

BUREAU'S
HIGHER SECONDARY
COST ACCOUNTING
CLASS-XII

(Prescribed by the Council of Higher Secondary Education, Odisha)

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FOREWORD

The Odisha State Bureau of Textbook Preparation and Production, Bhubaneswar has made a pioneer attempt to publish text books for Class-XII Commerce Stream with an excellent team of teachers in different subjects.

The present book “**Cost Accounting**” is meant for Higher Secondary Commerce students. This book has been written by a team of learned academicians namely Dr. Ranjit Mishra, Dr. Satyabrata Tripathy, Sri Bijaya Kumar Das and Dr. Ajit Kumar Kar and reviewed by Dr. Dhruba Prasad Pattnaik. I would like to record my sincere gratitude to all of them for accomplishing this maiden venture in time. The main purpose of developing this text book is to provide a thorough exposure to the students of Commerce in this subject. The book, prepared according to the new syllabus prescribed by the CHSE, Odisha, shall cater to the needs of young students.

I believe that the students and teachers of commerce stream shall welcome and appreciate the book. I would also like to welcome constructive suggestions for further improvement of the book.

Sri Umashankar Tripathy

Director

Odisha State Bureau of Textbook
Presentation and Production
Bhubaneswar, Bhubaneswar

PREFACE

"The Odisha State Bureau of Text Book Preparation has constituted Board of writers and reviewers in different subject of commerce stream to develop text books at Higher Secondary level in accordance with the syllabus of the Council of Higher Secondary Education, Odisha. We the members of the Board have a great pleasure in presenting the first edition of the book "Cost Accounting - Class XII".

The salient features of this book are simple language, lucid style, comprehensive coverage and latest information on the topics covered. A sincere attempt has been made to present the relevant materials of this book in such a way that it can enable the students to clearly understand all the topics as well as prepare them for answering all possible examination questions. This book is divided into 12 chapters. The objective type, short answer type and essay type questions have been given at the end of each Chapter with answers to objective type questions. We have taken all possible care to see that the requirements of the students are duly adhered to.

The authors owe personal debt of gratitude to friends, colleagues, eminent scholars and authors on Cost Accounting. We are deeply indebted to various authors whose works have been adopted in this book. We take this opportunity to express our grateful thanks to Dr. Dhruba Prasad Pattnaik for his invaluable assistance in reviewing the text for this book. The present edition of this book would not have seen the light of day but for the direct assistance of Odisha State Bureau of Text Book Preparation and Production, Department of Higher Education, Government of Odisha. We are thankful to all staff members of the Bureau for their active co-operation.

The authors would be very glad to receive continuously constructive criticism and creative feedback from the student readers, esteemed teachers and also from practicing managers and businessmen.

Board of Writers

CONTENTS

CHAPTER	TOPICS	PAGE NO.
01.	COST ACCOUNTING-MEANING, NATURE AND SCOPE	1 - 14
02.	COST ACCOUNTING METHODS AND TECHNIQUES OF COSTING, CLASSIFICATION OF COSTS ELEMENTS OF COST AND PREPARATION OF COST SHEET	15 - 50
03.	MATERIAL	51- 73
04.	STORING OF MATERIALS	74 - 96
05.	PRICING OF ISSUE OF MATERIALS	97 -119
06.	CONTROL MATERIALS	120 -147
07.	LABOUR	148 - 164
08.	LABOUR ACCOUNTING	165 - 197
09.	INCENTIVE PLANS	198-224
10.	OVERHEAD-CONCEPT, CLASSIFICATION, CODIFICATION AND COLLECTION	225 - 241
11.	ALLOCATION AND APPORTIONMENT OF OVERHEADS	242 -269
12.	ABSORPTION OF OVERHEAD	270 - 311

SYLLABUS

COST ACCOUNTING

+2 SECOND YEAR

4th Elective (Paper - II)

Objectives :

Course Inputs

Unit-I Introduction to Cost Accounting :

Cost Accounting - Concept, Evolution, Objectives, Nature and Scope, Advantages and Limitations of Cost Accounting, Cost Accounting Vs Financial Accounting, Cost Unit, Cost Centre, Classification of Cost, Methods of Costing, Costing Techniques, Installation of a Costing System, Elements of Cost and preparation of Cost Sheet. (Excluding Tender & Quotation)

Unit-II Material :

Material - Concept, Classification of Material, Purchase of material: Importance of purchase, Six R's principle, Centralized & Decentralized purchasing, Functions of purchase Department and Procedure of purchasing, Storing of Material: Need for storing, stores Organization, Stores Records : Bin Card, Stores Ledger, Physical Stock Taking, Periodical Stock Taking and Perpetual Inventory System, Pricing of Issue of Materials (FIFO, Weighted Average Methods as per AS-2), Control of Material- Meaning- Need for material control - Techniques of Inventory Control- EOQ, Stock level, ABC Analysis, VED Analysis, Stock Turnover ratio, Material Loss : Concept and Types.

Unit -III Labour

Labour - Meaning & Definition, Classification, Characteristics of Ideal Wage System- Time Rate, Piece rate**Labour** - Meaning & Definition, Classification, Characteristics of Ideal Wage System- Time Rate, Piece rate

Labour Accounting - Time keeping, Time Booking- idle Time-Overtime-Casual Worker & Out Worker**Labour Accounting** - Time keeping, Time Booking- idle Time-Overtime-Casual Worker & Out Worker

Labour Turnover - Meaning, Causes, Effects and Remedial Measures

Incentive Plans - Halsey premium, Halsey & weir, Rowan Premium plan.**Labour Turnover** - Meaning, Causes, Effects and Remedial Measures Incentive Plans-Halsey premium, Halsey & weir, Rowan Premium plan.

Unit-IV Overheads :

Overhead - Meaning, Definition, Classification, Codification, Collection and Departmentalization of Overhead through Allocation and Apportionment, Principles of Apportionment, Bases of Apportionment, Primary Distribution Summary and Secondary Distribution Summary.**Overhead** - Meaning, Definition, Classification, Codification, Collection and Departmentalization of Overhead through Allocation and Apportionment, Principles of Apportionment, Bases of Apportionment, Primary Distribution Summary and Secondary Distribution Summary.

Absorption of overhead- Overhead Rate, Methods of absorption of production Overhead-production Unit Method, Percentage on Direct Material, Percentage on Direct Labour, Percentage on Prime Cost, Direct labour Hour Method and Machine Hour Rate Method, Under/Over Absorption of Overhead Meaning, Causes.**Absorption of overhead**- Overhead Rate, Methods of absorption of production Overhead-production Unit Method, Percentage on Direct Material, Percentage on Direct Labour, Percentage on Prime Cost, Direct labour Hour Method and Machine Hour Rate Method, Under/Over Absorption of Overhead Meaning, Causes.

Unit-V Project Work and Viva :Unit-V Project Work and Viva :

Suggested outlines of Project Work :Suggested outlines of Project Work :

- Prepare a statement of cost for a manufacturing concern

- Prepare a statement of cost for a manufacturing concern
- Preparation of Stores Ledger Account under FIFO and LIFO method
- Preparation of Stores Ledger Account under FIFO and LIFO method
- Preparation of Stores Ledger Account under Average Cost method
- Preparation of Stores Ledger Account under Average Cost method
- Prepare a statement of Labour Cost and calculate labour cost per day
- Prepare a statement of Labour Cost and calculate labour cost per day
- Calculate the total earnings of several workers in an organization under different incentive schemes
- Calculate the total earnings of several workers in an organization under different incentive schemes
- Apportion the cost of service department on production departments
- Apportion the cost of service department on production departments
- Compute a machine hour rate so as to cover the overhead expenses of any organization

CHAPTER - 1

COST ACCOUNTING,

MEANING, NATURE AND SCOPE

STRUCTURE

- 1.1 The evolution of cost accounting
- 1.2 The objectives of cost accounting
- 1.3 The nature and scope of cost accounting
- 1.4 Some fundamental concepts in cost accounting
- 1.5 The advantages and limitations of cost accounting.
- 1.6 Cost accounting Vs. Financial accounting
- 1.7 Questions.

1.1 Evolution of Cost Accounting :-

Rapid growth of Industrialisation took place in the later part of the 19th century. Industries and business houses felt the need for improving productivity and maintaining records for taking appropriate decisions for survival and growth of the business in the face of increasing competition. The prevalent accounting system was not able to provide the accurate information regarding the cost and benefit associated with the business. The need for a new system of accounting was felt. This led to the development of cost accounting as a new branch of accounting with a difference in its approach as compared to the financial accounting. Though the importance was realised by many business organisations during the later part of the 19th century, the development of cost accounting was very slow. In 1890s, several new cost concepts were introduced and with this, cost accounting as a field of study and branch of accounting got a boost in its development. The Institute of Costs and Works Accountants was established in London. At about the

2 Cost Accounting

same time, the National Association of Cost Accountants was established in New York. These two institutions have greatly contributed for the development of cost accounting profession. The development of cost accounting became faster after 1914. The development took place due to the growth of heavy industry and introduction of mass production technologies. In addition to that the introduction of the theory and practice of scientific management by F.W.Taylor influenced the development of cost accounting in a big way. There was a shift from cost ascertainment to cost control. The increasing overhead or indirect cost component and the change in the earlier mind set and attitude of the managers not to disclose their costing methods also contributed to the development of cost accounting.

The development of cost accounting in India is of recent origin. After independence, Govt of India embarked on planned economic development. Industrial development was high on the Govt's priority list. The Companies Act 1956 and provision of cost audit immensely contributed towards the development of cost accounting.

1.2 Objectives of cost accounting:-

The following are the main objectives of cost accounting:

(a) To ascertain cost – The primary objective of cost accounting is to ascertain the cost per unit of the different products manufactured by a business concern. It also ascertains the cost of the process, job or operation.

(b) To identify sources of wastage – It aims to identify the causes of wastage. There are various sources of wastage. The wastages may take the form of material wastage, time wastage, wastages relating to use of equipments machinery and so on. The identification of the causes of wastage help in cost control and reducing the wastage.

(c) To classify cost– Cost accounting classifies total cost on the following basis for a better understanding of cost behaviours. The basis of cost classification are :

- (i) element
- (ii) functions (direct, indirect)
- (iii) variability
- (iv) controllability

(d) To help in taking appropriate decisions. It helps in supplying useful data to the management for taking various financial decisions such as introduction of new products, replacement of labour by machines etc.

(e) To reduce cost and exercise control. Cost accounting aims to exercise effective control over stock of raw materials, work-in progress, consumable stores and finished products.

(f) To facilitate preparation of cost statement. Management needs accurate and relevant information for effective decision making. Cost accounting prepares the cost statement for this purpose and presents them to the management.

(g) To undertake cost audit. Cost accounting makes provision for cost audit. Cost audit is a specialized service. It prevents errors and frauds and ensures an effective and transparent system.

(h) To identify areas of cost saving. It aims to identify areas of economy and cost saving by installing effective system of cost control for controlling material, labour and overhead costs.

(i) To guide price-setting. Cost accounting guides management in fixing the prices of products or services.

(j) To control cost. It aims to control costs by setting standards, comparing actuals with standards and then taking effective corrective measures.

To sum up, the above objectives can be regrouped under the following three heads

1. Ascertainment and analysis of cost and income.
2. Accumulation and utilisation of cost data for cost control purposes.
3. Providing useful data to the management for taking decisions.

1.3 Nature and Scope of Cost Accounting

The scope of cost accounting is very wide in a free economy. In a volatile market economy where companies practice cost leadership as a strategic tool for gaining competitive advantage over their competitors, the scope of cost accounting has become much wider.

We can discuss the nature and scope of cost accounting in the following manner.

Nature of Cost Accounting –

- (i) Cost Accounting is a process of accounting for costs.
- (ii) It records incomes and expenditures relating to the production of goods and services.
- (iii) It provides statistical data on the basis of which future estimates can be prepared.
- (iv) It is concerned with cost ascertainment and cost control.
- (v) It establishes standards so that actual costs can be compared to find out variances.
- (vi) It involves preparation and presentation of periodical cost statements for management decision making.

Scope of Cost Accounting –

(i) Determination and analysis of cost – Ascertaining the cost at different stages of production is of primary importance to the cost accountant. Information pertaining to the costs are collected at different stages of production process. Then the costs so ascertained are analysed to know the efficiency of the production and other functional activities of the business.

(ii) Cost control – It involves setting the standard, comparing the actual expenditure with the predetermined standard and developing variances. Then such variances or deviations are analysed and necessary corrective actions are taken to control the cost.

