not included in Cost Accounts	4,000	By Loss due to Obsolescence charged in Financial Accounts	2,800
To Stores adjustment credited in Financial Books	240	By Loss due to Depreciation in Stock Values charged in Financial Books	3,350
To Net Profit as per Cost Accounts	86,460		92,200
	92,200		

Note: Where Costing Profits are taken as Base Profits and Financial Profits are taken as Target Profits, the items credited in the account must be debited and the items debited in the account must be credited.

Problem 2 (Problem on Preparation of Memorandum Reconciliation Account)

The Net Profit of Buddha Engineering Company appeared as ₹1,28,755 as per Financial Records for the year ended 31 March 2018. The Cost Books, however, showed a Net Profit of ₹1,72,400 for the same period. A scrutiny of the figures revealed the following:

	₹
Works Overhead under-absorbed	3,120
Administration Overheads recovered in excess	1,700
Depreciation as per Cost Books	12,500
Depreciation as per Financial accounts	11,200
Interest on Investments not included in Cost Accounting	8,000
Income tax provided in Financial Accounts	40,300
Loss due to Obsolescence shown in Financial Accounts	5,700
Bank Interest and Transfer Fees credited in Financial Accounts	750
Credit for Stores Adjustment in Financial Records	475
Loss on account of fire accident, charged in Financial Accounts	6,750

Prepare a Memorandum Reconciliation Account.

[*BU B.Com, May (2013); May (2014) (modified); May (2016) (modified); May (2017)*]

Solution

Step 1: Analysis of the Transactions

Transaction	Profits on Relative Basis	
	In Financial Books	**In Costing Books**
Works Overhead under-absorbed in Cost Accounts	Less	More
Administration Overhead recovered in excess in Cost Books	More	Less
Depreciation over-recovered in Cost Books	More	Less
Interest on Investments included only in Financial Accounts	More	Less
Income Tax provided for only in Financial Accounts	Less	More
Loss due to Obsolescence shown in Financial Accounts only	Less	More
Bank Interest and Transfer Fees credited only in Financial Books	More	Less
Stores Adjustment credited only in Financial Accounts	More	Less
Loss on account of fire accident, charged only in Financial Accounts	Less	More

Step 2: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on 31 March 2018

	₹		₹
To Works Overhead under-absorbed	3,120	By Profits as per Costing Books	1,72,400
To Income Tax provided in Financial Books	40,300	By Administration Overheads recovered in excess	1,700
To Loss due to Obsolescence, shown in Financial Accounts	5,700	By Depreciation recovered in excess in Costing Books	1,300
		By Interest on Investments not included in Cost Accounting	8,000

	₹		₹
To Loss on account of fire accident, charged in Financial Accounts	6,750	By Bank Interest and Transfer Fees credited in Financial Accounts	750
To Profits as per Financial Accounts	1,28,755	By Credit for Stores Adjustment in Financial Records	475
	1,84,625		1,84,625

In case the students are asked to prepare a Statement of Reconciliation instead of a Memorandum Reconciliation Account, it must be prepared as follows:

Statement of Reconciliation as on 31 March 2018

Particulars	₹	₹
Net Profits as per Cost Accounts		1,72,400
Add:		
Administration Overheads recovered in excess	1,700	
Depreciation recovered in excess in Costing Books	1,300	
Interest on investments not included in Cost Accounting	8,000	
Bank Interest and Transfer Fees credited in Financial Accounts	750	
Credit for Stores Adjustment in Financial Records	475	(+)12,225
Less:		1,84,625
Works Overhead under-absorbed	3,120	
Income Tax provided in Financial Books	40,300	
Loss due to Obsolescence shown in Financial Accounts	5,700	
Loss on account of fire accident charged in Financial Accounts	6,750	(–)55,870
Net Profits as per Financial Accounts		1,28,755

Problem 3 (Problem on Preparation of Statement of Reconciliation or Memorandum Account, when there is Loss)

Prepare a Reconciliation Statement from the following information

	₹
Net Loss as per Cost accounts	3,44,800
Net Loss as per Financial Accounts	4,32,090
Works Overhead under-recovered in Cost Accounts	6,240
Depreciation overcharged in Cost Accounts	2,600
Administration Overheads recovered in excess	3,400
Interest on Investments	17,500
Goodwill written off	11,400
Income Tax paid	80,600
Stores Adjustment credited in Financial Books	950
Loss on Damaged Stock shown in Financial Accounts	13,500

[*BU BBM, May (2015); May (2017) (modified)*)]

Solution

Step 1: Analysis of the Transactions

Transaction	Loss on Relative Basis	
	In Financial Books	**In Costing Books**
Works Overhead under-recovered in Cost Accounts	More	Less
Depreciation overcharged in Cost Accounts	Less	More
Administration Overhead recovered in excess in Cost Account	Less	More
Interest on Investments, recorded only in Financial Accounts	Less	More
Goodwill written off, recorded only in Financial Accounts	More	Less
Income Tax paid, shown only in Financial Accounts	More	Less
Stores Adjustment credited in Financial Accounts only	Less	More
Loss on Damaged Stock shown in Financial Accounts only	More	Less

Note:
Alternatively, the analysis can be made for Impact on Profit. In which case, the Relative Profit will be exactly the opposite of what is shown in the given table.

Step 2: Preparation of Statement of Reconciliation

Statement of Reconciliation as on ————

Particulars	₹	₹
Net Loss as per Financial Accounts		4,32,090
Add:		
Depreciation Overcharged in Cost Accounts	2,600	
Administration Overhead recovered in excess	3,400	
Interest on Investments	17,500	
Stores Adjustment credited in Financial Accounts	950	(+) 24,450
		4,56,540
Less:		
Works Overhead under-recovered in Cost Accounts	6,240	
Goodwill written off	11,400	
Income Tax paid	80,600	
Loss on Damaged Stock shown in Financial Accounts	13,500	(–)1,11,740
Net Loss as per Cost Accounts		3,44,800

Note: Where Costing Losses are taken as Base Losses and Financial Losses are taken as Target Losses, the items added in the given format must be deducted and the items deducted must be added.

Alternatively, the Statement of Reconciliation can be presented in the following manner, in case of loss:

Statement of Reconciliation as on ————

Particulars	₹	₹
Net Profits as per Financial Accounts		(–) 4,32,090
Add:		
Works Overhead under-recovered in Cost Accounts	6,240	
Goodwill written off	11,400	
Income Tax paid	80,600	
Loss on Damaged Stock, shown in Financial Accounts	13,500	(+)1,11,740
		(–)3,20,350
Less:		
Depreciation Overcharged in Cost Accounts	2,600	
Administration Overhead recovered in excess	3,400	
Interest on Investments	17,500	
Stores Adjustment credited in Financial Accounts	950	(–)24,450
Net Profits as per Cost Accounts		(–)3,44,800

In case students are asked to prepare a Memorandum Reconciliation Account, instead of a Reconciliation Statement, it must be prepared in the following manner:

Memorandum Reconciliation Account as on 31 March ————

	₹		₹
To Net Loss as per Financial Accounts	4,32,090	By Works Overhead under-recovered in Cost Accounts	6,240
To Depreciation Overcharged in Cost Accounts	2,600	By Goodwill written off	11,400
To Administration Overhead recovered in excess	3,400	By Income Tax paid	80,600
To Interest on Investments	17,500	By Loss on Damaged Stock, shown in Financial Accounts	13,500
To Stores Adjustment credited in Financial Accounts	950	By Net Loss as per Cost Accounts	3,44,800
	4,56,540		4,56,540

Problem 4 (Problem on Preparation of a Statement of Reconciliation when there is Adjustment Relating to Valuation of Stock)

The Net Profit of ARM Engineering Company appeared as ₹75,970, as per Financial Records for the year ended 31 March 2018. The Cost Books, however, showed a Net Profit of ₹75,400 for the same period. The difference was due to the following:

The Closing Stock of Finished Goods in Financial Books was valued at ₹14,500, while the same in Cost Books was ₹14,100. The Stores Adjustment credited in Financial Books was ₹570. The Work in Progress in Financial Books was valued at ₹9,600 and in Cost Books at ₹10,000.

Prepare a Statement of Reconciliation.

Solution

Step 1: Analysis of the Transactions

Transaction	Profits on Relative Basis	
	In Financial Books	**In Costing Books**
Over-valuation of Stock of Finished Goods in Financial Accounts	More	Less
Stores Adjustment credited only in Financial Accounts	More	Less
Under-valuation of Closing Stock of Work in Progress in Financial Accounts	Less	More

Step 2: Preparation of Statement of Reconciliation

Statement of Reconciliation as on 31 March 2018

Particulars	₹	₹
Net Profits as per Cost Accounts		75,400
Add:		
Difference in Value of Closing Stock of Finished Goods	400	
Stores Adjustment credited in Financial Accounts	570	(+)970
		76,370
Less:		
Difference in Value of Closing Stock of Work in Progress	400	(–)400
Net Profits as per Financial Accounts		75,970

Problem 5 (Problem on Preparation of Statement of Reconciliation for finding Profits as per Costing books, when there is Adjustment Relating to Valuation of Stock)

Find out the Profits as per Costing Records from the information given.

Profits as per Financial Records: ₹1,58,500

The following details are ascertained on comparison of Cost and Financial Accounts:

	₹
Opening Stock of Material in Cost Accounts	32,600
Opening Stock of Material in Financial Accounts	33,000
Opening Stock of Work in Progress in Cost Accounts	20,000
Opening Stock of Work in Progress in Financial Accounts	19,000
Closing Stock of Material in Cost Accounts	36,000
Closing Stock of material in Financial Accounts	34,400
Closing Stock of Work in Progress in Cost Accounts	16,000
Closing Stock of Work in Progress in Financial Accounts	16,200
Interest remitted but ignored in Cost Accounts	800
Interest charged but not considered in Financial Accounts	6,000
Preliminary Expenses written off	13,000
Overhead Expenses charged in Financial Accounts	1,21,200
Overheads recovered in Cost Accounts	1,26,000

Solution

Step 1: Analysis of the Transactions

Transaction	Profits on Relative Basis	
	In Financial Books	**In Costing Books**
Over-valuation of Opening Stock of Material in Financial Accounts	Less	More
Under-valuation of Opening Stock of Work in Progress in Financial Accounts	More	Less
Under-valuation of Closing Stock of Material in Financial Accounts	Less	More
Over-valuation of Closing Stock of Work in Progress in Financial Accounts	More	Less
Interest remitted but ignored in Cost Accounts	Less	More
Interest charged but not considered in Financial Accounts	More	Less
Preliminary Expenses written off, considered only in Financial Accounts	Less	More
Overheads over-recovered in Cost Accounts	More	Less

Step 2: Preparation of Statement of Reconciliation

Since the Financial Profits are given and Costing Profits have to be ascertained, the Financial Profits have been taken as Base Profits.

Statement of Reconciliation as on 31 March 2018

Particulars	₹	₹
Profits as per Financial Accounts		1,58,500
Add:		
Difference in Opening Stock of Materials (₹33,000 – ₹32,600)	400	
Difference in Closing Stock of Materials (₹36,000 – ₹34,400)	1,600	
Interest remitted but ignored in Cost Accounts	6,000	
Preliminary Expenses written off	13,000	(+)21,000
		1,79,500
Less:		
Difference in Opening Stock of Work in Progress (₹20,000 – ₹19,000)	1,000	
Difference in Closing Stock of Work in Progress (₹16,200 – ₹16,000)	200	
Interest charged but not considered in Financial Accounts	800	
Difference in Overheads (₹1,26,000 – ₹1,21,200)	4,800	(–)6,800
Profits as per Cost Accounts		1,72,700

In case students are asked to prepare a Memorandum Reconciliation Account, instead of a Reconciliation Statement, it must be prepared in the following manner:

Since the Financial Profits are given and Costing Profits have to be ascertained, the Financial Profits have been taken as Base Profits.

Memorandum Reconciliation Account as on 31 March 2018

	₹		₹
To Difference in Opening Stock of Work in Progress (₹20,000 – ₹19,000)	1,000	By Profit as per Financial Accounts	1,58,500
To Difference in Closing Stock of Work in Progress (₹16,200 – ₹16,000)	200	By Difference in Opening Stock of Materials (₹33,000 – ₹32,600)	400
To Interest charged but not considered in Financial Accounts	800	By Difference in Closing Stock of Materials (₹36,000 – ₹34,400)	1,600
To Difference in Overheads (₹ 1,26,000 – ₹1,21,200)	4,800	By Interest remitted but ignored in Cost Accounts	6,000
To Profits as per Cost Accounts (*Bal. fig.*)	1,72,700	By Preliminary Expenses written off	13,000
	1,79,500		1,79,500

Problem 6 (Problem on Preparation of Memorandum Reconciliation Account for finding Loss as per Financial Records, when there is Adjustment Relating to Valuation of Stock)

From the following particulars, prepare a Memorandum Reconciliation Account and find out the Loss as per Financial Records:

	₹
Net Loss as per Cost Accounting	1,72,400
Works Overhead under-recovered	3,120
Administration Overhead over-recovered	1,700
Depreciation charged in Financial Accounts	11,200
Depreciation recovered in Cost Accounts	12,500
Interest received not included in Cost Accounts	8,000
Loss on Sale of Assets shown in Financial Accounts	5,700
Income Tax provided in Financial Books	40,300
Bank Interest credited in Financial Books	750
Value of Opening Stock in Cost Accounts	52,600
Value of Opening Stock in Financial Accounts	54,000
Value of Closing Stock in Cost Accounts	52,000
Value of Closing Stock in Financial Accounts	49,600
Interest charged in Cost Accounts but not in Financial Accounts	6,000
Preliminary Expenses written off in Financial Accounts	800
Provision for Doubtful Debts in Financial Accounts	150
Stores Adjustment credited in Financial Books	475

Solution

Step 1: Analysis of the Transactions:

Transaction	Loss on Relative Basis	
	In Financial Books	In Costing Books
Works Overhead under-recovered in Cost Accounts	More	Less
Administration Overhead over-recovered in Cost Accounts	Less	More
Depreciation over-recovered in Cost Accounts	Less	More

Transaction	Loss on Relative Basis	
	In Financial Books	**In Costing Books**
Interest received not included in Cost Accounts	Less	More
Loss on Sale of Assets shown only in Financial Accounts	More	Less
Income Tax provided for, only in Financial Accounts	More	Less
Bank Interest, considered only in Financial Accounts	Less	More
Over-valuation of Opening Stock in Financial Accounts	More	Less
Under-valuation of Closing Stock in Financial Accounts	More	Less
Interest charged only in Cost Accounts	Less	More
Preliminary Expenses written off, considered only in Financial Accounts	More	Less
Provision for Doubtful Debts, recorded only in Financial Accounts	More	Less
Stores Adjustment credited only in Financial Books	Less	More

Step 2: Preparation of Memorandum Reconciliation Account

Since the Costing Losses are given and Financial Losses have to be ascertained, the Costing Losses have been taken as Base Losses.

Memorandum Reconciliation Account as on ————

	₹		₹
To Net Loss as per Costing Books	1,72,400	By Administration Overhead over-recovered	1,700
To Works Overhead under-recovered	3,120	By Depreciation over-recovered in	
To Loss on Sale of Assets, shown in		Cost Accounts (₹12,500 – ₹11,200)	1,300
Financial Accounts	5,700	By Interest received not included in	
To Income Tax provided in		Cost Accounts	8,000
Financial Books	40,300	By Bank Interest credited in	
To Difference in Value of Opening		Financial Books	750
Stock (₹54,000 – ₹52,600)	1,400	By Interest charged in Cost	
To Difference in Value of Closing		Accounts but not in Financial Accounts	6,000
Stock (₹52,000 – ₹49,600)	2,400	By Stores Adjustment credited in	
To Preliminary Expenses written off	800	Financial Books	475
To Provision for Doubtful Debts in		By Net Loss as per Financial Books	
Financial Accounts	150	(*Bal. fig.*)	2,08,045
	2,26,270		2,26,270

In case, the students are asked to prepare a Statement of Reconciliation instead of Memorandum Reconciliation Account, it must be prepared as follows:

Since the Costing Losses are given and Financial Losses have to be ascertained, the Costing Losses have been taken as Base Losses.

Statement of Reconciliation as on ————

Particulars	₹	₹
Net Loss as per Costing Books		1,72,400
Add:		
Works Overhead under-recovered	3,120	
Loss on Sale of Assets, shown in Financial Accounts	5,700	
Income Tax provided in Financial Books	40,300	
Difference in Value of Opening Stock (₹54,000 – ₹52,600)	1,400	
Difference in Value of Closing Stock (₹52,000 – ₹49,600)	2,400	
Preliminary Expenses written off	800	
Provision for Doubtful Debts in Financial Accounts	150	(+)53,870
		2,26,270
Less:		
Administration Overhead over-recovered	1,700	
Depreciation over-recovered in Cost Accounts (₹12,500 – ₹11,200)	1,300	
Interest received, not included in Cost Accounts	8,000	
Bank Interest credited in Financial Books	750	
Interest charged in Cost Accounts but not in Financial Accounts	6,000	
Stores Adjustment credited in Financial Books	475	(–)18,225
Net Loss as per Financial Records		2,08,045

Problem 7 (Problem on Preparation of Statement of Cost and Statement of Reconciliation)

The Financial Profit and Loss Account of a manufacturing company for the year ended 31 March 2018 is as follows:

	₹		₹
To Materials Used	50,000	By Sales	1,24,000
To Carriage Inwards	34,000		
To Factory Expenses	12,000		
To Direct Wages	1,000		
To Administration Expenses	4,500		
To Selling Expenses	6,500		
To Debenture Interest	1,000		
To Net Profit	15,000		
	1,24,000		1,24,000

The amounts charged in Cost Accounts are as follows:

	₹
Factory Overheads:	11,500
Office Overheads:	4,590
Selling Overheads:	6,640

No charge has been made in Cost Accounts in respect of Debenture Interest. Prepare a Statement of Cost and reconcile the profits as per Financial Accounts with that of Cost Accounts.

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended 31 March 2018

Particulars	₹	₹
Material Consumed	50,000	
Add: Carriage Inwards	34,000	84,000
Direct Wages		1,000
Prime Cost		85,000
Factory Overhead		11,500
Works Cost		96,500
Office and Administration Overhead		4,590
Cost of Production		1,01,090
Selling and Distribution Overhead		6,640
Total Cost		1,07,730
Profits (*Bal. fig.*)		16,270
Sales		1,24,000

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	**In Costing Books**
Factory Overheads under-recovered	Less	More
Administration Overheads over-recovered	More	Less
Selling Overheads over-recovered	More	Less
Debenture Interest recorded only in Financial Accounts	Less	More

Step 3: Preparation of Statement of Reconciliation

Statement of Reconciliation as on 31 March 2018

Particulars	₹	₹
Profits as per Financial Accounts		15,000
Add:		
Factory Overhead under-recovered (₹12,000 – ₹11,500)	500	
Debenture Interest recorded only in Financial Accounts	1,000	(+)1,500
		16,500
Less:		
Office Expenses over-recovered (₹4,590 – ₹4,500)	90	
Selling Expenses over-recovered (₹6,640 – ₹6,500)	140	(–)230
Profits as per Cost Accounts		16,270

Problem 8 (Problem on Preparation of Statement of Cost and Memorandum Reconciliation Account)

During the year, a company had prepared a Trading and Profit and Loss Account, the details of which are as follows:

	₹		₹
Opening Stock	2,47,179	Sales	3,46,500
Purchases	82,154	Closing Stock	75,121
Direct Wages	23,133	Sundry Income	316
Factory Overhead	20,826		
Administrative Expenses	9,845		
Selling Expenses	22,176		
Net Profit	16,624		
	4,21,937		4,21,937

As per Costing Records, the Closing Stock of Raw Material was valued at ₹78,197. The Direct Wages were charged at ₹24,867.

Factory Overheads was taken at ₹19,714. Administrative Overheads were taken at 3% of Selling Price. The Selling Price includes 5% for Selling Expenses. The Sundry Income was not included in Cost Accounts. Prepare a Statement of Cost and a Reconciliation Statement.

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended ————

Particulars	₹	₹
Material Consumed		
Opening Stock of Raw Material	2,47,179	
Add: Purchases	82,154	
	3,29,333	
Less: Closing Stock of Raw Material	78,197	2,51,136
Direct Wages		24,867
Prime Cost		2,76,003
Factory Overhead		19,714
Works Cost		2,95,717
Administration Overhead (3% of Sales – i.e., 3% of ₹3,46,500)		10,395
Cost of Production		3,06,112
Selling Overhead (5% of Sales – i.e., 5% of ₹3,46,500)		17,325
Total Cost		3,23,437
Profits (*Bal. fig.*)		23,063
Sales		3,46,500

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	**Profit on Relative Basis**	
	In Financial Books	**In Costing Books**
Under-valuation of Closing Stock in Financial Accounts	Less	More
Direct Wages charged in excess in Cost Accounts	More	Less
Factory Overheads under-recovered	Less	More

Transaction	Profit on Relative Basis	
	In Financial Books	**In Costing Books**
Administration Overheads over-recovered	More	Less
Selling Overheads under-recovered	Less	More
Sundry Income considered only in Financial Accounts	More	Less

Step 3: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on ————

	₹		₹
To Difference in Value of Closing Stock (₹78,197 – ₹75,121)	3,076	By Profits as per Costing Books	23,063
To Factory Overheads under-recovered (₹20,26 – ₹19,714).	1,112	By Difference in Direct Wages (₹24,867 – ₹23,133)	1,734
To Selling Overheads under-recovered (₹22,176 – ₹17,325)	4,851	By Administration Overheads over – recovered (₹10,395 – ₹9,845)	550
To Profits as per Financial Books	16,624	By Sundry Income recorded only in Financial Accounts	316
	25,663		25,663

Problem 9 (Problem on Preparation of Statement of Cost and Statement of Reconciliation)

The Trading and Profit and Loss Account of a company was as follows:

		₹		₹
Purchases	25,210		Sales (50,000 units at ₹1.50 each)	
Less: Closing Stock	4,080	21,130	Discount received	75,000
Direct Wages		10,500	Profit on Sale of Land	260
Works Expenses		12,130		2,340
Selling Expenses		7,100		
Administration Expenses		5,340		
Depreciation		1,100		
Net Profit		20,300		
		77,600		77,600

In Cost Accounts, the Closing Stock was valued at ₹4,280. The Works Expenses were taken at 100% of Direct Wages. The Selling and Administrative Expenses were charged in Cost Accounts at 10% on Sales and10 Paisa per unit respectively. The Depreciation charged in Cost Accounts was ₹800. Prepare a Statement of Cost to ascertain the Profit as per Cost Accounts and a Reconciliation Statement.

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended ————

Particulars	₹	₹
Materials Consumed		
Purchases	25,210	
Less: Closing Stock	4,280	20,930
Direct Wages		10,500
Prime Cost		31,430

(Contd.)

Particulars	₹	₹
Factory Overheads		
Works Expenses (100% of Direct Wages)	10,500	
Depreciation	800	11,300
Factory Cost		42,730
Administration Overheads (50000 units at 10 Paisa per unit)		5,000
Cost of Production		47,730
Selling Overheads (10% on Sales – i.e., 10% of ₹75,000)		7,500
Total Cost		55,230
Net Profits (*Bal. fig.*)		19,770
Sales		75,000

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Under-valuation of Closing Stock in Financial Accounts	Less	More
Depreciation under-recovered in Cost Accounts	Less	More
Factory Overheads under-recovered in Cost Accounts	Less	More
Administration Overheads under-recovered in Cost Accounts	Less	More
Selling Overheads over-recovered in Cost Accounts	More	Less
Discount received considered only in Financial Accounts	More	Less
Profit on Sale of Land considered only in Financial Accounts	More	Less

Step 3: Preparation of Statement of Reconciliation

Statement of Reconciliation as on ————

Particulars	₹	₹
Profits as per Costing Books		19,770
Add:		
Difference in Selling Overheads (₹7,500 – ₹7,100)	400	
Discount received	260	
Profit on Sale of Land	2,340	(+)3,000
		22,770
Less:		
Difference in Value of Closing Stock (₹4,280 – ₹4,080)	200	
Difference in Depreciation (₹1,100 – ₹800)	300	
Difference in Works Expenses (₹12,130 – ₹10,500)	1,630	
Difference in Administration Overheads (₹5,340 – ₹5,000)	340	(–)2,470
Profits as per Financial Books		20,300

Problem 10 (Problem on Preparation of Statement of Cost and Memorandum Reconciliation Account with Adjustment on Valuation of Stock)

Srividya Limited has furnished you the following information from the Financial Books for the year ended 31 December 2017.

	₹		₹
Opening Stock (500 units at ₹35 each)	17,500	Sales (10,250 units)	7,17,500
Material Consumed	2,60,000	Closing Stock (250 units at ₹50 each)	12,500
Wages	1,50,000		
Gross Profit c/d	3,02,500		
	7,30,000		7,30,000
Factory Overheads	94,750	Gross Profit b/d	3,02,500
Administration Overheads	1,06,000	Interest	250
Selling Overheads	55,000	Rent received	10,000
Bad Debts	4,000		
Preliminary Expenses	5,000		
Net Profit	48,000		
	3,12,750		3,12,750

The Cost Sheet shows the Cost of Material as ₹26 per unit. The Labour Cost is ₹15 per unit. The Factory Overheads are absorbed at 60% of Labour Cost and Administration Overheads at 20% of Factory Cost.

The Selling Expenses are charged at ₹6 per unit.

The Opening Stock of Finished Goods is valued at ₹45 per unit.

Prepare Statement of Cost as per Cost Accounts and Memorandum Reconciliation Account.

Solution

Step 1: Preparation of Statement of Cost

Number of Units sold =	Number of units of Opening Stock of Finished Goods **(plus)** Number of Units produced during the period **(minus)** Number of Units of Closing Stock of Finished Goods.

In this problem, the number of units produced is not given. It can be ascertained using the given formula.

So, 10,250 units = 500 units + No. of units produced during the year (–) 250 units

Number of units produced during the year = 10250 + 250 (–) 500 units = **10000 units**.