(iii) Cost audit – Cost audit involves the verification of the accuracy and authenticity of the cost accounts and records. The purpose of cost audit is to see the arithmetical accuracy of the cost records and to examine whether the principles and rules have been followed correctly.

(iv) Budgetary control – Budget is a plan expressed in numerical term. Budgets provide guidance for spending money for a particular project or business activity. It also

fixes responsibility on the executives. In case of any deviation from the predetermined standard, corrective measures are taken.

(v) Preparation of cost statement and reporting to management— Periodical preparation of cost statement is one of the important functions of cost accounting. The statement may be monthly, or quarterly. It reports all relevant information to the management for taking right decisions.

1.4 There are four basic concepts in cost Accounting. They are

1. Cost
2. Costing
3. Cost Accounting
4. Cost Accountancy

1. Cost – Cost means the amount of expenditure incurred in producing a product or rendering a service. The term cost does not have a definite meaning and its scope is quite broad. Some of the definitions of ‘cost’ are mentioned below.

(a) “the price paid for something is called cost.”

– ***The Oxford Dictionary.***

(b) “Cost is the amount of expenditure (actual or notional incurred or attributable to a given thing.”

– ***C.I.M.A. London***

2. Costing – the term costing has been defined as follows:

(a) “the technique and process of ascertaining cost.”

– ***C.I.M.A. London***

(b) “the process of classifying, recording and appropriate allocation of expenditure for the determination of costs, the relation of these costs to sales value and the ascertainment of profitability –

– ***Wheldon***

3. Cost Accounting – Cost Accounting is the process of accounting for costs. It begins with the recording of income and expenditure and ends with the preparation of periodical statement for ascertaining and controlling costs. In a way Cost Accounting includes costing. However in actual practice, both the terms are used interchangeably.

4. Cost Accountancy – Cost Accountancy is the science, art and practice of a cost Accountant. It refers to the principles, rules and concepts followed by cost accountants. It has been defined by jC.I.M.A. London as “the application of costing and cost accounting principles methods and techniques to the science , art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived there from for the purpose of managerial decision making.

1.5 ADVANTAGES OF COST ACCOUNTING–

As discussed earlier cost accounting has a wider scope and the advantages derived out of cost accounting are discussed below.

(1) Measures efficiency– Based upon the data, the efficiency of different departments are studied and a comparision is made. The management also uses the costing data to make interfirm comparision on various aspects of operation.

(2) Helps in cost control– The wastages are reduced and effective cost control is achieved. It helps in ascertaining the degree of importance each element of cost has in the total cost of production and the scope for economy in operation.

(3) Helps in decision making – Cost accounting has a mechanism of preparing relevant cost statement. The presentaion of information in a scientific and systematic way helps the management to take effective and qualitative decisions.

(4) Ensures best use of limited resources– Cost accounting provides reliable data on different elements of cost. Thus helps management in achieving maximum output at the minimum cost.

(5) Cost audit – The application of cost audit ensures arithmetical accuracy and examines the authenticity of cost records.

(6) Determination of Prices– Cost accounting provides detailed information about the costs incurred for producing a product. It helps the management in fixing the price of a product.

(7) Helps in inventory control – Cost accounting helps in controlling inventory. It applies different techniques of inventory control. These techniques help in exercising control over raw materials work-in-progress and finished goods.

(8) Advantages to creditors and investors – Creditors and investors usually depend on relevant and reliable information for taking their decision to extend credit or invest in a particular organisation. A proper costing system and cost statement helps them in taking such decisions.

(9) Advantages to the Government – It provides accurate and reliable information to the government for taking various administrative, economic and tax related actions.

LIMITATIONS OF COST ACCOUNTING–

Cost accounting has many advantages as discussed above. But it is not free from limitations. The main limitations of Cost Accounting are as follows :

1. Lack of a uniform procedure – It does not have a uniform procedure. Because of this laxity, same information may be interpreted differently by two cost accountants. Keeping in view this limitation, all cost accounting results can be taken as mere estimates.

2. Not an exact science- Exact science is based on the principle which remain static for all time to come and are not affected by any change. But cost accounting is not a static science. The features and principles of cost accounting change with the time and circumstances.

3. Expensive- The installation of a cost accounting system in an organisation involves a great deal of expenditure. The small and medium size organisations find it very expensive to install a cost accounting system in their organisations. Thus a detailed cost accounting system can be used only by big concerns.

4. Based on estimation- Some components of cost like indirect costs are charged on the basis of estimates. Therefore, the actual costs may vary from estimated costs. The estimates may not always be very pragmatic as the accuracy depends upon the estimator's capability to foresee the future.

5. Problem of reconciliation of cost and financial accounts- Cost accounting and financial accounting are two different branches of accounting having different approaches.

The analysis and interpretations provided by cost accounting and financial accounting differ due to differences in their approach. It is very difficult to reconcile these two types of accounting. However it is required to reconcile before taking any decision.

1.6 COST ACCOUNTING vs FINANCIAL ACCOUNTING.

Financial Accounting is mainly concerned with recording, classifying and summarising financial transactions in accordance with the generally accepted accounting principles. Cost accounting is the process of accounting for costs. It puts emphasis on the ascertainment and control of costs. Both forms of accounting, ie. financial and cost accounting provide information to the management in a systematic manner for policy formulation and control. The differences are based on their approaches to the accounting procedure. Financial accounting has a broad and macro approach whereas cost accounting provides tools for indepth analysis of performance in terms of cost efficiency. Cost Accounting has emerged as a separate field of accounting due to the following limitations of financial accounts. The limitations are :

- (i) No indepth study on cost behaviour.
- (ii) It does not provide day to day cost data to the management. It is historical in nature.
- (iii) Adequate cost information forms the basis for price determination. Financial accounting does not provide the detailed and analytical information on cost. Hence it is not helpful in price determination.
- (iv) The most important limitation of financial accounting is that it does not establish cost standards against which actual costs can be compared.
- (v) Proper analysis of costs into direct, indirect, fixed, variable, controllable, uncontrollable etc are not done in financial accounting.

Because of the above limitations of financial accounting, an alternate form of accounting was developed Cost accounting emerged as an aternative method. Though both the accounting methods provide information to the management, for better decision making, cost accounting provides a rather indepth and analytical information as compared to financial accounting. Let us discuss more on the difference between cost and financial accounting.

Basis of distinction	Financial Accounting	Cost Accounting
Objective	It provides information in a general way. It records financial transactions and prepares financial statements to know the financial position of the business	The main objective is to ascertain, analyse and control costs.
Format	The accounts are kept as per the requirements of the Companies Act.	The cost records are kept by the companies not because of any statutory obligation but to keep them for knowing the cost behaviour and better analysis of the cost data.
Periodicity of reporting	The results of the operating results are prepared at the end of the year.	It does not have a specific time of report preparation, cost reports are prepared and presented to management as per the requirement any time.
Audit	External or statutory audit of the financial records are conducted by the independent auditor	Cost audit is done for verifying the accuracy and authenticity of the cost data. But there is no legal binding for this. No external auditor is needed for cost audit.
Form of accounts prepared	Financial accounting prepares two statements namely, profit and loss Account and Balance Sheet.	The various formats of accounts or data sheet prepared under cost accounting are cost

Basis of distinction	Financial Accounting	Cost Accounting
Stock Valuation	Stocks are valued at cost or market price which ever is less.	sheet, process account contract account etc. Stocks are valued at cost.
Type of Information	Financial accounting deals mainly with actual facts and figures.	Cost accounting deals with actual facts and figure as well as estimates.
Reference accounting, and guidance	Financial statements are prepared as per the guidelines prescribed by the Companies Act. In case of any doubt or confusion reference can be made to the provisions of the Companies Act.	In case of cost no such legal guidelines are available. The past conventions and views of cost accountants are taken into note in case of any confusion.
Recording	It classifies, records and analysis the transactions according to the nature of expenses without any indepth analysis.	It records the transactions according to the purposes for which costs are incurred. This provides an indepth and objective analysis of the transactions.
Scope of operation	It records the transactions and keeps records of the whole business. They are independent in nature and discloses the net profit or net loss of the business as	It provides an analytical information regarding the profit or loss of each product job or service.

Basis of distinction	Financial Accounting	Cost Accounting
Money as unit of expression	a whole. Transactions expressed in monetary units are recorded in financial accounting.	Both monetary and non-monetary information are used here.
Parties involved	Financial accounting, records transactions between the business concern and third parties.	Cost accounting records transactions which are essentially internal. They do not form the basis of payment and receipt of cash.

1.7. QUESTIONS.

OBJECTIVE AND SHORT QUIESTIONS

Q.1. Choose the correct answer from the given alternatives in each bit:

(a) Cost Accounting is useful for :

- (i) ascertaining the financial position of a firm
- (ii) ascertaining the profit or loss of a firm
- (iii) controlling cost
- (iv) declaring dividend.

(b) Cost accounting like financial accounting

- (i) is exact and precise
- (ii) provides information about the business in a general way.
- (iii) meets the requirements of companies Act and Income Tax Act .
- (iv) none of the above.

(c) Financial accounting is useful for

- (i) ascertaining cost
- (ii) controlling Cost
- (iii) presentation of cost information to the management
- (iv) ascertaining profit earned and financial position of the business.

(d) Cost Accounting is based on :

- (i) estimated figures
- (ii) actual figures
- (iii) historical figures
- (iv) projected figures

2. Express in one word / term :

- (a) The technique and process of ascertaining costs.
- (b) The amount of expenditure incurred in producing a product or service.
- (c) A type of accounting which helps to know the financial position of a firm on a particular date.

3. Fill in the gaps-

- (a) Costing is a technique of _____.
- (b) Cost accounting is the science, art and _____ of a cost accountant.
- (c) Cost accounting provides data for management _____.
- (d) _____ means the amount of expenditure incurred in producing a product or rendering a service.

4. Correct the underlined portion of the following sentences

- (a) Cost accounts provide information for ascertaining the financial position as on a particular date
- (b) Costing is the science, art and _____ of cost accountant.
- (c) Financial accounting deal with actual facts and figures as well as estimates.

5. Answer in one sentence.

- (a) What do you mean by costing ?
- (b) What do you mean by cost ?
- (c) State one advantage of cost accounting
- (d) State one limitation of cost accounting

6. Answer the following question within 30 words :

- (a) Define cost accounting
- (b) Explain the objective of financial accounting

14 Cost Accounting

(c) Explain how stocks are valued under cost account and is it different from financial accounting.

7. Answer the following questions within 50 words :

- a) Explain the scope of operation of both financial accounting and cost accounting.
- (b) Discuss any three Limitations of cost accounting
- (c) Explain the term cost audit and cost control
- (d) Explain the nature of cost accounting.

LONG ANSWER TYPE QUESTION.

- 8. Define cost accounting. Explain the nature and scope of cost accounting .
- 9. Discuss the advantages and limitations of cost accounting .
- 10. Draw out a distinction between Cost Accounting and Financial Accounting.
- 11. "Cost Accounting is an aid to management." Discuss the main points in support of this statement.

Answers

Q.1. (a) – (iii) (b) – (iv) (c) –(iv), (d) –(i)

Q.2. (a) Costing, (b) cost, (c) Financial Accounting

Q.3. (a) ascertaining cost, (b) practice, (c) decision – making (d) cost

Q.4. (a)Financial, (b) cost accountancy, (c) Cost



CHAPTER - 2

METHODS AND TECHNIQUES OF COSTING CLASSIFICATION OF COSTS & ELEMENTS OF COST

STRUCTURE
2.1 Measuring of cost unit, cost centre and profit centre.
2.2 Classification of costs
2.3 Methods of costing
2.4 Institution of a costing system
2.5 Costing techniques
2.6 Elements of cost
2.7 Measuring of cost-sheets
2.8 Preparation of cost-sheets
2.9 Guessions.

2.1 Measuring of cost unit, cost centre and profit centre.

Cost unit – Cost unit is a unit or division of product, service, or time in terms of which costs are ascertained. It is the unit of product, service or time in relation to which costs may be ascertained. It must not be too big or too small. It should be convenient for ascertaining cost. The unit used for ascertaining cost varies from product to product, best suited to person and basic to basic.

Cost Centre – Cost centre is defined as a location, person, or item of equipment (or group of these) for which cost may be ascertained and used for the purpose of cost control. It is the smallest segment of activity or area of responsibility for which costs are accumulated. In some small organisations the departments are treated as cost-centres. However in large organisations, a department may consist of several cost centres. The

determination of a suitable cost centre is very important for cost collection and ascertainment. For the manager, it rather becomes a responsibility centre. He is responsible for the cost control of his cost centre. Cost centres may be product centres or service centre. In a manufacturing organisation, where raw materials pass through several processes before becoming finished products, the production department or section where this physical transformation takes place is called product centre. Service centre is a department or centre which incurs direct and indirect costs. They are not directly involved in the physical conversion process of raw material into finished products. They provide the support service to the production process for smooth operation.