Statement of Cost for the period ended 31 December 2017

(Units produced: 10000, Units sold: 10,250)

Particulars	₹	₹
Material consumed (at ₹26 per unit produced)		2,60,000
Labour cost (at ₹15 per unit produced)		1,50,000
Prime Cost		4,10,000
Factory Overheads (60% of Labour Cost – i.e., 60% of ₹1,50,000)		90,000
Factory Cost		5,00,000
Administration Overheads (20% of Factory Cost – i.e., 20% of ₹5,00,000)		1,00,000
Cost of Production		6,00,000

(Contd.)

Particulars	₹	₹
Add: Opening Stock of Finished Goods (500 units × ₹45 per unit)		22,500
		6,22,500
Less: Closing Stock of Finished Goods (See Note)		15,000
Cost of Goods Sold		6,07,500
Selling Expenses (at ₹6 per unit sold)		61,500
Total Cost		6,69,000
Profits (*Bal. fig.*)		48,500
Sales		7,17,500

Note:
The Value of Closing Stock of Finished Goods must be calculated on the basis of Cost of Production. The valuation has been made as follows:

The Cost of Production for 10000 units is ₹6,00,000.

Hence, the Cost of producing 250 units (i.e., the Number of units of Finished Goods in Stock) is $\left(\frac{₹6,00,000 \times 250 \text{ units}}{10000 \text{ units}}\right)$ = **₹15,000.**

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	**In Costing Books**
Factory Overheads under-recovered in Cost Accounts	Less	More
Administration Overheads under-recovered in Cost Accounts	Less	More
Under-valuation of Opening Stock in Financial Accounts	More	Less
Under-valuation of Closing Stock in Financial Accounts	Less	More
Selling Overheads over-recovered in Cost Accounts	More	Less
Bad Debts considered only in Financial Accounts	Less	More
Preliminary Expenses written off considered only in Financial Accounts	Less	More
Interest Income recorded only in Financial Accounts	More	Less
Rent received recorded only in Financial Accounts	More	Less

Step 3: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on 31 December 2017

	₹		₹
To Selling Overheads over-absorbed in Cost Accounts (₹61,500 – ₹55,000)	6,500	By Profits as per Financial Books	48,000
		By Factory Overheads under-absorbed in Cost Accounts (₹94,750 – ₹90,000)	4,750
To Difference in Value of Opening stock of Finished Goods (₹22,500 – ₹17,500)	5,000	By Administration Overheads under-absorbed in Cost Accounts (₹1,06,000 – ₹1,00,000)	6,000
To Interest	250	By Difference in Value of Closing	2,500
To Rent received	10,000	Stock of Finished Goods (₹15,000 – ₹12,500)	4,000
To Profits as per Cost Accounts	48,500	By Bad Debts written off	5,000
	70,250	By Preliminary Expenses written off	70,250

Problem 11 (Problem on Preparation of Statement of Cost and Statement of Reconciliation with Adjustment of Valuation of Stock of Work in Progress and Stock of Finished Goods)

Following is the summary of Trading and Profit and Loss Account of Arathi Ltd. for the year ended 31 March 2018.

	₹			₹
Materials	1,00,000	Sales (50,000 units)		2,50,000
Wages	40,000	Closing Stock of Finished Goods (2,000 units)		15,000
Factory Expenses	24,000	Closing Work in Progress:		
Administration Expenses	40,000	Materials	10,000	
Selling and Distribution Expenses	26,000	Wages	7,000	
Preliminary Expenses	4,000	Factory Overhead	3,000	20,000
Goodwill	6,000	Dividend received		1,000
Net profit	46,000			
	2,86,000			2,86,000

In the Cost Accounts, Factory Expenses have been allocated to the production at 20% on Prime Cost. Administration Expenses are charged at ₹1 per unit, and Selling and Distribution Expenses at ₹0.50 per unit. Prepare Statement of Cost and Reconciliation Statement.

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended 31 March 2018

(Units produced: 52000, Units sold: 50000)

Particulars	₹	₹
Direct Materials		1,00,000
Direct Wages		40,000
Prime Cost		1,40,000
Factory Overheads (20% of Prime Cost)		28,000
		1,68,000
Less: Closing Stock of Work in Progress (See Note 1)		20,400
Factory Cost		1,47,600
Administration Overheads (at ₹1 per unit produced)		52,000
Cost of Production		1,99,600
Less: Closing Stock of Finished Goods (See Note 2)		7,677
Cost of Goods Sold		1,91,923
Selling and Distribution Expenses (at ₹0.50 per unit sold)		25,000
Total Cost		2,16,923
Profits (*Bal. fig.*)		33,077
Sales		2,50,000

Notes:

1. Valuation of Closing Stock of Work in Progress:
   The Closing Stock of Work in Progress includes Material, Labour and Factory Overheads. Under Costing System, Factory Overheads are recovered at 20% of Prime Cost. Accordingly, the Value of Closing Stock of Work in Progress is:

	₹
Materials:	10,000
Wages:	7,000
Factory Overheads (20% of ₹17,000):	3,400
	20,400

2. Valuation of Closing Stock of Finished Goods:
The Value of Closing Stock of Finished Goods must be calculated on the basis of Cost of Production. The valuation has been made as follows:
The Cost of Production for 52000 units is ₹1,99,600
Hence, the Cost of producing 2000 units (i.e., the Number of units of Finished Goods in Stock) is $\left(\frac{₹1,99,600 \times 2000 \text{ units}}{52000 \text{ units}}\right)$ = **₹7,677 (rounded off).**

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Factory Overheads over-recovered in Cost Accounts	More	Less
Under-valuation of Closing Stock of Work in Progress in Financial Accounts	Less	More
Administration Overheads over-recovered in Cost Accounts	More	Less
Over-valuation of Closing Stock of Finished Goods in Financial Accounts	More	Less
Selling Overheads under-recovered in Cost Accounts	Less	More
Preliminary Expenses written off, recorded only in Financial Accounts	Less	More
Goodwill written off, recorded only in Financial Accounts	Less	More
Dividend received, recorded only in Financial Accounts	More	Less

Step 3: Preparation of Statement of Reconciliation

Statement of Reconciliation as on 31 March 2018

Particulars	₹	₹
Profits as per Financial Accounts		46,000
Add:		
Difference in Value of Closing Work in Progress (₹20,400 – ₹20,000)	400	
Selling Overheads under-recovered in Cost Accounts (₹26,000 – ₹25,000)	1,000	
Preliminary Expenses written off	4,000	
Goodwill written off	6,000	(+)11,400
		57,400
Less:		
Factory Overheads over-recovered in Cost Accounts (₹28,000 – ₹24,000)	4,000	
Administration Overheads over-recovered in Cost Accounts (₹52,000 – ₹40,000)	12,000	
Difference in Value of Closing Stock of Finished Goods (₹15,000 – ₹7,677)	7,323	
Dividend received	1,000	(–)24,323
Profits as per Cost Accounts		33,077

Problem 12 (Problem on Preparation of Statement of Cost and Memorandum Reconciliation Account with Adjustment on Valuation of Stock of Work in Progress and Valuation of Stock of Finished Goods)

Following is the summary of a Trading and Profit and Loss Account of Surekha & Co. Ltd. for the year ended 31 March 2018.

	₹			₹
To Direct Material	69,800	By Sales (60,000 units)		1,50,000
To Wages	38,100	By Closing Stock of Finished Goods		
To Production Overhead	21,300	(2,000 units)		4,000
To Administrative Overheads	9,550	By Closing Work in Progress:		
To Selling Expenses	11,350	Materials	1,600	
To Preliminary Expenses	1,000	Wages	900	
To Goodwill written off	2,350	Factory Overhead	500	3,000
To Dividends	2,500	By Dividend received		13,500
To Taxes	5,000			
To Net profits	9,550			
	1,70,500			1,70,500

In Cost Accounts, the Production Overheads has been absorbed at 20% on Prime Cost, Administration Overheads at 15 Paisa per unit manufactured, Selling Overheads at 20 Paisa per unit sold. Prepare Memorandum Reconciliation Account.

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended 31 March 2018

(Units produced: 62000, Units sold: 60000)

Particulars	₹	₹
Direct Materials		69,800
Direct Wages		38,100
Prime Cost		1,07,900
Production Overheads (20% of Prime Cost)		21,580
		1,29,480
Less: Closing Stock of Work in Progress (See Note 1)		3,000
Factory Cost		1,26,480
Administration Overheads (at ₹0.15 per unit produced)		9,300
Cost of Production		1,35,780
Less: Closing Stock of Finished Goods (See Note 2)		4,380
Cost of Goods Sold		1,31,400
Selling Expenses (at ₹0.20 per unit sold)		12,000
Total Cost		1,43,400
Profits (*Bal. fig.*)		6,600
Sales		1,50,000

Notes:

1. Valuation of Closing Stock of Work in Progress:
   The Closing Stock of Work in Progress includes Material, Labour and Production Overheads. In Costing System, Factory Overheads are recovered at 20% of Prime Cost. Accordingly, the Value of Closing Stock of Work in Progress is as follows:

	₹
Materials:	1,600
Wages:	900
Production Overheads (20% of ₹17,000):	500
	3,000

2. Valuation of Closing Stock of Finished Goods:
   The Value of Closing Stock of Finished Goods must be calculated on the basis of Cost of Production. The valuation has been made as follows:
   The Cost of Production for 62000 units is ₹1,35,780.
   Hence, the Cost of producing 2000 units (i.e., the Number of units of Finished Goods in Stock) is $\left(\frac{₹1,35,780 \times 2000 \text{ units}}{62000 \text{ units}}\right)$ = **₹4,380.**

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Production Overheads over-recovered in Cost Accounts	More	Less
Administration Overheads under-recovered in Cost Accounts	Less	More
Under-valuation of Closing Stock of Finished Goods in Financial Accounts	Less	More
Selling Overheads over-recovered in Cost Accounts	More	Less
Preliminary Expenses written off, recorded only in Financial Accounts	Less	More
Goodwill written off, recorded only in Financial Accounts	Less	More
Dividends paid, recorded only in Financial Accounts	Less	More
Taxes paid, recorded only in Financial Accounts	Less	More
Dividends received, recorded only in Financial Accounts	More	Less

Step 3: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on 31 March 2018

	₹		₹
To Administration Overheads under-recovered in Cost Accounts (₹9,550 – ₹9,300)	250	By Profits as per Costing Books	6,600
		By Production Overheads over-recovered in Cost Accounts (₹21,580 – ₹21,300)	280
To Difference in Value of Closing Stock of Finished Goods (₹4,380 – ₹4,000)	380	By Selling Overheads over-recovered in Cost Accounts (₹12,000 – ₹11,350)	650
		By Dividends received	13,500
To Preliminary Expenses	1,000		
To Goodwill written off	2,350		
To Dividends paid	2,500		
To Taxes paid	5,000		
To Profits as per Financial Books	9,550		
	21,030		21,030

Problem 13 (Problem on Preparation of Statement of Cost and Statement of Reconciliation when the Number of Products are More than One)

Kriti Ltd. commenced business on 1 April 2017 as a manufacturer of fountain pens. Three standard types of pens were manufactured, which were designated as A, B and C. The Trading and Profit and Loss Account for the year ending 31 March 2018 is as follows:

	₹			₹
Materials Charged	24,500	Sales		66,000
Labour	15,000	Stock of finished goods		6,900
Works Expenses	14,600	Closing Work in Progress:		
Office Expenses	13,800	Materials	1,000	
Net Profit	7,000	Wages	500	
		Factory Overhead	500	2,000
	74,900			74,900

The Cost Records revealed that the company has charged the Materials and Labour at Actual Cost, Works Overhead at 100% on Labour and Office Overhead at 25% on Works Cost.

The following figures are taken from the Cost Accounts:

	A	B	C
Average Cost of Material per fountain pen (₹)	2.00	2.50	3.00
Average Cost of Labour per fountain pen (₹)	1.00	1.50	2.00
Selling Price per fountain pen (₹)	6.00	8.00	10.00
Number of Pens manufactured	2000	3000	4000
Number of Pens sold	1800	2400	3600

Prepare a Statement of Cost and Profit and reconcile the two sets of accounts.

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended 31 March 2018

Particulars	**PEN A (Units manufactured – 2000, Units sold – 1800)**		**PEN B (Units manufactured – 3000, Units sold – 2400)**		**PEN C (Units manufactured – 4000, Units sold – 3600)**		**Total (₹)**
	Total (₹)	**P.U. (₹)**	**Total (₹)**	**P.U. (₹)**	**Total (₹)**	**P.U. (₹)**	
Materials	4,000	2.00	7,500	2.500	12,000	3.00	23,500
Labour	2,000	1.00	4,500	1.500	8,000	2.00	14,500
Prime Cost	6,000	3.00	12,000	4.000	20,000	5.00	38,000
Factory Overheads (100% of Labour)	2,000	1.00	4,500	1.500	8,000	2.00	14,500
Works Cost	8,000	4.00	16,500	5.500	28,000	7.00	52,500

(Contd.)

Particulars	PEN A (Units manufactured – 2000, Units sold – 1800)		PEN B (Units manufactured – 3000, Units sold – 2400)		PEN C (Units manufactured – 4000, Units sold – 3600)		Total (₹)
	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	
Office Overheads (25% of Works Cost)	2,000	1.00	4,125	1.375	7,000	1.75	13,125
Cost of Production	10,000	5.00	20,625	6.875	35,000	8.75	65,625
Less: Closing Stock of Finished Goods (See Note)	1,000	----	4,125	----	3,500	----	8,625
Total Cost	9,000	5.00	16,500	6.875	31,500	8.75	57,000
Profits (Bal. fig)	1,800	1.00	2,700	1.125	4,500	1.25	9,000
Sales	10,800	6.00	19,200	8.000	36,000	10.00	66,000

Note:
Closing Stock of Finished Goods is valued at Cost of Production. The following table shows the Valuation of Closing Stock of Finished Goods.