Advantages of cost centre

- a) It helps in accurate ascertainment of cost
- b) It helps in cost control.
- c) It shows the trend in cost variances of each cost centre.

Profit centre – A profit centre is that segment or area of activity of a business which is responsible for both revenue and expenses. It takes the cost and revenue aspects of a centre or segment of activity of a business. It helps in measuring the performance of that unit, and also the performance of the manager in charge of that unit. Profit centres are therefore created to delegate responsibility to individuals and measure their performance. In cost centres, costs are collected and ascertained whereas the profit centres take into account the cost as well as the profit. Profit centres are usually target based. The profit centres are granted autonomy so that they can achieve the target profit. Creation of profit centres in an organisation aims to implement decentralization in the system.

2.2 CLASSIFICATION OF COSTS :

Cost classification is the process of grouping costs according to their common characteristics. Identical items are placed together on the basis of some common features. A proper classification helps in accurate collection and ascertainment of costs against a particular cost centre. The costs can be classified on the following bases.

1- By elements of cost - The costs are divided into three categories i.e Materials, Labour and Expenses. This classification is important as it helps to find out the total cost, and work-in-progress. Material cost is the cost of components used as input of finished products. Labour cost includes wages and salaries paid to the employees as remuneration. Costs other than material cost and labour cost which can be directly attributed to the production of a particular unit are called direct expenses.

2- By functions - According to this classification, costs are divided in the light of functional areas of a business organisation. The activities of a business organisation are grouped on the basis of certain functions. They are production, selling and distribution and administration etc. Production cost includes those costs which are involved in manufacture, construction, processing of raw material into finished product. The costs which are incurred for sales related activities and distribution of products from the manufacturer to the final consumers are included in selling and distribution cost. Administrative costs are those costs which are incurred for salaries of the office staff, rent of the office building, electriciy, telephone, interest and such other expenses.

3- As Direct or indirect- Direct costs are those costs which are identified with a particular cost centre or cost unit. Material, labour and certain expenses which are incurred for a particular product or for a particular process of production are examples of direct costs. The costs which are incurred for the benefit of a number of cost centres or cost units and can not be identified with a particular product, process or cost centre are called indirect costs, Rent, salaries, machinery depreciation etc. are examples of indirect costs.

4- By variability - According to this classification, costs are classified on the basis of activity level, or volume of production. Under this head costs are classified as.

(i) Fixed Cost - These are costs which remain the same over a period of time. It does not change with the change in the volume of production, Rent, insurance premium, for the buildings, salary etc. are examples of fixed cost. This classification helps in estimating total cost at various levels of activity and taking decisions.

(ii) Variable Cost - These are costs which vary in direct proportion to the volume of the output. It increases or decreses in the same proportion with increase and decrease in production unit.

(iii) Semi Variable Costs - It refers to the costs which are partly fixed and partly variable. These are also known as semi fixed costs. These costs increase or decrease with the change in volume of output but not in the same proportion as the change in the volume of output. Depreciation, maintenance of plant, repairs etc are examples of semi variable costs.

5. By Controllability - Under this head the costs are divided into-

(i) Controllable Costs - These are the costs which are more or less under the control of the management. The manager of a particular cost centre can keep the cost under control with proper planning and avoiding wastage and duplication of several activities. This can be achieved through properly trained employees.

(ii) Uncontrollable Costs - These are the costs which cannot be controlled by the management or the persons in charge of several responsibility centres. External causes market forces, Government policies, change in the management policies are some of the factors which influence these costs. Therefore these costs remain out of the control of the individual manager in particular and the top management in general.

6. By time - Costs can be classified as.

(i) Historical Cost - These are already ascertained costs and kept for analysis in hindsight. Just as history recounts the past, these costs are the amount already spent and give scope for analysis of the cost. They are based on recorded facts.

(ii) Predetermined Costs - These are costs which are estimated or computed in advance. These estimated costs are also called standard costs. They act as guides for future course of action. The standard or predetermined costs are compared with the actual costs to find out the variances. The variance analysis helps the management to find out the areas of strength and weaknesses and take remedial measures.

7. By relevance to decision making

i) **Marginal cost** – It refers to the increase or decrease in the aggregate cost on account of increase or decrease in production by a single unit. The unit may be an article or a batch of similar articles. It is generally equal to the increase or decrease in total variable cost because of increase or decrease of one additional unit.

- ii) **Opportunity cost** – opportunity cost is the advantages in terms of money foregone due to not using the facilities as it was originally planned. For example, if own building is proposed to be used for installing a plant, the amount of rent the building could have fetched, had it been rented out, is the opportunity cost.
- iii) **Imputed or Hypothetical cost** – Cost that does not involve payment of cash or cash outflow is known as imputed or hypothetical cost. It does not form a part of the total cost. But it is important for taking decisions. For example interest on capital, though it does not form a part of total cost, it is treated as an expense in financial accounting.
- iv) **Shutdown cost** – It is that part of fixed cost that has to be incurred even if the factory is shutdown or closed temporarily due to shortage of material, non-availability of work force etc.
- v) **Sunk cost** – Cost that can not be recovered or reversed or revised is known as sunk cost.
- vi) **Joint cost** – Cost incurred when two or more products are produced out of one or same input or process. The cost of the material and the cost involving the production process are called joint cost. Oil refinery is the example. Where a range of products such as petrol, diesel, kerosene etc. are derived from crude petroleum. Hence the cost of crude oil or petroleum and the cost of the refining process are treated as joint cost.

2.3 METHODS OF COSTING.

Industries differ on the basis their size, nature of product or service produced by them, technology, methods of doing business etc. Therefore there can not be one standard or uniform costing method for all the industries. Different industries follow different methods. The various methods of costing are discussed below.

1. Job Costing - Under this method, costs are collected and ascertained for each job or work-order. Each job has a separate profile bearing a number. A job card is prepared for each job and all the costs incurred for the job are collected and ascertained in respect of that job in a form known as job order.

The industries where job costing is used are printing press, repair shops, general engineering work shops etc.

2. Contract Costing - This method is usually used for a job which is big and of longer duration. Each contract is treated as a separate unit for the purpose of cost ascertainment and cost control. Separate accounts are kept for each contract and all direct and indirect costs relating to the contract are collected. This method is used by builders, civil engineering contractors.

3. Batch Costing - A batch may represent a number of small orders, which are treated as a unit. Each batch is treated as a unit for the purpose of ascertainment of its cost. The cost per unit is determined by dividing the cost of the batch by the number of units produced in a batch. Batch costing is generally used in industries like bakery, pharmaceuticals, toy manufacturing, ready-made, garments etc.

4. Process Costing - This is suitable for industries where production is continuous and carried on through different stages or processes before becoming a finished product. Costs are determined separately for each process. The output of each process is used as a raw material or input for the next process. As finished products are obtained at the end of each process, it will be necessary to ascertain not only the cost of each process but also cost per unit at each process. This method is generally used in mass production industries. Process costing is generally used in industries like textile, chemicals, sugar, paper.

5. Unit costing – this is also known as single or output costing. This is suitable for industries where manufacture is continuous and units are identical. The object of this method is to ascertain the cost per unit of output. Here cost accounts take the form of cost sheets prepared for a definite period. The cost per unit is determined by dividing the total expenditure incurred during a given period by the number of units produced during that period. This method is applied in industries like mines, breweries, cement works brick work etc.

6. Operating Costing – This is suitable for industries which render services as distinct from those with manufacturing goods. This method is used to ascertain the cost of services rendered. This is suitable for industries such as transport undertakings, power

supply companies, municipal services hospitals, hotels etc.

7. Operation Costing – This method of manufacture consists of a number of distinct operations. It refers to conversion costs i.e. cost of converting the raw materials into finished goods. This method takes into consideration the rejections in each operation for calculating input units and costs. The cost per unit is determined with reference to final output.

8. Multiple Costing – It means combination of two or more of the above methods of costing. Where a product comprises many assembled parts or components, as in the case of motor cars, costs have to be ascertained for each component as well as for the finished product. For different components different methods of costing may be used. It is also known as ‘composite costing’.

2.4 INSTALLATION OF A COSTING SYSTEM

An effective costing system is an essential component of the company administration and control system. That is why an organization should be very careful while designing an effective costing system. An ideal costing system must be capable of ensuring all the benefits of a good costing system. Before installing the costing system the management should take following characteristics of an ideal costing system into consideration.

- 1. It should be simple –** The costing system should be simple . A simple costing can easily be understood by the employees of the organisation. It should be capable of presenting the facts, figures and other relevant information in a proper format so that everybody can understand it easily.
- 2. It should be flexible –** An ideal costing system should contain the quality of being adaptive to the changes. The business scenario changes with time. The costing system should change as per the changing needs of the business so that it becomes workable and useful to the business.
- 3. It should be suitable to the business –** There can not be a single format of costing system for all types of business. This is because, businesses differ in the context of their size, nature, conditions etc. Therefore, a right type of costing should be chosen which should be appropriate or suitable for the business.

4. **It should be economical** – A costing system should not be expensive. The expenses incurred from the installation and operation of a costing system should be within the financial capacity of the business. The cost incurred and the benefits derived from the functioning of costing system should match each other in a justifiable manner.
5. **It should be capable of presenting the information in a comparable and analytical manner** – The information are required for taking important decisions. The management wants informations in a systematic and analytical manner. The comparison of the present facts and figures with the past figures is important for vital decisions. Comparative statement relating to the performance of the business with its competitors and in the context of the overall industry standard are also required for various important decisions. A good costing system should have the quality of providing such information as and when needed and in an analytical and comparable manner.
6. **It should be uniform** – The forms, and the manner of presentation should be uniform and consistent. The size of the papers, color and print design should be uniform.
7. **Reconciliation of cost and financial accounts.** – The system should be designed in such a manner that a proper reconciliation of cost and financial accounts is made possible . such reconciliation gives a clear financial picture of the concern and helps in maintaining a sound accounting practice.
8. **It should describe the duties of responsibilities of the cost accountant** – A clearly defined duties and responsibilities of the cost accountant are very important for the smooth functioning of a costing system. Any ambiguity in describing the duty and responsibility will lead to confusion and deviation from usual costing procedure.

STEPS FOR INSTALLATION OF A COSTING SYSTEM

1. **Identifying the objective of installation** – The costing system is installed with a view to achieve certain objectives. The objective may vary from the simple act of cost determination to a more detailed information collection and analytical

presentation of facts and figures for managerial decision making. The nature of objectives should be identified while installing a costing system.

2. **Studying the organisational structure-** The organisation structure and the nature of the business should be studied. The authority and responsibility of different positions should be analyzed. The layout of the factory , the structure and function of the production department, the wage payment system, the time keeping and time booking systems, the system of issuing orders, the methods of dealing with wastage of materials and the amount of fixed semi – variable and variable overheads etc , should be studied and analyzed properly while installing a costing system.
3. **Suitability of the cost accounting system** – the system of cost accounting usually depends on the nature of the business and extent of cost related information required. Therefore a suitable cost accounting system should be selected for efficient running of a business organisation.
4. **Deciding on the classification of costs** – A complete basis of classification of various costs into direct , indirect type and grouping of indirect costs into production, administration and selling and distribution should be developed for a better understanding of the cost behavior and managerial decision making.
5. **Developing awareness among the employees** – The employees and other relevant parties must be informed about the installation of a new costing system. They should be properly informed about the functioning of the costing system.
6. **Organizing the cost office** –A costing system should be fast and must be capable of presenting facts and figures in an analytical manner to the management. The cost office should be organized keeping the above objective into consideration. The costing staff should be allowed to have access to the production department for a better understanding of the operation of the business. The cost office should discharge duties relating to cost accounting and cost control.
7. Relationship of cost office to other departments. The cost accountant should have a thorough knowledge about the functioning of other departments. The costing department should function independently. There should be a great deal of interface between the costing department and other departments of the organisation .

Difficulties in installing a costing system –

1. **Resistance from accounting staff** – The accounting staff may feel insecure with the introduction of a costing system. They may have an apprehension that their jobs are in danger along with their importance in the organisation. This prompts them to resist the introduction of a costing system.
2. **Lack of Top management support** – No system becomes success and effective unless it gets the support of top management. Sometimes the CEO or the Managing Director of various organizations introduce the costing system without even consulting the departmental heads or other senior officers. This leads to misunderstanding and a feeling of interference in their departmental affairs. They may not cooperate with the costing officials.
3. **Feeling of uncertainty among the existing staff** – A fear of uncertainly is created when the costing system is installed for the first time in an organisation. The existing accounting staff may apprehend that their jobs and positions are in danger. So they develop a sense of non co operation towards the effort of installation of a costing system.
4. **Non co-operation at different levels of organisation** – The foremen, supervisors and other staff may express their displeasure at the introduction of the costing system. This is because of the additional burden of work and paper works which they are required to do as a consequence of the introduction of the costing system.
5. **Cost burden** – The introduction of the costing system involves additional works and additional man power. A major change may be required in the existing procedure of work. This results, in heavy cost burden.

How to overcome the above difficulties in introducing a costing system in an organisation.

1. **Top management support** – The top management must take some positive steps to include all persons who matter in the process of introduction of a costing system. The top management should consult the departmental managers for a smooth introduction of the system.

2. **Educate the existing staff** – The existing accounting staff and other employees should be educated and motivated to accept the costing system. Their fear of uncertainty must be removed and the utility of the system should be explained to them in order to get their cooperation and support.
3. **Training the existing accounting staff** – The existing accounting staff must be trained properly so that they can operate the costing system with efficiency. This will reduce the uncertainty and existing staff can be used without recruiting new people.
4. **Selecting the appropriate costing system** – An appropriate costing system should be selected for the organisation. Different organizations need different types of costing system. Therefore a type of costing system specific to an organisation should be selected.
5. **Supervision** – Proper monitoring and supervision system should be put in place for the smooth operation of the costing system.

2.5 Types (Techniques) of costing

The different types or techniques of costing are usually followed for ascertaining costs.

1. **Uniform costing** – It is the use of same costing principles and / or practices by several undertakings for common control or comparison of costs.
2. **Marginal costing** – It is the ascertainment of marginal cost by differentiating between fixed and variable cost. It allocates variable cost ie direct material, direct labour, direct expenses and variable overheads to the product.
3. **Standard costing** – under such type of costing technique a comparison is made between the actual cost and a pre- determined standard cost. The purpose of such comparison is made to find out the deviation or variances. The causes of such variances are then investigated and analyzed. This helps the management to take corrective or remedial measures.

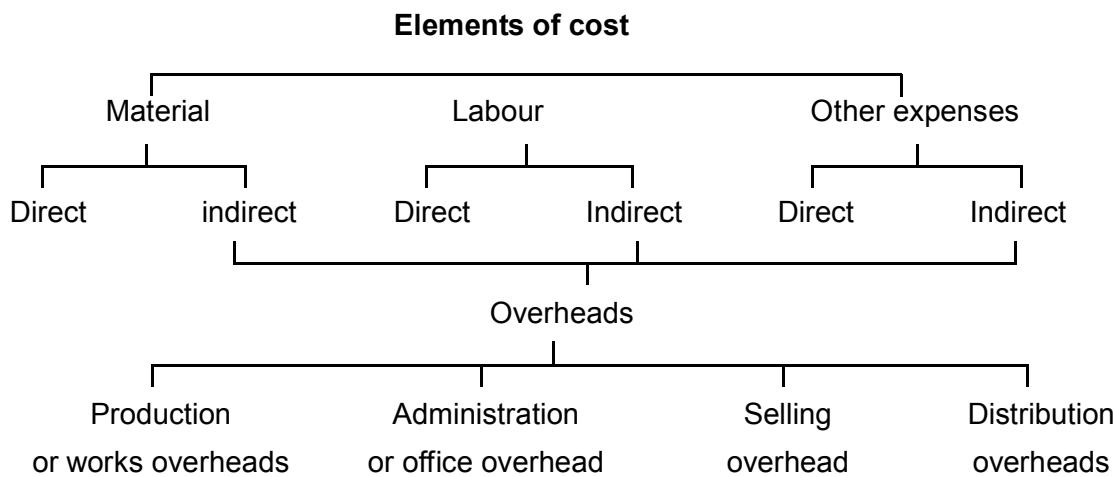
4. **Historical costing** – It is the ascertainment of costs after they have been incurred. A comparison is made between the costs incurred over different periods of time. This helps in identifying the trend of costs over a period of time .
5. **Direct costing** – It is the practice of choosing all direct costs , variable and some fixed costs relating to operation, processes or products leaving all other costs to be written off against in which they arise.
6. **Absorption costing** – It is the practice of charging all costs, irrespective of its nature type and behaviour to production.

2.6 ELEMENTS OF COST

Management requires necessary cost data for proper planning, decision making and control. A detailed expression of how the cost is covered is essential for effective decision making. Therefore the total cost is analyzed by dividing it into different elements on the basis of the nature of expenses.

Elements of Cost

There are three elements of cost. They are material, labour and other expenses. Each of these elements may be direct or indirect .



by grouping the above elements of cost, the following divisions of cost are obtained .

1. Prime cost = Direct Materials + Direct labour + Direct Expenses.
2. Works or Factory cost = Prime cost + Works or factory or production overheads
3. Cost of production = Works cost + Administration overheads
4. Total cost or cost of sales = Cost of Production + Selling and distribution overheads.

The difference between the cost of sales and selling price represents profit or loss .

Let us explain the various elements

1. Direct material – The material which can be conveniently measured or directly attributed to the product is called direct material. It forms part of the finished product. Timber in furniture making ,cloth in dress making, bricks in building a house are some of the example of direct material .

The following are normally classified as direct material:-

- (i) All raw materials like pig iron in foundry, sugar cane in sugar manufacturing, fruits in canning industry.
- (ii) Materials specifically purchased for a specific job, process or order like glue for book binding, starch powder for dressing yarn.
- (iii) Parts or components purchased or produced like batteries for transistor – radios and tires for cycles.
- (iv) Primary packing materials like cotton wrappings, card board boxes etc. very small items which form part of the finished product are not usually treated as direct material. Sewing thread in dress making and nails in furniture making etc. are examples of such small materials which though form part of the finished products are not treated as direct materials.

2. Direct labour – The labour cost which are conveniently and directly charged to particular job, product or process are considered as direct labour. It includes payment made to the following groups of labour:

- (i) Labour engaged on the actual production of the product or in carrying out of an operation.
- (ii) Labour engaged in aiding the manufacturing process by way of supervision, maintenance, transportation of materials etc.

However, in certain circumstances wages paid to supervisors, inspectors etc. are treated as direct labour provided they are directly engaged for specific product or service. On the contrary some small and in significant costs incurred for trainees or apprentices as wages are treated as indirect cost even though they are spent for some specific product or process.

3. Direct Expenses – All expenses which can be identified to a particular cost centre are treated as direct expenses. In other words all expenses (other than direct material and direct labour) include specifically for a particular product, job, department etc are called direct expenses. Royalty , excise duty hire charges of a specific plant and equipment travelling expenses in the context of a particular contract or job, cost of patent rights, special drawings designs etc. are examples of direct expenses.

INDIRECT EXPENSES

The expenses which can not be conveniently and directly identified or attributed to a specific cost centre are called indirect expenses. These are common expenses. Rents, rates, insurance, municipal taxes, general manager's salary, canteen and welfare expenses, power and fuel, cost of training new employees, lighting and heating ,telephone expenses, depreciation, repairs. advertising are some of the indirect expenses. These indirect expenses are to be apportioned to or absorbed by cost centers or cost units. These indirect expenses are also called overheads. Over heads may be defined as the aggregate of the cost of indirect materials , indirect labour and such other expenses including services. Which can not be charged directly to specific cost units. The main groups are the following :

- (i) Manufacturing overheads
 - (ii) Administration overheads
 - (iii) Selling overheads
 - (iv) Distribution overheads
 - (v) Research and Development overheads
- (i) Manufacturing or production or works overheads. These are the indirect expenses which are incurred in connection with the operation of the manufacturing divisions of a concern and cover all indirect expenses incurred by the undertaking from the

- receipt the order until its dispatch either or to the customer or to the finished goods store. Examples of such expenses are consumable stores like cotton waste , brushes brooms etc, cool and fuel grease, factory office stationery , works manager's salary, salary of supervisor, inspector, wages of watch man , sweeper , rent, rates , insurance of factory building , telephone charges, electricity charges, depreciation of plant etc.
- (ii) Administration overheads - These are indirect expenses incurred in formulating the policy, directing the organisation and controlling the operations of an undertaking which is not related directly to research, development production or selling activity. Examples are the expenses on stationery and postage, salary of the office staff , director's fees, legal expenses, office rent, electricity expenses etc.
 - (iii) Selling overheads – These are expenses which are incurred for stimulating demand for the firm's product or services and securing orders. These include sales office stationery , packing materials , cost of catalogues and brochures, sales men's salaries commission to salesmen, advertising, showroom expenses, bad debts, travelling expenses etc.
 - (iv) Distribution overhead – It is the expenditure incurred in the process which begins with making the packed product available for dispatch and ends with reconditioning empty packages if any for reuse. Examples of such expenses are expenses on fuel and maintenance of delivery vans, special packing , warehouse maintenance expenditure, wages for loading and unloading, carriage inward and carriage outward etc.
 - (v) Research and Development Expenses – The expenditure incurred for innovation and research are included for such type of indirect expenses . Development cost is the cost of the process which begins with the implementation of the decision to produce a new or improved method and ends with the commencement of formal production of that product or by that method.

2.7 Meaning of a cost sheet

A cost sheet is a statement of cost. It shows total cost as well as cost per unit for a given period. The data incorporated in cost sheet are collected from various statements of accounts which are written either on day – to – day or regular basis.

The cost sheet is a statement showing various components of total costs in a classified manner. It shows prime cost, works or factory cost, cost of production, cost of goods sold and total cost. It is also called as a “Statement of cost” According to C.I.M.A. London, a cost sheet is a document which provides for the assembly of the detailed cost of a cost centre or cost unit.

The cost sheet is generally prepared in columnar form. The columns are for the total cost of current periods, per unit cost for a preceding period and total and per unit cost for the budget period and so on . Cost sheet does not form part of double entry cost accounting records. Inspite of this, the relationship between cost sheet and financial accounts which are maintained on double entry system is very important as cost sheet derives its data from financial accounting. Therefore periodically it becomes necessary to reconcile the information obtained from accounting and financial accounting.

Advantages of cost sheet

- (i) It shows total cost and unit cost of output
- (ii) It reflects the break up figures of the total cost i.e different elements of cost .
- (iii) It facilitates comparison between two consecutive periods. That is to say the previous year's figure can be compared with current year's figures.
- (iv) It enables a manufacturer to keep a close watch and control over the cost of production.
- (v) By providing a comparative study of the various elements of current cost with the past results and standard costs.
- (vi) It helps in fixing up the selling price more accurately.
- (vii) It helps in minimizing the cost of production at the time of tough competition,

2.8 Preparation of cost-sheet

2.8.1 PROFORMA OF A COST SHEET

COST SHEET OF

For the period.....

	Output _____	Units
	Total cost	Cost per unit
	₹	₹
Direct Materials	—	—
Direct Labour	—	—
Direct Expenses	—	—
PRIME COST	—	—
Add Factory (works) overheads	—	—
WORK COST	—	—
Add Administrative overheads	—	—
COST OF PRODUCTION	—	—
Add Selling and Distribution overhead	—	—
TOTAL COST	—	—
COST OF SALES	—	—
Add profit	—	—
SALES		

Illustration -1 Ascertain (i) Prime cost (ii) Works cost (iii) Cost of production (iv) Total cost (v) sales

The information are furnished below

Direct materials consumed 1000 units @ Rs.40 each

32 Cost Accounting

Direct labour hours utilized 1000 hours @ 25 per hour other direct expenses Rs. 10,000, Factory over heads 40% of the prime cost. Administrative expenses Rs.15,000 selling and Distribution expenses Rs. 5,000 and profit 8% of the cost of goods sold. Total units produced and sold are 1000 units.

Solution :

Cost sheet of _____

For the month ending

	Total cost	Cost per unit
	₹	₹
Direct Materials	40,000	40
Direct labour	25000	25
Direct Expenses	10,000	10
PRIME COST	75,000	75
Add Factory (works) over head	<u>30,000</u>	<u>30</u>
Works cost	1,05,000	105
Add administrative over head	<u>15,000</u>	<u>15</u>
COST OF PRODUCTION	120,000	120
Add selling and Distribution overhead	<u>5,000</u>	<u>5</u>
Total cost (cost of sale)	1,25,000	125
Add profit	<u>10,000</u>	<u>10</u>
SALES	<u>135,000</u>	<u>135</u>

Illustration -2

Calculate prime cost, Factory cost , cost of production, cost of sales and profit from the following particulars.