Product	No. of Units of Closing Stock	Cost of Production per Unit	Value of Closing Stock of Finished Goods
A	200	5.00	1,000
B	600	6.875	4,125
C	400	8.75	3,500

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Works Overheads over-recovered in Cost Accounts	More	Less
Office Overheads under-recovered in Cost Accounts	Less	More
Under-valuation of Closing Stock of Finished Goods in Financial Books	Less	More

Notes:

1. Material Cost charged in Financial Accounts is ₹23,500 (i.e., ₹24,500 (–) ₹1,000 in Closing Work in Progress). Hence, there is no difference in Material Cost in both the books.
2. Labour Cost charged in Financial Accounts is ₹14,500 (i.e., ₹15,000 (–) ₹500 in Closing Work in Progress). Hence, there is no difference in Labour Cost in both the books.
3. Works Expenses charged in Financial Accounts is ₹14,100 (i.e., ₹14,600 (–) ₹500 in Closing Work in Progress). However, in Cost Accounts, the Works Expenses recovered are ₹14,500. Hence, Works Expenses are over-recovered in Cost Accounts by ₹400.

Step 3: Preparation of Statement of Reconciliation

Statement of Reconciliation as on 31 March 2018

Particulars	₹	₹
Profits as per Costing Books		9,000
Add:		
Works Overhead over-recovered in Costing Books (₹14,500 – ₹14,100)	400	(+) 400
		9,400

Particulars	₹	₹
Less:		
Office Overheads under-recovered in Costing Books (₹13,800 – ₹13,125)	675	
Difference in Value of Closing Stock of Finished Goods (₹8,625 – ₹6,900)	1,725	(–)2,400
Profits as per Financial Books		7,000

Problem 14 (Problem on Preparation of Statement of Cost and Memorandum Reconciliation Account when the Number of Products are more than One)

V commences his business on 1 January 2017 as a battery manufacturer, manufacturing three types of batteries: A, B and C. The Trading and Profit and Loss Account for the year is given as follows:

	₹			₹
Materials Charged	27,269.05	Sales		71,940.00
Labour	16,535.00	Stock of Finished Goods		2,790.65
Works Expenses	15,720.00	Closing Work in Progress:		
Office Expenses	11,150.00	Materials	3,100	
Net Profit	8,756.60	Wages	800	
		Factory Overhead	800	4,700.00
	79,430.65			79,430.65

He has maintained the Cost Accounts for each type of battery and has charged out the Material and Labour at Actual Cost, Works Overhead at 100% on Labour and Office Overhead at 20% on Works Cost.

From the following additional information, prepare a Statement of Cost and Profit for all the three types of batteries and a Memorandum Reconciliation Account.

	A	B	C
Average Cost of Material per finished battery (₹)	15.37	16.75	11.41
Average Cost of Labour per finished battery (₹)	9.50	11.00	8.75
Selling Price per battery (₹)	47.00	52.00	40.00
Number of Batteries manufactured	845	470	290
Number of Batteries sold	820	450	250

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended 31 December 2017

Particulars	BATTERY A (Units manufactured – 845, Units sold – 820)		BATTERY B (Units manufactured – 470, Units sold – 450)		BATTERY C (Units manufactured – 290, Units sold – 250)		Total (₹)
	Total (₹)	P.U (₹)	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	
Materials	12,987.65	15.37	7,872.50	16.95	3,308.90	11.41	24,169.05
Labour	8.027.50	9.50	5,170.00	11.00	2,537.50	8.75	15,735.00
Prime Cost	21,015.15	24.87	13,042.50	27.95	5,846.40	20.16	39,904.05
Factory overheads (100% of Labour)							
Works Cost	8.027.50	9.50	5,170.00	11.00	2,537.50	8.75	15,735.00

(Contd.)

Particulars	BATTERY A (Units manufactured – 845, Units sold – 820)		BATTERY B (Units manufactured – 470, Units sold – 450)		BATTERY C (Units manufactured – 290, Units sold – 250)		Total (₹)
	Total (₹)	P.U (₹)	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	
Office Overheads (25% of Works Cost)	29.042.65	34.37	18,212.50	38.95	8,383.90	28.91	55,639.05
Cost of Production	5,808.53	6.87	3,642.50	7.75	1,676.78	5.78	11,127.81
Less: Closing Stock of Finished Goods (See Note)	34,851.18	41.24	21,855.00	46.50	10,060.68	34.69	66,766.86
Total Cost	1,031.00	----	930.00	----	1,387.60	----	3,348.60
Profits (*Bal. fig*)	33,820.18	41.24	20,925.00	46.50	8,673.08	34.69	63,418.26
Sales	4,719.82	5.76	2,475.00	5.50	1,326.92	5.31	8,521.74
	38,540.00	47.00	23.400.00	52.00	10,000.00	40.00	71,940.00

Note:
Closing Stock of Finished Goods is valued at Cost of Production. The following table shows the Valuation of Closing Stock of Finished Goods.

Product	No. of Units of Closing Stock	Cost of Production per Unit	Value of Closing Stock of Finished Goods
A	25	41.24	1,031.00
B	20	46.50	930.00
C	40	34.69	1,387.60

Step 2: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Works Overheads over-recovered in Cost Accounts	More	Less
Office Overheads under-recovered in Cost Accounts	Less	More
Under-valuation of Closing Stock of Finished Goods in Financial Books	Less	More

Notes:

1. Material Cost charged in Financial Accounts is ₹24,169.05 (i.e., ₹27,269.05 (–) ₹3,100.00 in Closing Work in Progress). Hence, there is no difference in Material Cost in both the books.
2. Labour Cost charged in Financial Accounts is ₹15,735.00 (i.e., ₹16,535.08 (–) ₹500 in Closing Work in Progress). Hence, there is no difference in Labour Cost in both the books.
3. Works Expenses charged in Financial Accounts is ₹14,920.00 (i.e., ₹15,720.00 (–) ₹800.00 in Closing Work in Progress). However, in Cost Accounts, the Works Expenses recovered are ₹15,735.00. Hence, Works Expenses are over-recovered in Cost Accounts by ₹815.

Step 3: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on 31 December 2017

	₹		₹
To Works Overhead under-recovered in Cost Accounts (₹15,735.00 – ₹14,920.00)	815.00	By Profits as per Financial Books	8,756.60
		By Office Overheads under -recovered in Cost Accounts (₹11,150.00 – ₹11,127.81)	22.19
To Profits as per Costing Books	8,521.74	By Difference in Value of Closing Stock of Finished Goods (₹3,348.60 – ₹2,790.65)	557.95
	9,336.74		9,336.74

Problem 15 (Problem on preparation of Statement of Cost, Profit and Loss Account and Statement of Reconciliation)

From the following particulars, prepare Statement of Cost, Profit and Loss Account and Reconciliation Statement.

	₹
Opening Stock of Raw Materials	1,44,000
Opening Stock of Finished Goods	2,88,000
Purchase of Raw Materials	8,64,000
Closing Stock of Raw Materials	2,16,000
Closing Stock of Finished goods	72,000
Direct Wages	3,60,000

Factory Overheads 20% on Prime Cost
Office Overheads 80% of Factory Overheads
Selling Price 20% over the Cost Price
The Actual Factory Expenses were ₹2,27,150 and Actual Office Expenses were ₹1,85,950.

Solution

Step 1: Preparation of Statement of Cost
Selling Price must be fixed at 20% over the Cost Price. The Profit and Loss Account does not provide cost information for fixing Selling Price. Hence, Statement of Cost must be prepared before preparation of Profit and Loss Account.

Statement of Cost for the period ended ————————

Particulars	₹	₹
Material Consumed		
Opening Stock of Raw Material	1,44,000	
Add: Purchases	8,64,000	
	10,08,000	
Less: Closing Stock of Raw Material	2,16,000	7,92,000
Direct Wages		3,60,000
Prime Cost		11,52,000
Factory Overhead (20% of Prime Cost)		2,30,400
Works Cost		13,82,400

(Contd.)

Particulars	₹	₹
Administration Overhead (80% of Factory Overheads)		1,84,320
Cost of Production		15,66,720
Add: Opening Stock of Finished Goods		2,88,000
		18,54,720
Less: Closing Stock of Finished Goods		72,000
Total Cost		17,82,720
Profits (20% of Cost Price)		3,56,544
Sales		21,39,264

Step 2: Preparation of Profit and Loss Account

Profit and Loss Account for the year ended ————————

	₹		₹
To Opening Stock		By Sales (from Statement of	21,39,264
-Raw Material	1,44,000	Cost)	
-Finished Goods	2,88,000	By Closing Stock	
To Purchases	8,64,000	-Raw Material	2,16,000
To Direct Wages	3,60,000	-Finished Goods	72,000
To Factory Expenses	2,27,150		
To Office Expenses	1,85,950		
To Net Profits (*Bal. fig*)	3,58,164		
	24,27,264		24,27,264

Step 3: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Factory Expenses over-recovered in Cost Accounts	MORE	LESS
Office Expenses under-recovered in Cost Accounts	LESS	MORE

Step 4: Preparation of Statement of Reconciliation

Statement of Reconciliation as on ————————

Particulars	₹	₹
Profits as per Financial Books		3,58,164
Add:		
Office Overheads under-recovered in Costing Books (₹1,85,950 – ₹1,84,320)	1,630	(+)1,630
		3,59,794
Less:		
Factory Overheads over-recovered in Costing Books (₹2,30,400 – ₹2,27,150)	3,250	(–)3,250
Profits as per Costing Books		3,56,544

Problem 16 (Problem on Preparation of Statement of Cost, Profit and Loss Account and Memorandum Reconciliation Account)

From the following particulars, find the Profits in both the books and prepare a Memorandum Reconciliation Account.

In Cost Accounts, the Factory Overhead is charged at 25% of Prime Cost and Office Overhead at 75% of factory-on-cost. The Selling Price is fixed at Cost + 25%.

The other particulars from Financial Records are:

	₹
Opening Stock of Raw Materials	4,000
Opening Stock of Finished Goods	8,000
Closing Stock of Raw Materials	6,000
Closing Stock of Finished Goods	2,000
Purchase of Raw Materials	24,000
Wages	10,000
Actual Factory Expenses	7,750
Actual Office Expenses	6,100

Solution

Step 1: Preparation of Statement of Cost

Selling Price must be fixed at 25% over the Cost Price. The Profit and Loss Account does not provide cost information for fixing Selling Price. Hence, Statement of Cost must be prepared before preparation of Profit and Loss Account.

Statement of Cost for the period ended ————————

Particulars	₹	₹
Material Consumed		
Opening Stock of Raw Material	4,000	
Add: Purchases	24,000	
	28,000	
Less: Closing Stock of Raw Material	6,000	22,000
Direct Wages		10,000
Prime Cost		32,000
Factory Overhead (or Factory on Cost – 25% of Prime Cost)		8,000
Works Cost		40,000
Administration Overhead (75% of Factory Overheads)		6,000
Cost of Production		46,000
Add: Opening Stock of Finished Goods		8,000
		54,000
Less: Closing Stock of Finished Goods		2,000
Total Cost		52,000
Profits (25% of Cost Price)		13,000
Sales		65,000

Step 2: Preparation of Profit and Loss Account

Profit and Loss Account for the year ended ————————

	₹		₹
To Opening Stock		By Sales (from Statement of	
-Raw Material	4,000	Cost)	65,000
-Finished goods	8,000	By Closing Stock	
To Purchases	24,000	-Raw Material	6,000
To Direct Wages	10,000	-Finished Goods	2,000
To Factory Expenses	7,750		
To Office Expenses	6,100		
To Net Profits (*Bal. fig*)	13,150		
	73,000		73,000

Step 3: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Factory Expenses over-recovered in Cost Accounts	MORE	LESS
Office Expenses under-recovered in Cost Accounts	LESS	MORE

Step 4: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on ————————

	₹		₹
To Office Overheads under-recovered in Costing Books (₹6,100 – ₹6,000)	100	By Profits as per Costing Books	13,000
		By Factory Overheads over-recovered in Costing Books	
To Profits as per Financial Books	13,150	(₹8,000 – ₹7,750)	250
	13,250		13,250

Problem 17 (Problem on Preparation of Statement of Cost, Profit and Loss Account and Memorandum Reconciliation Account, in Case of Loss)

The following figures are available from the Final Accounts for the year ended 31 March 2018.