	₹
Direct materials	1,00,000
Direct wages	25,000
Direct expenses	5,000
Wages of foreman	2,500
Electric power	500
Lighting – Factory	1500
Office	500
Depreciation :	
Factory plant	500
Office premises	1250
Consumable stores	2500
Manager's fees	5,000
Director's fees	1250
Office stationary	500
Storekeeper's wages	1000
Oil and water	500
Rent : Factory	5,000
Office	2500
Repairs and Renewals :	
Factory plant	3500
Office premises	500
Carriage out ward	375
Transfer to reserves	1000

Discount on Shares written off	500
Telephone charges	125
Postage and telegrams	250
Salesmen's salaries	1250
Travelling expenses	500
Advertising	1250
Ware house charges	500
Sales	1,89,500
Income tax	10,000
Dividend	2,000

Solution :**STATEMENT OF COST AND PROFIT.**

	₹	₹
Direct materials		1,00,000
Direct wages		25,000
Direct expenses		5,000
Prime cost		1,30,000

Add :

Factory overheads :

Wages of foreman	2500
Electric power	500
Storekeeper's wages	1000
On and water	500
Factory rent	5000
Repairs and Renewals factory plant	3500
Factory lighting	1500

Depreciation –Factory plant	500	
Consumable stores	2500	17,500
Factory cost		147,000

Add :

Administration overhead :

Office rent	2500	
Repairs and renewals – office premises	500	
Office lighting	500	
Depreciation : office premises	1250	
Manager's Salary	5000	
Director's fees	1250	
Office stationery	500	
Telephone charges	125	
Postage and Telegrams	250	11875
Cost of production		159,375

Add :

Selling and Distribution overhead

Coverage outward	375	
Salesmen's Salaries	1250	
Travelling expenses	500	
Advertising	1200	
Warehouse changes	500	3875
Cost of sales		163250
Profit		26250
Sales		189500

Notes

1. Transfer to reserves, income tax and dividend are excluded from cost accounts being items of appropriation of profits , so there items have not been included in costs .
2. Discount on shares written off being and item of non- operating nature is excluded from cost.

Treatment of stock .

Stock requires special treatment while preparing a cost sheet stock may be raw materials, work – in – progress and finished goods

Stock of Raw materials (opening and closing)

If the opening stock of raw materials , purchase of raw materials and closing stock of raw materials are given , then we can calculate the raw materials consumed by the following method.

Opening stock of Raw materials	XXX
Add : purchase of Raw materials	XXX
Less :- closing stock of Raw materials	XXX
Cost of Raw materials consumed	XXX

Note: Value of Raw materials Stolen or lost should be deducted like closing stock

Illustration -3 – Calculate the cost of raw materials consumed from the following cost data:

	₹
Opening stock of Raw materials	10,000
Closing stock of Raw materials	5000
Purchased during the period	5,00,000
Returned to the supplier as found defective	25,000
Stolen from stores	12,000

Solution

	₹	₹
Opening stock of Raw material		10,000
Add: purchase	<u>5,00,000</u>	<u>4,75,000</u>
		4,85,000
Less : closing stock	5,000	
Stolen from store	<u>12,000</u>	<u>17,000</u>
<u>Cost of Raw materials consumed</u>		<u>468,000</u>

Stock of work –in – progress (opening and closing)

Work – in – progress (WIP) refers to partly finished or semi finished goods . works on such goods have already started but not completed as on a particular date. It is valued at prime cost or works cost basis which has been discussed below .

- (i) If work – in – progress is valued at prime cost basis , then it is adjusted before arriving at the prime cost

Thus-

Direct materials consumed	XXX
Direct wages	XXX
Chargeable expenses	XXX
Add: opening work – in – progress	XXX
Less: closing work – in – progress	<u>XXX</u>
	-XXX
PRIME COST	XXX

- (ii) If the work – in- progress is valued at works cost basis , then the work – in – progress amount is adjusted before arriving at the works cost .

Thus

Raw materials consumed	XXX
Direct wages	XXX
Direct expenses	<u>XXX</u>
PRIME COST	XXX
Add : Factory overheads	XXX
Add: cost of opening W.I.P	XXX
Less : cost of closing W.I.P	<u>XXX</u>
FACTORY/ WORKS COST	XXX

(iii) Stock of finished goods

If opening and closing stocks of finished goods are given, then these must be adjusted before calculating cost of goods sold as under.

Raw material consumed	XXX
Direct labour	XXX
Direct expenses	<u>XXX</u>
PRIME COST	XXX
Add : Factory overhead	<u>XXX</u>
FACTORY COST	XXX
Add: Administration overhead	<u>XXX</u>
Cost of production	XXX
Add: opening stock of finished goods	<u>XXX</u>
	XXX
Less : closing stock of finished goods	<u>XXX</u>
Cost of goods sold	XXX

2.9 QUESTIONS

OBJECTIVE AND SHORT ANSWER TYPE QUESTIONS

Q.1. Choose the correct alternative

(a) Which of the following is not a method of costing ?

- (i) Contract costing
- (ii) Marginal Costing
- (iii) Batch Costing
- (iv) Process costing

(b) Which of the following is not a technique of costing?

- (i) Marginal costing
- (ii) standard costing
- (iii) Historical costing
- (iv) Job costing

(c) Sugar cane in sugar industry is

- (i) Direct expenses
- (ii) Direct material
- (iii) Indirect material
- (iv) Indirect expenses

(d) Wages of a carpenter in furniture manufacturing shop is

- (i) Direct wages
- (iii) Direct expenses
- (ii) Indirect wages
- (iv) Indirect expenses

40 Cost Accounting

- (e) Primary packing material is
- (i) Direct material
 - (ii) Indirect material
 - (iii) Direct expenses
 - (iv) Indirect expenses
- (f) Aggregate of direct material , direct wages and direct expenses is known as
- (i) Factory cost
 - (ii) Cost of production
 - (iii) Total cost
 - (iv) Prime cost
- (g) Basically there are two methods of costing. They are
- (i) Job Costing and Batch Costing
 - (ii) Job costing and Process costing
 - (iii) Process costing and operation costing
 - (iv) Operating and operation costing
- (h) Cost of Sale is the sum total of
- (i) Direct material + Direct Labour + Direct expenses
 - (ii) prime cost + Factory overheads
 - (ii) Works cost + Administration overheads
 - (iv) cost of production + Selling and distribution overheads
- (i) Which of the following expenses is not included in cost accounts?
- (i) carriage out ward
 - (ii) cost of samples
 - (iii) Taxes on income and profits
 - (iv) Legal expenses.

- (j) There elements of cost are:
- (i) production overheads + office overheads + Selling and distribution overheads
 - (ii) Direct materials + Direct labour + Direct expenses
 - (iii) Indirect material + Indirect Labour + Indirect expenses
 - (iv) None of the above .
- (k) Indicate expenses which are not included in cost :
- (i) Abnormal wastage of material
 - (ii) Direct labour
 - (iii) Factory overheads.
 - (iv) Office overheads.

2. Fill in the gaps.

- (a) Prime cost + _____ = works cost
- (b) _____ is also known as period costs
- (c) _____ is the smallest unit of activity or centre of responsibilities for which cost are collected.
- (d) _____ costs vary in total in direct proportion to the volume of output.
- (e) The costs which are ascertained after their incurrence are called _____ cost.
- (f) _____ cost is a predetermined cost.
- (g) A _____ cost is an irrecoverable cost and is caused by complete abandonment of plant.

3. Correct the underlined portion of the following sentences.

- (a) Job costing is a technique of costing.
- (b) In marginal costing a comparison is made of the actual cost and predetermined cost.

42 Cost Accounting

- (c) under uniform costing, the ascertainment of cost is done after they have been incurred.
- (d) Direct Cost are common costs which are to be allocated to various products manufactured in the factory
- (e) Profit center is defined as a location person or item of equipment for which cost may be ascertained.
- (f) cost of production + selling and distribution overheads = Factory Cost.
- (g) When the job is big and spread over long period of time, the method of job costing is used.
- (h) In transport undertaking and other utility companies operation costing is used.
- (i) Rent of office building is a variable cost.

4. Express in one word / term

- (a) The smallest segment of activity or areas of responsibility for which costs are accumulated.
- (b) Costs which vary in direct proportion to the volume of output.
- (c) The sum total of works cost and administration expenses.
- (d) Costs which are ascertained after they have been incurred.
- (e) Expenses which can be identified to a particular cost centre.

5. Answer the following questions in one sentence each.

- (a) What do you mean by profit centre ?
- (b) What is prime cost ?
- (c) What is contract costing ?
- (d) What is period cost ?
- (e) What is direct labour?
- (f) What do you mean by work –in progress?

(g) What is cost of Sales ?

(h) What is Standard costing ?

6. Answer the questions within 30 words each :

(a) Distinguish between direct costs and indirect costs.

(b) Distinguish between fixed costs and variable costs.

(c) State the classification of costs on the basis of variability .

(d) Explain standard costing.

(e) Explain any two advantages of costing .

(f) Explain any two techniques of cost centre.

(g) What is cost sheet ?

(h) What is work – in- progress.

(i) How will you calculate the cost of raw materials consumed while preparing a cost sheet ?

7. Answer the following questions within 50 words each :

(a) Explain three characteristics of an ideal costing system.

(b) What do you mean by semi variable cost ? Give example ?

(c) What is process costing ?

(d) Distinguish between operating costing and operation costing.

(e) Explain various elements of cost.

LONG ANSWER TYPE QUESTION

8. Discuss the factors which are taken into consideration before installing a costing system.
9. Explain the requisites of a good costing system.
10. Discuss in detail the elements of cost.
11. Explain various methods of costing.

12. Explain different techniques of costing
13. Draw out a classification of costs.
14. Discuss the steps involved in the process of installation of a costing system. Outline the difficulties in installation of a costing system.
15. **Following are the particulars for the production of 800 waterproofs ; of K Waterproofs Manufacturers Ltd., for the year ending 31st March , 2011.**

Cost of materials ₹ 32,000; Direct wages ₹ 48,000; Manufacturing charges ₹ 20,000; office Salaries ₹ 24,000; Direct wages ₹ 4,000 Selling Expenses ₹ 8,00; General Expenses ₹ 12,000; and Sales ₹ 1,60,000.

Following estimates were made by the costing department of the company for the year ending 31st March, 2011:

- (a) The output and sales will be of 1,000 waterproofs. (b) The price of materials will rise by 25% on the previous year's level. (c) Wages during the year will rise by 12 ½%. (d) Manufacturing cost will rise in proportion to the combined cost of materials and wages. (e) Selling cost per unit will remain unchanged (f) Other expenses will remain unaffected by the rise in output .

From the above information prepare cost statement showing the price at which the water proofs would be marked so as to show a profit of 12 ½% on the selling price.

(Orissa Board)

Ans. [Selling price ₹ 225.00]

16. **A factory produces a standard product. Following informations are given to you from which you are required to prepare a cost sheet for January , 2011.**

₹

Raw materials consumed	2,91,000	Office Overheads 10% of works cost.
Direct wages	1,29,000	Selling and distribution expense Rs. 20 per unit sold

Other direct expenses 81,000 units produced and sold during the month 10,000.

Factory overhead 80% of direct wages.

Also find the selling price per unit on the basis that profit mark up is uniformly made to yield a profit of 20% of the selling price. There was no stock of work in progress either at the beginning or at the end of these period.

(C.H.S.E. Orissa)

Ans. [prime Cost ₹ 5,01,000; Works Cost ₹ 6,04,200; Cost of Production ₹ 6,64,620; Total Cost or Cost of Sales ₹ 8,64,620; Profit ₹ 1,21,155; Sales ₹ 10,80,775; Selling Price per unit ₹ 108.80]

17. Following are the cost particulars for the production of 1,000 washing machines of Balakrishna Udyog for the year ended 31st December , 2010.

	₹		₹
Cost of Materials	8,00,000	Salaries	6,00,000
Wages	12,00,000	Rent, Rates and Insurance	2,00,000
Manufacturing Expenses	5,00,000		Sales
	40,00,000		

The company plants to manufacture 2,000units of washing machines during the year 2011. You are required to submit a statement of cost showing the price at which the washing machine would be sold to as to show a profit of 225% on selling price. Following additional information is supplied to you.

- (a) Price of materials is expected to rise by 20% in 2011.
- (b) Wage rate s are also expected to show an increase of 10% in 2011.

There is no change in all other expenses.