	₹
Direct Material Consumption	2,50,000
Direct Wages	1,00,000
Factory Overhead	3,80,000
Administration Overhead	2,50,000
Selling and Distribution Overhead	4,80,000
Bad Debts	20,000
Preliminary Expenses written off	10,000
Legal Charges	5,000

	₹
Dividends received	50,000
Interest received on Deposits	10,000
Sales (1,20,000 units)	7,00,000
Closing Stock:	
Finished Goods (40,000 units)	1,20,000
Work in Progress	80,000

The Cost Accounts reveal:
Direct Material Consumption is ₹2,80,000
Factory Overhead recovered at 20% on Prime Cost
Administration Overhead at ₹3 per unit produced
Selling and Distribution Overhead at ₹4 per unit sold
Prepare:

(a) Cost Sheet
(b) Profit and Loss Account and
(c) Memorandum Reconciliation Account

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the year ended 31 March 2018

(Units produced – 160000, Units sold – 120000)

Particulars	₹	₹
Direct Materials		2,80,000
Direct Wages		1,00,000
Prime Cost		3,80,000
Production Overheads (20% of Prime Cost)		76,000
		4,56,000
Less: Closing Stock of Work in Progress		80,000
Factory Cost		3,76,000
Administration Overheads (@ ₹3 per unit produced)		4,80,000
Cost of Production		8,56,000
Less: Closing Stock of Finished Goods (See Note)		2,14,000
Cost of Goods Sold		6,42,000
Selling Expenses (@ ₹4 per unit sold)		4,80,000
Total Cost		11,22,000
Profits (*Bal. fig.*)		(–)4,22,000
Sales		7,00,000

Note:

The Value of Closing Stock of Finished Goods must be calculated on the basis of Cost of Production. The valuation has been made as follows:
The Cost of Production for 160000 units is ₹8,56,000.

Hence, the Cost of producing 40000 units (i.e., the number of units of Finished Goods in stock) is

$$\left(\frac{₹8,56,000 \times 40000 \text{ units}}{160000 \text{ units}}\right) = ₹2,14,000.$$

Step 2: Preparation of Profit and Loss Account

Profit and Loss Account for the year ended 31 March 2018

	₹		₹
To Materials Consumed	2,50,000	By Sales	7,00,000
To Wages	1,00,000	By Closing Stock of Work-in-	
To Factory Overheads	3,80,000	progress	1,20,000
To Administration Overheads	2,50,000	By Closing Stock of Finished Goods	80,000
To Selling and Distribution Overheads	4,80,000	By Dividends received	50,000
To Bad debts	20,000	By Interest on Deposits	10,000
To Preliminary Expenses written off	10,000	By Net Loss (*Bal. fig.*)	5,35,000
To Legal charges	5,000		
	14,95,000		14,95,000

Step 3: Identification of items of difference and analysis of their impact on Profits

Transaction	Loss on Relative Basis	
	In Financial Books	In Costing Books
Difference in Material Consumption recorded	Less	More
Factory Overhead under-recovered in Cost Books	More	Less
Administration Overhead over-recovered in Cost Books	Less	More
Under-valuation of Closing Stock of Finished Goods in Financial Books	More	Less
Bad Debts recorded only in Financial Accounts	More	Less
Preliminary Expenses written off, recorded only in Financial Books	More	Less
Legal Charges recorded only in Financial Books	More	Less
Dividends received recorded only in Financial Books	Less	More
Interest on Deposits recorded only in Financial Books	Less	More

Step 4: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on 31 March 2018

	₹		₹
To Loss as per Financial Books	5,35,000	By Factory Overheads under	
To Difference in Value of Materials		-recovered in Cost Books (₹3,80,000 – ₹76,000)	3,04,000
Consumed (₹2,80,000 – ₹ 2,50,000)	30,000	By Difference in Value of Closing	
To Administration Overheads over		Stock of Finished Goods	
-recovered in Costing Books		(₹2,14,000 – ₹1,20,000)	94,000
(₹4,80,000 – ₹2,50,000)	2,30,000	By Bad Debts	20,000
To Dividends received	50,000	By Preliminary Expenses written off	10,000
To Interest on Deposits	10,000	By Legal Charges	5,000
		By Loss as per Costing Books	4,22,000
	8,55,000		8,55,000

Problem 18 (Problem on Preparation of Statement of Cost, Profit and Loss Account and Statement of Reconciliation, in Case of Multi-products)

A factory turns out two products: A and B. The Cost of Material and Labour is as follows:
Material Cost per unit:

Product A: ₹12.50
Product B: ₹7.50
Wages per unit:
Product A: ₹10.00
Product B: ₹6.00

The Works Overhead is charged at 100% of Wages and Office Overhead at 25% of the works cost.

200 units of A and 500 units of B were produced and sold at ₹50 and ₹30 per unit respectively. There was no Opening and Closing Stock.

The Actual Works Expenses amounted to ₹4,800 and Office Expenses to ₹4,200.

Find the Profit as per Cost Accounts and Financial Accounts and reconcile the two.

Solution:

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended ————————

Particulars	PRODUCT A (Units Produced - 200)		PRODUCT B (Units Produced 500)		TOTAL (₹)
	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	
Direct Material	2,500.00	12.500	3,750.00	7.500	6,250.00
Direct Wages	2,000.00	10.000	3,000.00	6.000	5,000.00
Prime Cost	4,500.00	22.500	6,750.00	13.500	11,250.00
Works Overheads (100% of wages)	2,000.00	10.00	3,000.00	6.000	5,000.00
Works Cost	6,500.00	32.500	9,750.00	19.500	16,250.00
Office Overheads (25% of Works Cost)	1,625.00	8.125	2,437.50	4.875	4,062.50
Total Cost	8,125.00	40.625	12,187.50	24.375	20,312.50
Profit (*Bal. fig.*)	1,875.00	9.375	2,812.50	5.625	4,687.50
Sales	10,000.00	50.000	15,000.00	30.000	25,000.00

Step 2: Preparation of Profit and Loss Account

Profit and Loss Account for the year ended ————————

	₹		₹
To Materials	6,250.00	By Sales	25,000.00
To Wages	5,000.00		
To Works Expenses	4,800.00		
To Office Expenses	4,200.00		
To Net Profits (*Bal. fig.*)	4,750.00		
	25,000.00		25,000.00

Step 3: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Factory Expenses over-recovered in Cost Accounts	More	Less
Office Expenses under-recovered in Cost Accounts	Less	More

Step 4: Preparation of Statement of Reconciliation

Statement of Reconciliation as on ————————

Particulars	₹	₹
Profits as per Financial Books		4,750.00
Add:		
Office Overheads Under-Recovered In Costing Books (₹4,200.00 – ₹4,062.50)	137.50	(+)137.50
		4,887.50
Less:		
Factory Overheads Over-Recovered In Costing Books (₹5,000 – ₹4,800)	200	(–)200.00
Profits as per Costing Books		4,687.50

Problem 19 (Problem on Preparation of Statement of Cost, Profit and Loss Account and Memorandum Reconciliation Account, in Case of Multi-products)

Modern Radio Company, which commenced business on 1 January 2017, gives you the following information and asks you to prepare a Statement of Cost, a Profit and Loss Account and a Memorandum Reconciliation Account.

In the Costing Records, Works Overheads are charged at 100% on Labour and Office Overheads at 25% on Works Cost.

In Financial Accounts, where the actual expenses are shown, Works Expenses are ₹16,800 and Office Expenses are ₹6,220.

During the year 2017, two grades of radios are manufactured and are known as Janata and Deluxe. There was no Opening and Closing Stock. The company could sell 160 units of Janata and 95 units of Deluxe. The particulars are as follows:

	Janata (₹)	Deluxe (₹)
Average Cost of Material per radio	28.00	32.00
Average Cost of Labour per radio	48.00	58.00
Selling Price per radio	180.00	240.00

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended 31 December 2017

Particulars	JANATA (Units Produced - 160)		DELUXE (Units Produced - 95)		TOTAL (₹)
	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	
Direct Material	4,480.00	28.00	3.040.00	32.00	7,520.00
Direct Wages	7,680.00	48.00	5,510.00	58.00	13,190.00
Prime Cost	12,160.00	76.00	8,550.00	90.00	20,710.00

Particulars	JANATA (Units Produced - 160)		DELUXE (Units Produced - 95)		TOTAL (₹)
	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	
Works Overheads (100% of wages)	7,680.00	48.00	5,510.00	58.00	13,190.00
Works Cost	19,840.00	124.00	14,060.00	148.00	33,900.00
Office Overheads (25% of Works Cost)	4,960.00	31.00	3,515.00	37.00	8,475.00
Total Cost	24,800.00	155.00	17,575.00	185.00	42,375.00
Profit (*Bal. fig.*)	4,000.00	25.00	5,225.00	55.00	9,225.00
Sales	28,800.00	180.00	22,800.00	240.00	51,600.00

Step 2: Preparation of Profit and Loss Account

Profit and Loss Account for the year ended 31 December 2017

	₹		₹
To Materials	7,520.00	By Sales	51,600.00
To Wages	13,190.00		
To Works Expenses	16,800.00		
To Office Expenses	6,220.00		
To Net Profits (Bal. fig.)	7,870.00		
	51,600.00		51,600.00

Step 3: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Factory Expense under-recovered in Cost Accounts	Less	More
Office Expenses over-recovered in Cost Accounts	More	Less

Step 4: Preparation of Memorandum Reconciliation Account

Memorandum Reconciliation Account as on 31 December 2017

	₹		₹
To Office Overheads over-recovered in Costing Books (₹8,475 – ₹6,220)	2,255.00	By Profits as per Financial Books	7,870.00
To Profits as per Costing Books	9,225.00	By Factory Overheads under-recovered in Costing Books (₹16,800 – ₹13,190)	3,610.00
	11,480.00		11,480.00

Problem 20 (Problem on Preparation of Statement of Cost, Profit and Loss Account and Memorandum Reconciliation Account, in Case of Multi-products)

Hirelal Piano Co., which commenced business on 1 January 2017, presents you the following information. You are required to prepare a Statement of Cost and Profit for each piano and Profit and Loss Account as per Financial Records.

Two grades of pianos are manufactured under the brand names – Stylo and Omega.

Average Cost of Material per piano is:

Stylo: ₹8

Omega: ₹6.62

Average Cost of Labour per piano is:
Stylo: ₹14.62
Omega: ₹12
Number of Pianos Sold:
Stylo: 95
Omega: 160
Selling Price of the Piano:
Stylo: ₹60
Omega: ₹45

The Actual Works Expenditure amounted to ₹4,200 and the Office Expenditure amounted to ₹1,555.

You are also required to prepare a Statement of Reconciliation after charging the Labour and Material at Actual Cost, and recovering the Works Overhead at 100% on Labour and Office Overhead at 25% of the Works Cost.

Solution

Step 1: Preparation of Statement of Cost

Statement of Cost for the period ended 31 December 2017

Particulars	STYLO (Units Produced - 95)		OMEGA (Units Produced - 160)		TOTAL (₹)
	Total (₹)	P.U. (₹)	Total (₹)	P.U. (₹)	
Direct Material	760.00	8.00	1,059.20	6.62	1,819.20
Direct Wages	1,388.90	14.62	1,920.00	12.00	3,308.90
Prime Cost	2,148.90	22.62	2,979.20	18.62	5,128.10
Works Overheads (100% of Wages)	1,388.90	14.62	1,920.00	12.00	3,308.90
Works Cost	3,537.80	37.24	4,899.20	30.62	8,437.00
Office Overheads (25% of Works Cost)	884.45	9.31	1,224.80	7.655	2,109.25
Total Cost	4,422.25	46.55	6,124.00	38.275	10,546.25
Profit (*Bal. fig.*)	1,277.75	13.45	1,076.00	6.725	2,353.75
Sales	5,700.00	60.00	7,200.00	45.00	12,900.00

Step 2: Preparation of Profit and Loss Account

Profit and Loss Account for the year ended 31 December 2017

	₹		₹
To Materials	1,819.20	By Sales	12,900.00
To Wages	3,308.90		
To Works Expenses	4,200.00		
To Office Expenses	1,555.00		
To Net Profits (*Bal. fig.*)	2,016.90		
	12,900.00		12,900.00

Step 3: Identification of items of difference and analysis of their impact on Profits

Transaction	Profit on Relative Basis	
	In Financial Books	In Costing Books
Factory Expense under-recovered in Cost Accounts	LESS	MORE
Office Expenses over-recovered in Cost Accounts	MORE	LESS

Step 4: Preparation of Statement of Reconciliation

Statement of Reconciliation as on 31 December 2017

Particulars	₹	₹
Profits as per Costing Books		2,353.75
Add:		
Office Overheads over-recovered in Costing Books (₹2,109.25 – ₹1555.00)	554.25	(+) 554.25
		2,908.00
Less:		
Factory Overheads under-recovered in Costing Books (₹4,200.00 – ₹3,308.90)	891.10	(–) 891.10
Profits as per Financial Books		2,016.90

SUMMARY

- For ascertaining the reasons of difference in Profits or Loss shown by the two different accounting systems, i.e., Financial Accounting and Cost Accounting, a Statement of Reconciliation or a Memorandum Reconciliation Account is prepared.
- The reasons or causes for the difference in results as per Financial Accounts and Cost Accounts are:
  - Certain items are recorded only in Financial Accounts, but not in Cost Accounts
  - Certain items are considered only in Cost Accounts, but not recorded in Financial Accounts
  - Difference on account of treatment for Overheads
  - Method of Depreciation
  - Method of Stock Valuation
- A Statement of Reconciliation or Reconciliation Statement is a Statement prepared presenting the reasons for difference in results under the two accounting systems, thereby enabling the accuracy of both the systems and transparency in recording of business transactions.
- Memorandum Reconciliation Account is an alternative to Statement of Reconciliation. It is prepared to present the reasons for difference in the results shown by Financial Statements and Cost Statements. The account is not a part of the double-entry system. Hence, it is called Memorandum Reconciliation Account.

EXERCISES

Section B Type Problems

Problem 1

Prepare a Reconciliation Statement from the given particulars and find out Profit as per Financial Accounts.

		₹
(a)	Profit as per Costing Records	32,400
(b)	Opening Stock of finished goods overcharged in Costing	12,000
(c)	Closing Stock of finished goods undercharged in Financial Records	8,000
(d)	Income Tax provided in Financial Accounts	3,000

(e)	Bank Interest credited in Financial Books	1,200
(f)	Over-absorption of Administration Overheads in Costing Records	2,000

[*BU B.Com, May (2015)*]

[Ans: Profits as per Financial Accounts: ₹36,600]

[Hint: Add items b, e and f; Deduct items c and d]

Problem 2

During a particular year, the Cost Books of a company showed a Profit of ₹1,68,000. A careful scrutiny of the figure from both the sets of accounts revealed the following facts:

(a) Sundry Income of ₹5,000 was not considered in Cost Books.

		₹
(b)	Factory Overhead under-recovered in Cost Books	20,200
(c)	Selling Expenses under-recovered in Cost Books	51,750
(d)	Administration Expenses over-recovered in Cost Books	24,950

Reconcile Cost Books with Financial Books.

[*BU B.Com, May (2015), May (2011)*]

[Ans: Profits as per Financial Accounts: ₹1,26,000]

[Hint: Add items 1 and 4; Deduct items 2 and 3]

Problem 3

From the following information, prepare a Reconciliation Statement.

		₹
(a)	Profit as per Cost Account	27,400
(b)	Under-absorption of Factory Overhead in Cost Account	1,300
(c)	Over-absorption of Administration Overhead in Cost Account	600
(d)	Interest paid included only in Financial Account	400
(e)	Dividend received	1,000
(f)	Profit as per Financial Account	27,300

[*BU B.Com, May (2013)*]

[Hint: Add items c and e; Deduct items b and d, when Costing Profits are taken as Base Profits]

Section C Type Problems

Problem 1

From the following details, prepare a Reconciliation Statement and calculate Profit as per Financial Accounts.

		₹
(a)	Net Profit as per Costing Records	1,72,400
(b)	Work Overheads under-recovered in Costing	3,120
(c)	Administrative Overheads recovered in excess	1,700
(d)	Depreciation charged in Financial Records	11,000
(e)	Interest received but not included in Costing	8,000
(f)	Income Tax provided in Financial Books	40,300
(g)	Bank Interest credited in Financial Books	750
(h)	Stores Adjustments credited in Financial Books	475
(i)	Depreciation of Stock charged in Financial Books	6,750
(j)	Depreciation recovered in Costing	12,300

[*BU B.Com, May (2017), May (2016), May (2013)*]

[Ans: Profits as per Financial Accounts: ₹1,34,455]

[Hint: Add items c, e, g, h and j; Deduct items b, d, f and i]

Problem 2

From the following figures, prepare a Reconciliation Statement and find out Profit as per Financial Accounts:

		₹
(a)	Net Profit as per Cost Accounts	6,89,600
(b)	Works Overheads under-recovered	12,480
(c)	Administration Overheads recovered in excess	6,800
(d)	Depreciation charged in Financial Account	44,800
(e)	Depreciation recovered in Cost Accounts	50,000
(f)	Obsolescence Loss charged in Financial Books	22,800
(g)	Stores Adjustment (credit) in Financial Books	1,900
(h)	Income Tax provided in Financial Books	1,61,200
(i)	Depreciation of Stock charged in Financial Books	27,000
(j)	Bank Interest and Transfer Fee credited in Financial Books	3,000

[*BU B.Com, May (2017)*]

[Ans: Profits as per Financial Accounts: ₹4,83,020]

[Hint: Add items c, e, g and j; Deduct items b, d, f, h and i]

Problem 3

From the following figures, prepare a Reconciliation Statement and find out Profit as per Financial Accounts:

		₹
(a)	Net Profit as per Cost Accounts	3,44,800
(b)	Works Overheads under-recovered	6,240
(c)	Administration Overheads recovered in excess	3,400
(d)	Depreciation charged in Financial Accounts	22,400
(e)	Depreciation recovered in Cost Accounts	25,000
(f)	Obsolescence Loss charged in Financial Books	11,400
(g)	Stores Adjustment (credit) in Financial Books	950
(h)	Income Tax provided in Financial Books	80,600
(i)	Depreciation of Stock charged in Financial Books	13,500
(j)	Bank Interest and Transfer Fee credited in Financial Books	1,500

[*BU B.Com, May 2016)*]

[Ans: Profits as per Financial Accounts: ₹2,41,510]

[Hint: Add items c, e, g and j; Deduct items b, d, f, h and i]

Problem 4

From the following details, you are required to prepare a Reconciliation Statement and also ascertain Profit as per Financial Books.

Particulars	Cost Books (₹)	Financial Books (₹)
1. Profit as per Cost Records	3,85,000	?
2. Works Overheads	68,500	72,000
3. Administration Overheads	92,750	1,02,650
4. Selling Overheads	45,600	38,500
5. Depreciation	-	62,850
6. Stores Adjustment (Credit) in Profit and Loss Account	-	7,500
7. Value of Opening Stock	86,400	75,000
8. Value of Closing Stock	94,800	86,400
9. Reserve for Bad Debts	-	16,050
10. Interest on Bank Deposit received	-	16,750

Particulars	Cost Books (₹)	Financial Books (₹)
11. Loss on Sale of Machinery	-	15,000
12. Tax Provision	-	42,750
13. Interest on Bank Loan paid	-	18,250

[*BU B.Com, May (2016)*]

[Ans: Profits as per Financial Accounts ₹2,51,050]

Note: Works Overhead and Administration Overheads are under-absorbed in Costing Books by ₹3,500 and ₹9,900 respectively (Deduct them from Costing profits); Selling Overheads are over-absorbed in Costing Books by ₹7,100. (Add to Costing Profits); Opening Stock is overvalued in Costing Books by ₹11,400 (Add to Costing Profits) and Closing Stock is over-valued in Costing Books by ₹8,400 (Deduct from Costing Profits).

[Hint: Add items 4,6,7 and 10; Deduct items 2, 3, 5, 8, 9, 11, 12 and 13]

Problem 5

From the following figures, prepare a Reconciliation Statement and find out Profit as per Financial Accounts:

	₹
(a) Net Profit as per Cost Accounts	3,44,800
(b) Works Overheads under-recovered in Cost Account	6,240
(c) Administration overheads recovered in excess	3,400
(d) Depreciation charged in Financial Account	22,400
(e) Depreciation recovered in Cost Accounts	25,000
(f) Interest included in Financial Account	1,500
(g) Obsolescence Loss charged in Financial Account	11,400
(h) Income Tax provided in Financial Books	80,600

[*BU B.Com, May (2015)*]

[Ans: Profits as per Financial Accounts: ₹2,54,060]

[Hint: Add items c, e and f; Deduct items b, d, g and h]

Problem 6

The Profit as per Cost Accounts is ₹1,15,000. The following points are found out on comparison between Cost Accounts and Financial Accounts.

Particulars	Cost Books (₹)	Financial Books (₹)
(a) Opening Stock		
Materials	10,000	10,500
Work in Progress	15,000	12,000
Finished goods	14,000	13,000
(b) Closing Stock		
Materials	12,000	11,000
Work in Progress	20,000	21,500
Finished goods	30,000	28,000

(c) Director's Fee paid: ₹1,500; Reserve for Bad Debts: ₹600; Interest paid: ₹1,000; Transfer Fees received: ₹800 and Dividend received: ₹400, are exclusively taken in Financial Accounts but ignored in Cost Accounts.

(d) Rent, charged in Costing but not in Financial Accounts, is ₹5,000.

(e) Goodwill of ₹5,000 and Preliminary Expenses of ₹2,000 have been written off during the year.

(f) Overheads incurred are ₹50,600 but Overheads absorbed amounted to ₹48,100.

Find out the Profit as per Financial Accounts by preparing Reconciliation Statement.

[*BU B.Com, May (2015)*]

[Ans: Profits as per Financial Accounts: ₹1,10,600]

[Hint: *Add:* Opening Stock over-valued in Costing Books by ₹3,500, Transfer Fees and Dividend Income recorded only in Financial Books, and Rent charged only in Costing Books, and *Less:* Closing Stock over-valued in Costing Books by ₹1,500, Director's Fees, Reserve for Bad Debts, Interest Paid, Goodwill written off, Preliminary Expenses written off, shown only in Financial Books, and Overheads under-absorbed in Costing Books]

Problem 7

From the following figures, prepare a Reconciliation Statement.

		₹
(a)	Net Profit as per Cost Accounts:	4,00,000
(b)	Income Tax provided in Financial Accounts:	1,20,000
(c)	Share Transfer Fee credited in Financial Accounts:	8,000
(d)	Overheads as per Cost Accounts were estimated at ₹68,000, whereas, ₹56,000 was charged in Financial Accounts.	
(e)	Company provided ₹40,000 for Doubtful Debts	
(f)	Directors' fees shown in Financial Accounts:	14,000
(g)	Value of Closing Stock in Cost Accounts is ₹37,500, whereas, in Financial Accounts, it is ₹41,500.	
(h)	Interest on investment not included in Cost Accounts:	₹ 8,000
(i)	Stores Adjustment credited in Financial Accounts:	₹ 2,000

[*BU B.Com, May (2014)*]

[Ans: Profits as per Financial Accounts: ₹2,60,000]

[Hint: Add items c, d, g, h and I; Deduct items b, e and f]

Problem 8

The Net Profits of a manufacturing company appeared at ₹64,377 as per Financial Accounts, for the year ended 31 March 2018. The Cost Books, however, showed a Net Profit of ₹86,200 for the same period. A careful scrutiny of the figures from both the sets of accounts revealed the following facts:

		₹
(a)	Works Overheads under-recovered in Cost Books	1,560
(b)	Administrative Overheads excess recovered in costs	850
(c)	Depreciation charged in Financial Books	5,600
(d)	Depreciation recovered in Cost Books	6,250
(e)	Interest on investments not included in Cost Accounts	4,000
(f)	Loss due to Obsolescence in Financial Accounts	2,850
(g)	Income Tax provided in Financial Books	20,150
(h)	Bank Interest and Transfer Fee credited in Financial Books	375
(i)	Stores Adjustment (credited in Financial Accounts)	237
(j)	Loss due to depreciation in Stock Values charged in Financial Accounts	3,375

Prepare a statement showing the Reconciliation of Profit between Cost Accounts and Financial Accounts.

[Hint: Add items a, c, f, g and j; Deduct items b, d, e, h and i, when Financial Profits are taken as Base Profits]

Problem 9

The Net Profits of a manufacturing company appeared at ₹76,500 as per Financial Accounts for the year ended 31 March 2014. The Cost Books, however, showed a Net Profit of ₹88,460 for the same period. A careful scrutiny of the figures from both the sets of accounts revealed the following facts:

		₹
(a)	Income Tax provided in Financial Books	10,000
(b)	Bank Interest credited in Financial Books	250
(c)	Works Overheads under-recovered in Cost Books	1,550
(d)	Depreciation charged in Financial Books	5,600

(e)	Depreciation recovered in Cost Books	6,000
(f)	Administrative Overheads excess recovered in Costs	850
(g)	Loss due to Obsolescence in Financial Accounts	2,800
(h)	Interest on Investments not included in Cost Accounts	4,000
(i)	Stores Adjustment (credited in Financial Accounts)	240
(j)	Loss due to Depreciation in Stock Values charged in Financial Accounts	3,350

Prepare a Reconciliation Statement.

[Hint: Add items a, c, d, g and j; Deduct items b, e, f, h and i, when Financial Profits are taken as Base Profits]

Problem 10

X Company Ltd. maintains both Cost Accounting and Financial Accounting. The Costing System has revealed Profit, for the year ending 31 March 2018, of ₹1,15,200. However, the Financial Accounting result is different from this figure. Verification revealed the following information.

		₹
(a)	Over-absorption of Factory Overhead in Cost Accounting	2,200
(b)	Provision for Doubtful Debts	1,600
(c)	Preliminary Expenses written off	24,400
(d)	Transfer Fees received	3,400
(e)	Underwriting Commission paid	10,000
(f)	Discount on issue of shares	12,400
(g)	Dividend received	14,600
(h)	Under-recovery of Depreciation in Cost Accounting	1,600
(i)	Under-valuation of Closing Stock in Financial Accounting	2,400
(j)	Notional Interest recorded in Cost Accounting	2,600
(k)	Selling and Distribution Overhead over-recovered in Cost Accounting	15,000
(l)	Rent received not accounted in Cost Accounts	8,000
(m)	Bank Interest credited in Financial Accounts	2,500

Prepare a Reconciliation Statement as on 31 March 2018 to show Profits as per Financial Accounts.