(C.H. S.E. Orissa)

Ans. [Selling Price ₹ 3,907]

- 18. From the following cost data, calculate Raw Materials consumed, Prime Cost and works Cost :**

	₹
Stock of Raw Materials in the beginning	20,000
Stock at the end	10,000
Purchase of Raw Materials	1,00,000
Direct Wages	30,000
Direct Expenses	20,000
Factory Overheads 50% of Direct Wages	

[Ans. Raw Materials Consumed ₹ 1,10,000, Prime Cost Rs. 1,40,000. Works Cost ₹ 1,55,000].

- 19. From the following cost data., Calculate the Raw material consumed :**

	₹
Opening Stock of Raw Materials	60,000
Closing Stock of Raw Materials	40,000
Carriage Inward	20,000
Carriage Outward	5,000
Purchase of Direct Materials	5,00,000
Purchase of Indirect Materials	4,500

[Ans. ₹ 5,60,000]

- 20. From the following cost data, calculate Works Cost**

	₹
Materials Consumed	2,80,000
Direct Wages	1,70,000
Direct Expenses	25,000
Factory Overheads 50% of Direct Wages	

Opening Work – in – progress	40,000
Closing work – in – progress	50,000
[Ans. ₹ 5,50,000]	

21. Prepare a Cost Sheet from the followings :

Materials Consumed	1,20,000
Labour Cost	80,000
Work s Overheads 50% of Labour Cost	
Office Overhead 10% of Works Cost	
No. of units produced	2,640
No. of units sold	2000
Profit margin 20% on cost	

[Ans. Total selling price ₹ 2,40,000, Selling price per unit ₹ 120]

22. From the following calculate total cost of sales showing Prime Cost. Works Cost and Office Cost.

	₹		₹
Direct Materials	60,000	Selling Expenses	10,000
Direct Labour	40,000	Opening Work –in Progress	10,000
Factory Indirect Wages	10,000	Indirect Expenses (Factory)	10,000
Factory Supervision	10,000	Closing works-in-Progress	8,000
Official Salary	15,000	Direct expenses	5,000

48 Cost Accounting

23. From the following particulars relating to the manufacture of a product during the month of June 2016.

	₹	₹
Raw Materials Consumed		1,50,000
Direct wages		90,000
Machine hour rate		50
Administrative Overhead	20% on works cost	
Selling Overhead	₹ 5 per unit	
Units Produced	11,400	
Units Sold	10,000	
Selling Price	₹ 40 per unit	

You are required to prepare a cost sheet from the above showing.

- (a) The cost per unit.
- (b) Profit per unit sold and profit for the year, 2016.

[Ans. (a) ₹ 35, (b) profit ₹ 5 per cent . Profit for the period = ₹ 50,000]

24. X Ltd. has produced two types of product is A and B. From the following information prepare a statement showing cost and profit per each book sold. There were no stocks.

	Product 'A'	Product 'B'
	₹	₹
Materials	45,000	1,20,000
Labour	24,000	72,000

Factory overheads are recovered at 75% on labour. Office overheads at 10% on factory cost. The selling price of each unit is ₹ 50 for Product 'A' and ₹ 49 for Product 'B'. 2,000 units of Product 'A' and 6,000 units of Product 'B' were manufactured and sold during the period..

Cost per unit – Product ‘A’ ₹ 47.85 and Product ‘B’ ₹ 45.10

[Ans. Profit per unit – Product ‘A’ ₹ 2.15 and Product ‘B’ ₹ 3.90]

25.	Calculate Prime cost from the followings :	₹
	Direct Materials	90,000
	Indirect Materials	700
	Direct Wages	50,000
	Indirect Wages	2,500
	Direct Expenses	2,000
	Carriage Inward on Materials	1,000
	Carriage Outward on sales	600

There is no opening and closing stock of materials.

[Ans. Prime Cost = ₹ 1,43,000].

26.	Calculate Prime cost from the following	₹
	Opening Stock of Raw Materials	20,000
	Purchase	82,000
	Closing Stock of Raw Materials	7,000
	Direct Wages	37,000
	Indirect Wages	2,700
	Carriage Inward	3,000
	Carriage out –ward	2,500
	Direct Expenses	5,000
	Indirect Expenses	1,750
	Salaries to salesmen	3,000

[Ans. Prime Cost = ₹ 1,40,000].

27. The Accounts of M/s Zed Computers Ltd show the following costs for the month of July 2016:

Materials Used	3,30,000
Wages Paid	2,40,000
Factory Expenses	80,000
Administrative Expenses	65,000
Selling and Advertising Cost	33,750

What price should the company quote for a computer ? It is estimated that ₹ 1,500 for materials ₹ 900 for labour will be required for one set. Factory expenses are to be taken on the basis of labour, administrative expenses on the basis of works cost and advertising expenses on the basis of cost of production. A profit of 10% on cost of sale is required.

[Ans. Prime Cost = ₹ 2,400, Works Cost = ₹ 2,700, Cost of Production = ₹ 2,970, Cost of Sale = ₹ 3,118.50 and Selling Price = ₹ 3,430.35 per unit].

Answers :

- Q.1. (a) ii, (b) iv, (c) ii, (d) i, (e) i, (f) iv, (g) ii, (h) iv, (i) iii (j) ii, (k) i
- Q.2. (a) Factory overhead, (b) Fixed cost (c) Cost centre (d) Variable cost, (e) Historical cost (f) Standard cost (g) Sunk cost
- Q.3 (a) Method (b) Standard costing (c) Historical costing, (d) Indirect cost (e) cost, (f) cost of sales, (g) contract (h) operating (i) Fixed
- Q.4. (a) Cost centre, (b) Variable cost, (c) cost of production, (d) Historical cost, (e) Direct expenses.



CHAPTER - 3

MATERIAL

STRUCTURE

- 3.0. Introduction
- 3.1. Meaning
- 3.2. Purchase of materials
- 3.3. Types of purchases
- 3.4. Functions of purchase department
- 3.5. Procedure of purchasing
- 3.6. Questions

3.0 INTRODUCTION :

Material stands as the first element in any form of operation. It is inventoriable and does not waste and exhaust with the passage of time. It can be purchased in varying quantities according to the requirements of the firm in contrast to the other elements of cost like labour etc. Thus material is the most flexible and controllable input.

3.1. MEANING:

Material is the prime element of cost. In manufacturing concerns it forms the single largest component of cost. Normally, it means any commodity or substance which processed in a factory and converted into finished products. Material has number of elements : **a) raw material** forms the basic of materials which are supplied in crude form to be used for production i.e., iron ore, cotton, etc, **b) components** are not raw by nature but are used in the assembling of the finished products i.e. tyre and tube used in cycle industry **c) tools** are the appliances used in the production operation i.e., screw-driver, drill etc. **d) spare parts** are used for the maintenance of plant and machinery for

uninterrupted flow of materials for production e) **consumable stores** are used for smooth running the machines and other appliances i.e., lubricants, oil, cotton etc.

Materials are of two types- direct and indirect. Materials which form part of finished products are known as direct material. Leather used in the making of shoes is an example of direct material. Indirect materials, in contrast, can not be treated as a part of the finished product because it can not be conveniently and accurately allocated to a particular unit of product. Example of such material is, nails used in making the shoes.

3.2 PURCHASE OF MATERIALS :

3.2.1. Meaning :- Purchasing is one of the basic functions common to all types of business undertakings. In modern age purchasing is treated as a managerial activity which goes beyond the simple act of buying and includes the planning and policy making activities covering wide range of related activities besides research and development . Purchasing is done with a view to reducing investments, facilitating standardisation and competitive marketability of the products. At present purchasing has acquired the status of a dynamic management activity which includes able administration, accurate forecasting, effective planning and control, organize co-ordinated efforts and above all judicious timely decision. Thus purchasing has established it self as a prime management function and lapse of any aspect of it may lead to great loss to the organization. It is well known fact that "**Goods well bought are half sold**".

3.2.1 Objectives:- The objectives of the purchasing should be clearly defined to ease the functioning of the purchasing activities as well as to justify the creation of the purchase department. It is necessary that the objectives of purchasing should be within the fold of the overall objectives of the organization.

The objectives of purchasing can be outlined as follow :

1. **Maintain continuity of supply :-** Purchase function should ensure that there is continuous flow of materials and other supplies for production without any disruption and also observe that their required reserves for contingencies are well maintained. As a result, the operation of the organisation can continue without any break. This requires long experience, judgement and other related qualities on the part of the purchasing authority.

2. **Maintenace of standard** :- As the quality of the final product relies on the quality of the raw material, purchasing function should ensure that the quality of the materials is as per the required speicification and under no occasion it has been compromised.
3. **Avoidance of duplication, waste and obsolescence**:- Purchasing authority should be aware about the materials in hand and their requirements in advance before making any purchase. This awareness on the part of purchase authority can easily check the possibilities of duplication, waste and obsolescence of meterials in the organization.
4. **Maintenance of company's competitive position** :- The position the company holds in the market must be in the knowledge of the purchasing authorities before making any purchase. Because this will help them to decide to purchase the materials as per the requirements of the organization relating to the quantity, quality, size, brand name etc. without harming its position in the market.
5. **Developing alternative sources of supply** :

Sometimes the existing supplier fails to supply the materials for certain reasons. Like wise, due to the absence of alternative options the organisation is deprived of the opportunity to bargain with existing suppliers to earn favourable terms. Therefore, to meet these situations the purchasing authority should maintain upto date list of suppliers to tide over them easily.

6. **Co-ordination and maintenance of internal relationship.**

Purchase department meets the requirment of several departments in varieties. It is necessary that the purchase department, should deal with them in such a way that there will be no discontentment amongst them. Its efforts should be to develop better understanding, co-operation and cohesion between them in such a way that a sense of harmony should prevail over the entire organisation.

7. **Maintaining complete purchase record** :

It is necessary that the purchase records should be maintained with all its precision. There should not be any doubt of its credibility. In fact, this helps the purchasing authorities

to prepare their plans more accurately as well as to take measures to prevent corruptions in the purchasing process.

3.2.3. Importance :

Purchasing activities hold a prime place in each and every organisation. An organisation can not think of its existence without purchasing activities. Following explains the importance of purchasing in business organisation.

1. Basic Function : Purchasing is the base to all the activities of an organisation. This is because, to pursue any function several things are to be purchased else the function can not be performed. Similarly an organisation has to purchase certain materials, supplies etc. since it can not produce every thing of its own economically. It is impossible for any organisation to achieve its full capacity without a successful purchasing activity.

2. Reduce complexity of business : Modern business is full of complexities. Shortage of raw materials, fluctuation in prices, uncertainties about the supply of materials etc are a few to name their problems. Purchasing function looks after all these problems effectively and ensures the availability of materials in proper quantity and quality, at proper place and time and at proper price. Apart from this purchase activities, the purchasing department should undertake research and development of new materials, their sources etc to help the management to bring new product or products with variable provisions to the market.

3. Planning : Now-a-days the purchasing function is not merely involved in buying for the organisation but is also planning as well in order to fetch maximum value of money. This includes decision in advance about the most appropriate source of supply at the least price, tracing favorable terms and conditions for payment etc.

4. Support to maximise the profit : The ultimate aim of any industry is to magnify its profit by pursuing different business activities. This objective can be accomplished by appropriate blending of five Ms i.e., material, men, money, machine and management. Amongst all these elements materials holds the core position. Thus the purchasing activities ensure the supply of materials at the proper time in proper quantities and quality, at proper price to support such objective to be achieved.

5. Support savings : Material cost constitute approximately 60 to 70 per cent of the factory cost of the product in most of the manufacturing concerns. It is said that 1% saving in material purchase cost is equal to profit obtained by 10% increase in sales. Moreover, cost of materials purchased constitute about 70 per cent of working capital of an organisation. Thus by adopting a rational purchasing strategy, keeping above information in view, a firm can save both money and material at same time and can magnify its earning.

6. Balance needs with means : It is a common knowledge that a consumer has limited resources but his wants are unlimited. To bridge-up the gap, he should make best possible effort to maximise his satisfaction by adopting a realistic purchasing strategy. In other words should make efforts to obtain all his requirements within his budget by doing best possible purchase.

3.2.4 Principles :

The principles of efficient purchasing are right quantity, right quality, right time, right price, right source and delivery at the right place. In short these principles form six R's which forms the fundamentals of purchasing. These are briefly discussed below :

1. Purchasing the right quality : Right quality refers to the suitability of an item for a given purpose i.e. the item purchased is considered to be the right quality if it is suitable for the purpose it has been purchased. It means that the quality of the material to be purchased should not be too high or too low, rather should match to the purpose for which it has been purchased. As far as possible, standard items should be purchased to ensure its desired quality.