(Ans: Profits as per Financial Accounts: ₹1,11,100)

[Hint: Add items a, d, g, j, k, l and m; Deduct items b, c, e, f, h and i]

Bangalore University Question Paper

B.COM Semester IV Examination, May 2017
(Fresh + Repeaters) (CBCS)
(2015-16 and Onwards)
COMMERCE
Cost Accounting Paper 4.4

[Time: 3 hours] **[Total Marks: 70]**

Instruction: Answer should be written completely either in English or Kannada.

Section A

1. Answer any **five** sub-questions. Each sub-question carries **two** marks. (5 × 2 = 10)
   (a) Define cost.
   (b) Give two examples of selling and distribution overheads.
   (c) What is meant by over time?
   (d) What is material requisition?
   (e) Write two merits of piece rate system.
   (f) Write any two differences between cost accounting and financial accounting.
   (g) What is Reconciliation Statement ?

Section B

Answer any **three** questions. Each question carries **six** marks. (3 × 6 = 18)

2. What are the essentials of a good wage payment system?

3. From the following figures prepare a cost sheet showing the cost per unit and profit for the period:

	₹
Raw material consumed	40,000
Direct wages	24,000
Factory overhead	8,000

Office overhead 10% of factory cost selling overhead ₹1.50 per unit. Units produced 2000. Units sold 1800 at ₹50 each.

Answer: Profit ₹16,020

4. Following transactions relate to the Receipts and issue of material 'Z'.

Receipts:

1-10-2015	1000 units @ ₹8 per unit

13-10-2015	1800 units @ ₹8.60 per unit
23-10-2015	1200 units @ ₹7.60 per unit
Issues:	
5-10-2015	800 units
15-10-2015	800 units
25-10-2015	1200 units

Answer: Closing Stock 1,200 units ₹9,684

Prepare stores ledger under weighted average method.

5. From the following particulars compute machine hour rate:

	₹
Cost of machine	1,14,800
Installation charges	5,400
Anticipated life of machine 10 years	
Scrap value at the end of 10 years	5,000
Rent and rates per annum	12,000
Insurance per annum	3,000

Power cost is 5 units per hour @ 0.40 paise per unit.

There are 300 working days of 8 hours each in a year.

Answer: Machine Hour Rate ₹13.05

6. From the following calculate the earnings of workers A, B, C under Halsey plan Rowan scheme of payment:

Worker	A	B	C
Standard time (Hours)	3	4	5
Actual (Hours)	5	3	4
Basic wages per hour	2	2	2

Answer:

Worker	Halsey Plan ₹	Rowan Plan ₹
A	**10**	**10**
B	**7**	**7.5**
C	**9**	**9.6**

Note: Worker A is not entitled for any bonus as there is no saving of time in his case.

Section C

Answer any **three** question. Each question carries **fourteen** marks. $(3 \times 14 = 42)$

7. From the following figures compute machine hour rate for machines X, Y, Z for a four week period, each machine is expected to work 216 hours.

	₹
Rent and Rates	30,000
Lighting	4,000
Depreciation	20,000

Indirect wages	20,000
Power	12,000
Sundries	30,000
Canteen expenses	2,000
Repairs	8,000
Total	1,26,000

	Machines		
	X	Y	Z
Space occupied (Sq.ft.)	200	400	600
Light points	20	60	120
Cost of machine (₹)	2,50,000	1,50,000	1,00,000
No. of workers	20	40	40
Power actuals (₹)	5,000	3,000	4,000
Direct wages	40,000	60,000	50,000

Answer: Machine Hour Rate: X – ₹176.54; Y – ₹200.93 & Z – ₹205.87

8. The following data is furnished by a company for the year 2015:

Stock of material on 1-1-2015	35,000
Stock of material on 31-12-2015	5,000
Purchases ol materials	50,000
Wages	1,00,000
Factory overheads	20,000
Administration overhead	20,000
Closing stock of finished goods	20,000
Sales	2,50,000

Production during 2015, 5000 units.

The company wants to quote for a contract for the supply of 1000 units during the year 2016. The cost of material is expected to increase by 15% and wages by 10%. Prepare a statement of cost for the year 2015 and a tender statement for 2016 showing the price to be Quoted per unit, if the same percentage of profit is maintained as in the previous year.

Answer: Tender Price ₹61,600

9. From the following data prepare stores ledger account under FIFO method. Stock on 1st March 2015, 15000 units at 20/unit.

Purchases

Date	**Units**	**Rate per unit (₹)**
March 2	16000	19
4	13000	21
8	20000	22.50
24	40000	24
25	30000	25

Issues

Date	**Units**
March 5	13600
7	7000
15	17200
18	4900
22	15100
28	45000

On 31-3-2015 stock chocking revealed a shortage of 600 units.

Answer: Closing Stock: 600 units at ₹24 per unit ₹14,400 + 30,000 units at ₹25 per unit ₹7,50,000

10. From the following, prepare a Reconciliation statement, calculate profit as per Financial Accounts:

(a)	Net profit as per costing records	1,72,400
(b)	Works overhead under recovered in costing	3,120
(c)	Administrative overhead recovered in excess	1,700
(d)	Depreciation charged in financial records	11,000
(e)	Interest received but not included in costing	8,000
(f)	Income tax provided in financial books	40,300
(g)	Bank interest credited in financial books	750
(h)	Stores adjustment credited in financial books	475
(i)	Depreciation of stock charged in financial books	6,750
(j)	Depreciation recovered in costing	12,300

Answer: Profit as per Financial Accounts ₹1,34,455

11. From the following, you are required to calculate the earnings of a worker for a week under:
    (a) Straight piece rate system
    (b) Taylor's differential piece rate system
    (c) Halsey premium plan and
    (d) Rowan premium plan.

Weekly working hours	48
Hourly wage rate (₹)	30
Piece rate per unit (₹)	12
Normal time allowed per piece	12 minutes
Normal output per week	240 pieces
Actual output of the week	300 pieces

Differential piece rate 80% of piece rate when output is below normal and 120% of piece rate when output above normal.

Answer: Wages under –

(a)	**Straight Piece Rate System**	**₹3,600**
(b)	**Taylor's Differential Piece Rate System**	**₹4,320**
(c)	**Halsey Plan**	**₹1,620**
(d)	**Rowan Plan**	**₹1,728**

Model Question Paper 1

B.COM IV SEMESTER
Cost Accounting Paper 4.4

[Time: 3 hours] **[Total Marks: 70]**

Section A

1. Answer any **five** sub-questions. Each question carries **two** marks. (5 × 2 =10)
   (a) Define Costing
   (b) What are Overheads?
   (c) Mention any two reasons of Idle Time.
   (d) What is Perpetual Inventory System?
   (e) Define Labour Turnover.
   (f) Write two merits of FIFO Method.
   (g) What is Purchase Voucher?

Section B

Answer any **three** questions. Each question carries **six** marks. (3 × 6 = 18)

2. Write any six differences between cost accounts and financial accounts.

3. M/s RKS Ltd. manufactured and sold 2,000 articles in the year 2015. Following were the expenses:

• Raw Materials	₹2,00,000
• Direct Wages	₹1,60,000
• Direct Charges	₹1,00,000
• Factory Overheads	50% of Wages
• Office Overheads	10% of Factory Cost
• Selling Overhead	₹20 per unit sold
• All articles were sold for	₹7,00,000

   Prepare a Cost Sheet.

Answer: Profit ₹66,000

4. From the following details prepare Stores Ledger under Weighted Average Method.

Date	Receipts (Units)	Rate per unit (₹)	Issues (Units)
1/4/2018	13,000	10	-
8/4/2018	17,000	12	-
10/4/2018	-	-	20,000
16/4/2018	30,000	15	-
20/4/2018	-	-	15,000
26/4/2018	-	-	6,000

Answer: Closing Balance: 19,000 units ₹2,66,633

5. During the first week of November 2017 Mr. Raju produced 248 articles. He receives wages for a guaranteed 48 hours a week at ₹100 per hour. The estimated time to produce one article is 15 minutes. Calculate his wages according to Halsey Premium Plan and Rowan Premium Plan.

Answer: Halsey Premium Plan ₹5,500 and Rowan Premium Plan ₹5,884

6. Calculate Re-order Level, Minimum Level, Maximum Level and Average Stock Level from the following details:

Normal Usage	1,200 units per week
Maximum Usage	1,800 units per week
Minimum Usage	600 units per week
Re-order Period	4 to 6 weeks
Re-order Quantity	9,600 units per week

Answer: Re-order Level 10,800 units; Minimum Level 4,800 units; Maximum Level 18,000 units and Average Stock Level 9,600 units or 11,400 units

Section C

Answer any **three** questions. Each question carries **fourteen** marks. (3 × 14 = 42)

7. RKS Manufacturers Ltd. works with two machines, X and Y. From the following details, compute Machine Hour Rate.

Particulars	Machine X	Machine Y
Cost of Machine	₹1,60,000	₹2,00,000
Cost of Installation	₹40,000	₹20,000
Scrap Value	₹20,000	Nil
Estimated Life	10 Years	10 Years
Working hours per year	2,000 Hours	1,800 Hours
Area Occupied	300 sq. ft.	600 sq. ft.
Number of Light Points	12	6
Number of Workers	10	8
Time devoted by Foreman	1/3	2/3

Following expenses are incurred in the production plant:

- Rent ₹6,000 per month
- General Lighting ₹400 per month
- Foreman Salary ₹12,000 per week
- Power consumption 2 units per hour by each machine at ₹2 per unit
- Canteen expenses ₹20,000 per year
- Repairs ₹40,000 per machine per year

Answer: Machine X ₹156.16 per hour and Machine Y ₹302.05 per hour

8. From the following information, calculate earnings of each worker under Halsey Premium Plan and Rowan Premium Plan.

Name of Employee	Mr. R	Mr. K	Mr. S
Time allowed per 100 units	35 Hours	40 Hours	42 Hours
Hourly Rate	₹70	₹80	₹100
Actual time taken	50 Hours	48 Hours	46 Hours
Actual units produced	200	150	125

Answer:

Worker	Halsey Premium Plan (₹)	Rowan Premium Plan (₹)
R	**4,200**	**4,500**
K	**4,320**	**4,608**
S	**4,925**	**5,170**

9. From the following details for the month of June 2017, prepare Stores Ledger Account under FIFO Method.

Date	Particulars
1	Opening Stock 2,000 units at ₹13 each
3	Issued 1,000 units
5	Issued 800 units
7	Purchased 1,500 units at ₹14 each
9	Issued 720 units
11	Purchased 1,000 units at ₹15 each
13	Issued 1,400 units
19	Issued 500 units
20	Purchased 500 units at ₹16 each
23	Issued 400 units
25	Purchased 1,500 units at ₹17 each
27	Issued 300 units

Note: On 30 June 2017, when the stock verification was made, it was found that the actual stock is more by 10 units.

Answer: Closing Balance 1,390 units at ₹17 per unit ₹23,630

10. RKS Ltd. manufactures two types of Mixer Grinder – Classic and Premium. Following details are provided to you.

Particulars	Classic	Premium
Material Cost	₹8,19,000	₹32,60,400
Labour Cost	₹4,68,000	₹20,97,600
Selling Price	₹3,000 per unit	₹3,400 per unit
No. of units sold	780	2,860

In cost books, the works overheads are recovered at 80% on labour and office overheads are recovered at 15% on works cost. Actual works expenses and office expenses as per financial books amounted to ₹19,20,600 and ₹14,04,000, respectively.

From the above details you are required to ascertain profit as per cost books and as per financial books and prepare the reconciliation statement. Assume that there is no opening or closing stock.

Answer: Profit as per cost accounts ₹21,61,898 and as per financial accounts ₹20,94,400

11. RKS Ltd. has three production departments A, B and C and two service departments X and Y. Following details are provided to you.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Total departmental overheads as per primary distribution summary (₹)	6,30,000	74,000	28,000	45,000	20,000

The company apportions the service department costs to the production departments on the basis of the following percentages.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Department X	40%	30%	20%	-	10%
Department Y	30%	30%	20%	20%	-

You are required to find out the total overheads of production departments under the following methods:

(a) Simultaneous Equation Method
(b) Repeated Distribution Method

Answer: Total Overheads A – ₹6,60,602; B – ₹99,439 and C – ₹44,960

Model Question Paper 2

B.COM IV SEMESTER
Cost Accounting Paper 4.4

[Time: 3 hours] **[Total Marks: 70]**

Section A

1. Answer any **five** sub-questions. Each question carries **two** marks. (5 × 2 = 10)
   (a) What is Cost?
   (b) What are Direct Materials?
   (c) Give two examples of Fixed Overheads.
   (d) What is Time Keeping?
   (e) What is Bin-card?
   (f) Distinguish between Fixed Cost and Variable Cost.
   (g) Write two advantages of Piece Rate System of wage payment.

Section B

Answer any **three** questions. Each question carries **six** marks. (3 × 6 = 18)

2. What are overheads? Explain in detail the classification of overheads.

3. Calculate Maximum Stock Level, Minimum Stock Level and Re-order Level from the following data:
   - Normal Usage per week 200 units
   - Re-order Quantity 1,500 units
   - Maximum Usage per week 250 units
   - Minimum Usage per week 100 units
   - Re-order Period 6 to 12 weeks

   Answer: Maximum Stock Level 3,900 units; Minimum Stock Level 1,200 units and Re-order Level 3,000 units

4. The following transactions took place with respect to Material X. You are required to prepare Stores Ledger under LIFO Method

Date	Receipts (Units)	Rate per unit (₹)	Issues (Units)
1/4/2018	3,000	25	-
3/4/2018	5,000	26	-
4/4/2018	-	-	2,200
10/4/2018	-	-	4,000
20/4/2018	4,900	23	-
25/4/2018	-	-	3,000

Answer: Closing Balance 1,800 units at ₹25 per unit ₹45,000 and 1,900 units at ₹23 per unit ₹43,700

5. The wages of Mr. Chandru for a guaranteed 44 hours a week is ₹200 per hour. The estimated time to produce one article is 30 minutes. During one week, Mr. Chandru manufactured 100 articles. Calculate his wages under Halsey Premium Plan and Rowan Bonus Plan.