2. Purchase of right quantity : Excess purchase leads to loss for the organisation while loss of opportunity will be there for the organisation if it purchases less quantities than required. Moreover, the quantity of material to be purchased determines the sources of supply. Therefore, much attention should be given to the quantity to be purchased. Normally, the quantity at which the carrying cost and ordering cost of materials equals, is the most ideal quantity to be purchased. This is termed as the Economic Order Quantity where the carrying cost and ordering cost of the materials are at the least.

3. Right time of purchasing : Purchase of materials before right time creates over stocking - loss for the organisation, similarly purchase of material after the right time leads to under stocking - disruption of the operation. Therefore, a time between these two extreme points should be found-out to determine the right time. Generally, the time at which the materials reach their re-ordering level is the most appropriate time to purchase the materials. It creates neither any shortages or excess balance of stock, rather it allows sufficient time to place the purchase requisition and get the materials without disrupting the operational activities.

4. Buying of the right price : Price is affected by several factors such as the quality and quantity required, delivery time, after sale service, market conditions etc. Efforts should be made to make purchases at the right price because firm's success depends on it. Several options such as analysis of price list, competitive bidding and negotiations may be followed to arrive at the right price. However, right price is that price which gives ultimately lowest cost consistent with established standards of quality.

5. Selecting the right source : A source is right when it supplies quality items, renders prompt service to the satisfaction, timely delivers the product and charges a reasonable price. Moreover, it will be better if the source is in the vicinity of the organisation to avoid extra transporation cost and time. Keeping these factors in view the source may be selected avoiding any middle man in between. It will be better if an established organisation with good reputation is preferred as a source.

6. Right place : Right place refers to the selection of the most convenient location for the purchase of materials by the organisation. So that materials can be delivered to the store or plant of the organisation without any extra transportation cost and additional time.

3.3. TYPES OF PURCHASES :

The sturcture of purchase function varies from firm to firm. Broadly, the puchase functions may be organised in two ways i.e., centralised and decentralised. The decision about any one of the ways of purchasing depends upon a particular situation prevailing in an organisation. According to Alford and Betty, the following factors determine the form of purchasing function an organisation should follow :

- a. The extent of geographical separation of the plants.
- b. The essential homogeneity of the products manufactured by all these plants.
- c. The type and characteristics of materials.
- d. The location of suppliers.
- e. The volume in which individual items are purchased and their susceptibility to market changes.

3.3.4. Centralised Purchasing :

Centralised purchasing means that all the purchases are to be made by a single purchase department to avoid duplication, overlapping and non-uniform procurements. All the other departments of the organisation which require any material supplies etc. should send their requisition to the centralised purchase department to make timely and suitable purchases.

Advantages :

Following are the advantages of centralised purchases

- 1. As the purchase department is solely responsible for purchasing, all other departments are relieved from the task of purchasing their requirements and can concentrate on to their areas of activities in a better way.
- 2. Better control over purchasing is possible because reckless buying by different departments can be avoided. Moreover, all the records of purchase transactions are kept at one place. This facilitates not only better control over purchases but also provide useful information for future planning.
- 3. Due to bulk purchases, the purchase department earns the benefit of scale i.e. high trade discounts, concessional transportation charges etc. which reduces the cost of the materials.
- 4. The purchase department can be staffed with experts and specialists belonging to different fields. Their skill and expertise knowledge can be utilised to improve the functioning of the purchase department.
- 5. A uniform purchasing policy, practice and procedure can be followed under centralised purchasing. This will improve the purchasing strategy of the organisation.

Disadvantages :

Following are the disadvantages of centralised purchasing :

1. In centralised purchasing, branches located at different places can not take the advantages of localised purchasing.
2. In the centralised purchasing there is delay in getting the materials by the departments because of the lengthy procedure. Moreover, this process may create misunderstanding between purchase department and other departments for several reasons like sometime wrong purchases, extraordinary delay in entertaing their requisitions etc.
3. The creation and maintenance of a special purchase department under centralised purchasing is expensive and is not affordable for a small concern.
4. For certain types of goods like perishable goods, equipement which are technically complex, the centralised purchasing system in not suitable.

3.3.2. Decentralised purchasing :

When different units of a firm are located far apart and each of them makes their own purchases independently, it is termed as decentralised purchasing.

Advantages :

Following are the advantages of decentralised purchasing.

1. As the units are located far apart, benefits of local purchases can be enjoyed i.e. low price, seasonal price etc.
2. Transportation cost can be reduced since the head office is not required to send materials to the branches, as branches meet their requirements from the local markets.
3. Rejections, shortages or excess receipts can be settled quickly and easily as the purchases are made by local branches.

Disadvantages :

Following are the disadvantages of decentralised purchasing.

1. Benefits of scale is missing in this form of purchasing as local purchases are made in small quantities.

2. No uniform purchasing policy can be pursued as the local purchases are made by branches according to their own convenience and requirements.
3. No proper record of purchase transactions can be maintained at the head office which may prompt the branches to be indulged in reckless purchases.

3.4 FUNCTIONS OF PURCHASE DEPARTMENT :

In small concerns the purchasing functions are performed by owner himself. But in large concerns a separate purchase department is entrusted with the responsibility of purchasing. The head of such department is usually known as Purchase Manager. To make the department effective the purchase manager must be equipped with requisite experience and knowledge such as (a) good knowledge about his own organisation relating to technical, financial and other matters, (b) well versed with legal aspects relating to purchasing, (c) efficient in administrative and organisational aspects, (d) up to date knowledge about market position, (e) finally he should be a man of integrity and capable to take prompt decision.

Following are the functions of the Purchasing Department.

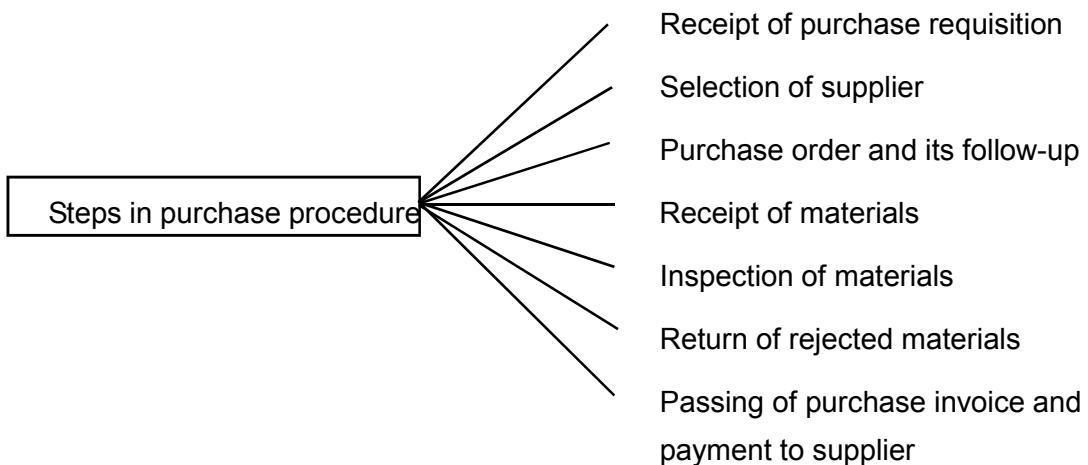
1. To ensure the availability of materials in order to keep their an uninterrupted flow to different departments for smooth functioning.
2. To follow competitive bidding in purchasing materials in order to reduce the cost of purchase.
3. To make purchase in reasonable quantities to keep investment at minimum.
4. To purchase materials of good quality to have minimum wastage of materials and loss in production.
5. To ensure that purchases are made only against authorised purchase requisitions and sanction from appropriate authority.
6. To observe that suppliers invoices are being paid promptly by accounts department for building good images of the organisation.
7. To keep alternative sources of supply in view so that materials may be purchased from them whenever a particular supplier fails.

8. To maintain good and cordial relations with the suppliers to avail better terms and conditions of purchase.
9. To co-ordinate and supervise the staff of the purchase department for its smooth functioning.
11. To maintain upto date list of name and address of the suppliers for every group of materials generally required for future reference.
12. Efforts should be made to maintain proper records in the purchase department to check corruption as well as to get upto date data for formulating of future plans and policies.
13. Finally, it should be the endeavour of the purchase department to purchase right quality materials in right quantity, at right price and at right time.

3.5 PROCEDURE OF PURCHASING :

Depending upon the size and nature of the operations, the purchase procedure may differ from organisation to organisation. However, the usual steps involved in purchasing procedure are as follows assuming that purchases are centralised :

Purchase procedure at a glance :



3.5.1. Receipt of Purchase Requisition :

The purchase manager or officer does not initiate any action to purchase materials until he receives the purchase requisition copy. A purchase requisition is a form used as a formal request to the purchase department to purchase the materials specified therein. Purchase requisition in fact, does two things, authorises the purchase department to initiate purchase and provide information in writing about the materials to be purchased. Such requisitions are received from several authorities - storekeeper for regular items of materials when such materials reach their reordering level; production manager for special materials for the manufacture of a new product; plant engineer for materials for repair and maintenance of the factory, and other departments for their varied needs.

The purchase requisition is generally prepared in triplicate. The original copy is sent to the purchase department, the second copy is retained by the storekeeper or the department initiated the requisition for future reference and third copy is sent to the authorising executive.

A general format of purchase requisition is given below :

PQR LTD

Purchase Requisition

PR No.

Date

Department

Date by which materials are required

Place where materials are required

Serial No.	Description	Code No.	Quantity	Remarks

Requested by....

Checked by....

Approved by....

3.5.2. Selection of Supplier :

Once the purchase requisition is received, the purchase department proceeds to select the most preferred supplier to settle the purchase transactions. Quotations are generally invited from the prospective supplier in general or sometimes tenders are issued to the known suppliers with whom the purchase department has long association because of regular transactions. On receipt of quotations from the proposers a comparative statement is prepared to select the most deserving one. While scrutinising the quotations for selecting the suppliers certain vital points should be kept in mind i.e. (a) capacity of the supplier (b) his financial credibility (c) his integrity (d) administrative efficiency of his organisation (e) price quoted (f) quantity for which price quoted is applicable (g) terms of payment (h) terms of delivery (i) specification to which the product are manufactured.

The purchase officer should keep in mind all the criterias given above in making choice of a suitable supplier however he must not become penny-wise and pound foolish. He should try to his best ability to collect all the information about the supplier selected and be aware about the very objective of the purchase department i.e., purchasing the right quality and quantity of materials, at the cheapest rate, at proper time to help the smooth running of the production department.

PQR LTD**Tender form**

Indent No.

Tender No.

To.

Date.

Dear Sir,

Please let us have your best offer for the supply of the following items. The items should be delivered F.O.R Delhi. The Tender closes on November 3, 2016 at 1 p.m. and will be opened at 11 am on the following date. The first copy of the tender should be despatched to us duly filled in.

Yours Faithfully

Purchase Office

for PQR Ltd.

Serial No.	Description of the item	Quality	Quantity	Price	Terms of Delivery	Other Terms

The tender method which is adopted to purchase the materials are of three types i.e., open tender, limited tender and single tender. Open tender method helps in inviting quotations in general by giving advertisement in the press and is followed when purchase involves considerable quantity and value. In limited tender method quotations are invited from limited number of suppliers with whom the organisation is well acquainted and holds confidence of favourable transactions. Single tender method is resorted to where the supplier is a sole supplier and organisation considers him as the most suitable supplier in comparison to others in the market..

3.5.3 Purchase Order and its Follow-up :

After selecting the supplier, the next step is to prepare the purchase order and place it with the selected supplier.

The purchase order is a written document prepared by the purchase department which authorises the supplier to supply the specified quantity of materials of specified quality at specified price on terms specified there in. It is the evidence of contract between the manufacturing organisation and the supplier that binds both of them legally. The supplier is bound to supply materials according to the terms and conditions of the purchase order and the purchaser is required to accept delivery of and make payment for materials as agreed upon. In fact, this document gives authority to the receiving department to receive the materials ordered for and to the accounts department to accept the bill from the supplier for payment.

Large sized enterprises usually prepare five copies of purchase order which are distributed as, original copy to supplier, one duplicate copy each to department initiated the requisition, receiving department, accounts department and last copy is retained in the purchase department for reference.

PQR LTD**Purchase Order**

To
.....
.....

Date
Purchase Requisition No.
Purchase Order No.

(Name and address of supplier)

Please supply the following items of materials in accordance with the terms and conditions mentioned here in :

Serial No.	Description	Code No.	Quantity	Price	Total cost	Remarks

Packing and despatch instructions

Discount

Terms of payment.....