   Answer: Halsey Premium Plan ₹9,400 and Rowan Bonus Plan ₹9,856

6. The costing data of RKS Ltd., shows the following details:
   - Materials consumed ₹14,00,000
   - Direct Wages ₹10,80,000
   - Factory Overhead ₹ 3,24,000
   - General Expenses ₹ 2,25,000

   You are required to prepare Cost Sheet showing Factory Cost and Total Cost. Also, calculate the percentage of factory overhead to direct wages and percentage of general overhead to factory cost.

   Answer: Factory Cost ₹28,04,000; Total Cost ₹30,29,000; Percentage of factory overhead to direct wages 30% and Percentage of general overhead to factory cost 8.02%

Section C

Answer any **three** questions. Each question carries **fourteen** marks. (3 × 14 = 42)

7. The following expenses were incurred for a job during the year ending 31st March, 2017.
   - Direct Materials ₹6,00,000
   - Direct Wages ₹8,00,000
   - Chargeable Expenses ₹2,00,000
   - Factory Overhead ₹4,00,000
   - Office Overhead ₹6,00,000
   - Selling Expenses ₹4,00,000

   The Selling Price fixed for the above job is ₹36,00,000.

   You are required to prepare a statement of cost and profit for the above job and calculate the estimated price of a new job to be taken up during the year 2017-18 with the following direct expenses:
   - Direct Materials ₹10,00,000
   - Direct Wages ₹14,00,000
   - Chargeable Expenses ₹ 4,00,000

   The various overheads shall be recovered on the following basis while calculating the estimated price of the new job:
   - Factory Overheads as a percentage on Direct Wages
   - Office Overheads and Selling Expenses as a percentage of Factory Cost

   The rate of profit on the new job shall be the same rate of profit as was earned for the previous job.

   Answer: Estimated price of new job ₹63,00,000

8. From the following figures prepare Reconciliation Statement and find out the profit as per financial accounts.
   (a) Net Profit as per cost accounts ₹3,44,800
   (b) Works Overheads under recovered in cost accounts ₹62,400
   (c) Administration Overheads recovered in excess ₹3,400
   (d) Depreciation charged in financial accounts ₹22,400
   (e) Depreciation recovered in cost accounts ₹25,000
   (f) Interest on investment included in financial accounts ₹16,000
   (g) Obsolescence loss charged in financial accounts ₹11,400
   (h) Income tax provided in financial accounts ₹80,600
   (i) Bank interest and transfer fee credited in financial accounts ₹1,500
   (j) Depreciation of stock charged in financial accounts ₹13,500
   (k) Stores ledger adjustment credited in financial accounts ₹950

   Answer: Profit as per financial accounts ₹2,01,350

9. RKS Ltd. has three production departments A, B and C and two service departments X and Y. Following details are provided to you.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Total departmental overheads as per primary distribution summary (₹)	1,50,000	1,75,000	1,00,000	40,000	30,000

The company apportions the service department costs to the production departments on the basis of the following percentages.

Particulars	Production Departments			Service Departments	
	A	B	C	X	Y
Department X	30%	20%	30%	-	20%
Department Y	40%	30%	20%	10%	-

You are required to find out the total overheads of production departments under the following methods:

(a) Simultaneous Equation Method

(b) Repeated Distribution Method

Answer: Overheads of Department A – ₹1,78,673; B – ₹1,95,409 and C – ₹1,20,918

10. From the following details for the month of June 2017 prepare Stores Ledger Account under FIFO Method

Date	Particulars
1	Opening Stock 6,000 units at ₹7.50 each
1	Purchased 13,000 units at ₹7.60 each
1	Issued 3,000 units
6	Issued 4,000 units
12	Issued 2,500 units
14	Returned surplus to stores 1,500 units (issued on 1/6/2017)
21	Issued 6,500 units
23	Purchased 12,500 units at ₹7.20 each
24	Issued 2,000 units
25	Issued 2,000 units
26	Issued 2,500 units

Note: On 30 June 2017, when the stock verification was made, it was found that the actual stock is more by 10 units.

Answer: Closing Balance 11,010 units at ₹7.2 per unit ₹79,272

11. From the following particulars you are required to calculate the earnings of Mr. Prasad and Mr. Sridhar for a week under the following methods:

(a) Straight Piece Rate System

(b) Taylor's Differential Piece Rate System

(c) Halsey Premium Plan and

(d) Rowan Premium Plan

Other details:

- Weekly working hours 48
- Hourly wage rate ₹150
- Piece rate ₹60
- Normal time allowed 12 minutes per piece

- Normal output per week 240 pieces
- Actual output for the week – Mr. Prasad 220 pieces and Mr. Sridhar 300 pieces

Note: Differential Piece Rate – 80% of piece rate for output below normal and 120% of piece rate for output above normal.

Answer:

Methods	Mr. Prasad (₹)	Mr. Sridhar (₹)
Straight Piece Rate System	**13,200**	**18,000**
Taylor's Differential Piece Rate System	**10,560**	**21,600**
Halsey Premium Plan and	**7,200**	**8,100**
Rowan Premium Plan	**7,200**	**8,640**

Note: As Mr. Prasad has taken 48 hours to produce 220 units which require a standard time of only 44 hours, he is not entitled for bonus. He would be paid only for actual hours worked. Therefore, his earnings would be 48 hours X ₹150 per hour = ₹7,200 in both the premium plans.

Model Question Paper 3

B.COM IV SEMESTER
Cost Accounting Paper 4.4

[Time: 3 hours] **[Total Marks: 70]**

Section A

1. Answer any **five** sub-questions. Each question carries **two** marks. (5 × 2 =10)
   (a) Define the term Cost Accounting.
   (b) Give the meaning of Direct Labour and state two examples.
   (c) What is Cost Centre? Give two examples.
   (d) What is Materials Control?
   (e) What is Time Study?
   (f) What is Piece Rate system? State any two advantages.
   (g) What is Labour Hour Rate?

Section B

Answer any **three** questions. Each question carries **six** marks. (3 × 6 = 18)

2. What is ABC analysis? What are its advantages?

3. Give the meaning of EOQ and calculate EOQ from the following:

Monthly consumption	1,500 units
Ordering cost	₹50
Inventory carrying cost per month per unit	₹0.60

Answer: 500 units

4. Following purchase and issue of materials take place in A Ltd.

Date	Purchases	Date	Issues
June 07, 2007	500 units at ₹12 per unit	June 22, 2007	1,000 units
June 13, 2007	700 units at ₹10 per unit	June 30, 2007	1,000 units
June 25, 2007	1,500 units at ₹8 per unit		

Prepare Stores Ledger under FIFO method.

Answer: Closing Balance 700 units at ₹8 per unit ₹5,600

5. Form the following details ascertain profit.

Particulars	Units	₹
Cost of Production	30,000	15,00,000
Opening Stock	5,000	2,25,000
Closing Stock	8,000	**?**
Selling and Distribution overhead per unit sold	-	5
Total Sales	-	20,00,000

Answer: Profit ₹5,40,000

6. From the following details, calculate labour cost per day of 8 hours.
   - Basic Pay — ₹7,500 per month
   - DA — 50%
   - Leave Salary — 10% of Basic + DA
   - Employer's Contribution to RPF — 8% of Basic + DA
   - Employer's Contribution to ESI — 4% of Basic + DA
   - The employer maintains a canteen on which he spends — ₹775 per month per worker
   - Total working hours per month — 200

Answer: ₹580

Section C

Answer any **three** questions. Each question carries **fourteen** marks. (3 × 14 = 42)

7. Following particulars relate to Nischal Ltd. for the year 2007.

Particulars	₹
Stock of raw materials on 1/1/2007	2,25,000
Stock of finished goods on 1/1/2007	2,23,000
Stock of raw materials on 31/12/2007	2,75,000
Stock of finished goods on 31/12/2007	3,40,000
Purchase of raw materials	19,50,000
Productive wages	14,00,000
Works on cost	2,80,000
Office on cost	5,37,000
Sales on cost	2,00,000
Sales	50,00,000

The company has to submit a quotation for a large order. It is estimated that direct materials and direct labour required would cost ₹2,40,000 and ₹1,80,000, respectively. You are required to:

(a) Prepare a Statement of Cost and Profit for the year 2007.
(b) Calculate the percentage of works on cost to productive wages and office on cost to works cost for the year 2007.
(c) Prepare a statement based on the previous year's percentages showing the quotation price for the large order assuming that 20% profit is expected on the quotation price.

Answer: Tender Price ₹6,55,500

8. Following is the summary of receipts and issues of a material in Nischal Ltd., during April 2008.

Date	Particulars
1 April 2008	Opening balance 500 units at ₹25 per unit
3 April 2008	Issued 70 units
4 April 2008	Issued 100 units
8 April 2008	Issued 80 units
13 April 2008	Purchased 200 units at ₹24.5 per unit
14 April 2008	Return of surplus from a work order 15 units at ₹24
16 April 2008	Issued 180 units
20 April 2008	Purchased 240 units at ₹24.40 per unit
24 April 2008	Issued 304 units
25 April 2008	Purchased 320 units at ₹24.30 per unit
26 April 2008	Issued 112 units
27 April 2008	Return of surplus from a work order 12 units at ₹24.5 per unit
28 April 2008	Purchased 100 units at ₹25 per unit and paid freight charges ₹200

The stock verification reveals that on the 15 and 27 April, 2008 there was a shortage of five units and eight units, respectively. Prepare Stores Ledger under FIFO Method.

Answer: Closing Balance

Qty.	Rate (₹)	Amount (₹)
216	**25**	**5,400**
208	**24.3**	**5,054**
4	**24.5**	**98**
100	**27**	**2,700**

9. (a) From the following data calculate Average Stock Level.

Maximum usage 3,600 units
Minimum usage 2,400 units
Re-ordering Quantity 9,000 units
Time lag for procurement of materials 2 – 6 weeks

Answer: Average Stock Level – 14,100 units

Hint: To find out Average Stock Level, it is necessary to calculate Minimum Level and Re-order Level.

(b) Following data is available in respect of Machine A and Machine B. Calculate Machine Hour Rate.

Particulars	₹
Consumable Stores – Machine A	3,000
Machine B	5,000
Repair expenses – Machine A	2,574
Machine B	5,616
Depreciation	18,000
Insurance – Machineries	15,000
Buildings	12,000
Room services	3,000
General expenses	2,000

Additional information:

Particulars	Machine A	Machine B
Number of Working Hours	2,200	1,800
Area occupied (sq. ft.)	3,000	5,000
Book Value (₹)	40,000	60,000

Note: Apportion general expenses equally between Machine A and Machine B.

Answer: Machine A – ₹12.77 and Machine B – ₹21.16

10. Nishanth Ltd. has three production and two service departments. From the following figures prepare the overhead distribution summary using repeated distribution method for secondary distribution and calculate the overhead rate per labour hour.

Particulars	Production Departments			Service Departments	
	A	B	C	D	E
Direct Materials (₹)	45,000	30,000	15,000	12,000	9,000
Direct Wages (₹)	30,000	22,500	15,000	6,000	4,500
Value of Machines (₹)	60,000	45,000	30,000	-	-
Floor Area (sq. ft.)	30,000	20,000	15,000	10,000	5,000
HP of Machines	240	200	160	-	-
No. of light points	120	90	60	30	20
No. of labour hours	5,000	5,000	5,000	-	-

Other details:

Indirect materials ₹22,200; Indirect wages ₹15,600; Depreciation on machinery ₹27,000; Depreciation on buildings ₹12,000; Rent, Rates and Taxes ₹9,000; Electric power ₹33,750; Lighting ₹2,400 and General expenses ₹7,800.

The service rendered by each service department to other departments is as follows:

Departments	A	B	C	D	E
D	30%	40%	20%	-	10%
E	10%	20%	50%	20%	-

Answer: Total overheads A – ₹60,156; B – ₹51,834 and C – ₹37,260
Overhead rate per labour hour A – ₹12.03; B – ₹10.37 and C – ₹7.45

11. From the following details, you are required to prepare a reconciliation statement and find the profit shown as per cost accounts.

Particulars	Cost accounts	Financial accounts
Net profit	? ? ?	3,38,650
Works overheads/expenses	37,600	33,250
Administration overheads/expenses	42,500	46,200
Selling overheads/expenses	31,300	35,800
Value of opening stock	18,000	22,300
Value of closing stock	23,000	25,800
Depreciation	21,500	18,600
Stores adjustment (credit)	-	1,250
Reserve for doubtful debts	-	7,250
Interest on bank deposits	-	6,150
Loss on sale of machinery	-	5,800

Answer: Profit as per cost accounts ₹3,46,750