Condition regarding empties for PQR Ltd

Excise duty and VAT Tax.... Signature

Place of delivery Chief Purchasing Officer

Date of delivery

Follow up action is necessary to ensure timely delivery of materials ordered. It protects against hold-up in production due to non-receipt of materials on time. Regularly reminders should be issued to the supplier about the delivery of material on time as agreed earlier. In case delivery date expires without any receipt of materials, after making

thorough scrutiny of the reasons informed by the supplier, a new delivery date may be finalised with the consent of the supplier. Extension of time for the delivery date should be granted only subject to penalty in the contract. It will be better if purchase department keeps on alternative sources of supply ready to meet such contingencies.

3.5.4. Receipt of Materials :

In large concerns a separate department is set up to receive the materials. The receiving department performs the function of unpacking the materials received and verifies their quantity and conditions. The quantity is checked against the purchase order copy and supplier advice note received along with the materials. A Goods Received Note is prepared by receiving department which includes all the information about the goods received. A Good Received Note is generally prepared in four copies. The original copy is sent to the purchase department to mark the completion of the transaction. Second copy is sent to the department initiated the requisition to inform about the receipt of materials. The third copy is sent to the accounts department for the entry in the stores ledger and the fourth copy is retained in the receiving department for office records and future reference.

PQR Ltd.

Goods Received Note

To

Supplier's

G.R.N. No.

Purchase order No.....

Date

Item No.	Description	Code No.	Quantity	Price	Total	Remarks Condition of Goods

Receiving by

Storekeeper....

Inspected by

Stores ledger posted by

3.5.5. Inspection of Materials :

Once the job of the receiving department is over material are sent to inspection department to check the quality of the materials received. Inspection department has to ensure that the quality of materials is as per the specification stated in the purchase order. Where technical or laboratory inspections are required the goods may be sent to laboratory etc., for the confirmation of quality. Finally, Inspection Report is prepared to show the result of inspection. If the goods are rejected, reasons for rejection are specified in the report. The Inspection Report is generally prepared in duplicate, the original is sent to the purchase department, and the duplicate is retained for reference.

PQR
Goods Inspection Note

Suppliers Name G.I.N No.....

Purchase order No. Date

Goods Received Note No.....

Serial No.	Description	Code No.	Quantity received	Quantity rejected	Reasons for rejection	Remarks

Inspected by

3.5.6. Return of Rejected Materials :

Where materials received are found damaged or not in accordance with the inspection, these are returned to the supplier along with the Debit Note, informing him that his account has been debited with the value of the concerned materials. The rejected materials are returned to the supplier immediately or they may be held, pending his instruction.

The Debit Note is generally prepared in triplicate by the purchasing department on the basis of inspection report. The original copy is sent to the supplier and second copy is given to the accounts department for adjustments. The last copy is retained for future reference.

3.5.7. Passing of Purchase Invoice and payment to supplier :

Purchase invoice is generally prepared by the supplier which contains the details of materials supplied and the amount to be paid. The purchase department verifies the invoice with several documents like purchase order, goods received note, inspection report, debit note etc.

Once the invoice is found in order after verification, the purchase manager puts the rubber stamp on the invoice as approved and signs it. Thereafter, the invoice is passed on to the account department for payment.

On receipt of Purchase Invoice the accounts department checks the authenticity and the arithmetical accuracy of the invoice. The voucher authorising payment is prepared and entries are made in record and finally payment is made against invoice as per the agreed terms.

3.6 QUESTIONS

1. Choose and write the correct answer from the alternatives given below :

a. Purchase requisition is prepared in :

- I. duplicate II. triplicate III. quadruplicate iv. five copies

b. Purchase order is prepared by :

- I. costing department II. store keeper
III. purchase department IV. production department.

c. A printed form used by storekeeper to make a formal request to purchase department to purchase material is known as :

- I. purchase order II. purchase requisition
III. bill of materials IV. material purchase note.

- d. Good Received Note is prepared by :
- I. store keeper II. costing department
III. receiving department IV. purchase department.
- e. It is rightly said that
- I. goods well bought are well sold
II. goods well bought are half sold
III. goods well bought give good profit
IV. right purchase of materials give right profit.
- f. Materials which form the part of the finished product is known as :
- I. indirect material II. direct material
III. new material IV. consumable material.
- g. At present purchasing has acquired the status of a
- I. dynamic management II. critical management.
III. management by exception IV. complex management
- h. Obsolescence refers to the product when it is
- I. out dated II. spoiled III. damaged IV. lost
- i. Name the method of purchasing which is followed to avoid duplication, overlapping, non-uniformity in its procurement :
- I. centralised purchasing II. decentralised purchasing
III. purchasing through agents IV. e-purchasing.
- j. Benefits of localised purchasing can be earned under the methods of :
- I. centralised purchasing II. decentralised purchasing,
III. e-purchasing IV. purchasing through agents.

- k. Purchase department cannot make any purchase of its own unless it gets :
- I. purchase order II. purchase requisition
III. purchase invoice IV. oral request to purchase
- l. Economic order quantity refers to the quantity of materials where its carrying cost and ordering costs are :
- I. at an average II. at the maximum III. equal IV. unequal
- m. At which level of materials quantity the purchasing process should be initiated.
- I. minimum level II. danger level
III. re-order level IV. maximum level.
- n. A uniform purchasing policy and procedure can be adopted only in case of
- I. centralised purchase II. decentralised purchase
III. purchase through agents IV. E-purchase
- o. The document which authorises the supplier to supply the materials is :
- I. purchase requisition II. purchase order
III. purchase invoice IV. goods requisition note

2. Express each of the following in one word/term

- (a) The document which authorises the purchase manager to initiate purchasing process is called ?
- (b) The method of purchasing where the benefit of scale is absent is called ?
- (c) The mechanism which determines the quantity of material most advantageous to business organisation to purchase is called ?
- (d) The document which empowers the supplier to supply the materials to the business organisation is called ?

3. Answer the following questions in one sentence each :

- (a) Define the term purchasing.
- (b) What is purchase requisition?

(c) What is centralised purchasing ?

(d) What is Goods Received Note ?

4. Fill in the blanks :

(a) The original copy of purchase order is sent to _____.

(b) _____ is generally invited from supplier of materials to select them.

(c) After issuing the purchase order _____ activities are pursued to expedite the purchasing process.

(d) After the receipt of materials _____ department verifies the quality of materials by following different steps.

5. Correct the underlined portion of the following sentences :

(a) In connection with the return of rejected materials to supplier debit note is prepared by accounts department.

(b) After the receipt of purchase order the supplier sends the goods which are received by purchase department.

(c) Uniformity in purchasing strategy can be conceived only in case of decentralised purchasing.

6. Answer the following questions within 30 words.

(a) Explain any two advantages of centralised purchasing.

(b) Explain the meaning of right quality in relation to purchase of material.

(c) What is purchase invoice ?

(d) What do you mean by centralised purchasing ?

(e) What is purchase requisition ?

(f) Give a specimen form of a purchase order.

(g) What is goods received note ?

(h) Explain the meaning of the term "Standardisation".

- (i) Explain any two importance of purchasing.
- (j) Describe any two factors to be considered to select the materials to be purchased.
- (k) State any two factors which determine the form of purchasing functions of a business concern.
- (l) Explain any two benefits associated with decentralised purchasing.
- (m) Name any two qualities purchase manager must possess to be effective in his performance
- (n) What is Debit Note ?

7. Answer the following questions within 50 words :

- (i) Why purchasing is considered as the basic function of an organisation ?
- (ii) What do you mean by right quantity in connection with the purchase of materials ?
- (iii) Explain any two demerits of centralised purchasing.
- (iv) Discuss any two objectives of purchasing.
- (v) Discuss any two documents associated with purchasing procedure.
- (vi) What is right time of purchasing materials ?
- (vii) What factors should be considered for the selection of a suitable supplier for the purchase of materials ?
- (viii) Describe any three important functions of a purchase department.

Long Type Question

- 8. What do you mean by purchasing ? Describe its objectives and importance.
- 9. Define purchasing. Explain different principles of purchasing.
- 10. Show the differences between centralised purchasing and decentralised purchasing
Which form of purchasing you prefer the most and why ? Explain with examples.
- 11. Describe the steps involved in purchasing materials by a manufacturing concern.
- 12. Write short notes on.

- a. Purchase Requisition
- b. Right Quality of materials
- c. Decentralised purchasing
- d. Return of materials.

Answer

- 1. (a) II, (b) III, (c) I, (d) III, (e) II, (f) II, (g) I, (h) I, (i) I,
(j) II, (k) I, (l) III, (m) III, (n) I, (o) II
- 2. 1. Purchase Requisition 2. decentralised purchasing,
- 3. Economic order quantity, 4. Purchase order
- 4. 1. Supplier, 2. Quotation, 3. follow up, 4. inspection
- 5. 1. purchase department, 2. Receiving Department 3. Centralised.



CHAPTER - 4

STORING OF MATERIALS

STRUCTURE

- 4.0 Introduction
- 4.1 Meaning
- 4.2 Need
- 4.3 Significance
- 4.4. Stores Organisation
 - 4.4.1 Centralised Stores
 - 4.4.2 Decentralised Stores
 - 4.4.3 Central stores with substores
- 4.5. Stores Records
 - 4.5.1 Bin Card
 - 4.5.2 Stores Ledger
- 4.6 Physical Stock- Taking
- 4.7 Perpetual Inventory System
- 4.8 Question

4.0 INTRODUCTION :

Once the materials are received, checked and inspected, the next step involves their proper storing. Investment in materials constitute a major portion of the current assets. Moreover, its storing is important for their proper use in the day to day activities of an organisation. Therefore, irrespective of the size of the organisation a separate store department should be created for proper storing of materials. The organisation which

does not care its materials well suffers a lot such as, theft, misappropriation, pilferage etc. Therefore, storing of materials constitute the primary function of an organisation and is also as important as purchasing of material by a business concern.

4.1 MEANING :

Storing or store-keeping may be described as “Physically storage of materials carried into the store in a scientific manner with a view to i) saving them from all kinds of damages and losses and ii) exercising over all control over their movement.” Thus keeping of stores in a proper way helps in minimising production costs and providing efficient service. Store keeping in fact, is a service function which involves the activities of receiving materials, protecting them in store from damages or unauthorised removal, issuing them in right quantities, at the right time to the right person and providing these services promptly and at least cost.

4.2 NEED :

Now days storing of material has become a regular feature in each and every organisation irrespective of their size, nature and state of operation. The following are the points highlighting the need for storing of materials.

1. To make available the right quality and quantity of materials, equipments, tools and other components within least possible time to the production department and other service units of the organisation.
2. To ensure uninterrupted supply of raw materials and other required items to production department and other service units of the organisation for their proper and smooth functioning.
3. To provide efficient and effective store keeping service. These include the prevention of overstocking and under stocking of materials, initiating protective measures against pilferage, theft, fire, evaporation and make possible the economic use of the available storage space and labour.
4. To improve co-ordination between stores department and other departments for smooth functioning of store department in respect of issue of materials, receipt of materials and transfer of material etc.

5. To maintain upto date store records to know the position of the stock of different items of materials at a particular point of time. This enables the store keeper to initiate purchase requisition for the right quantity and at the right time. It also helps the organisation to verify the position of the stock physically from time to time.

6. To provide information in detail along with requisite advice to management to formulate useful plan and policies, regarding purchase, store keeping, issue of material and so on.

4.3 SIGNIFICANCE :

Store-keeping has drawn greater attention in today's trade and industries due to highly competitive nature of the world. In fact, it has become a part and parcel of business system. Its proper enforcement helps an organisation to receive and store them well as well as issue them more easily, quickly and efficiently. The significance of store keeping are discussed below :

1. It receives the materials and place them at proper racks, bins and shelves in such a way that the damages to them can be avoided easily. Moreover, they can be traced-out correctly at the time of their issue to different departments within a short time.

2. It helps the organisation to maintain production schedule and deliver the goods on the promised date. This becomes possible as it maintains uninterrupted supply of materials of right quantity and quality and at right time to production department.

3. It reduces the investment in inventory by keeping strict watch over the over-stocking and under-stocking of materials in the store.

4. It provides up-to-date information about the material requirements and their regular analysis which control losses, wastages, obsolescence and pilferage of material. This improves the quality of stores management as well as reduce the cost of store operation.

5. It stands as the link between purchasing and production. This helps the organisation to determine materials of right quality and quantity and their issue at right time, not only for the present but also for the uncertain future.

6. It deals with materials in varieties which makes it of different grades and varieties. This enables it to gather expertise which helps in making right purchase and providing valuable guidance to the management. As a result the management becomes capable of forming prudent policies.

4.4. STORES ORGANISATION :

Investment in materials constitutes a major portion of capital of an organisation. This necessitates an efficient stores functioning which includes holding in proper custody of all stores to be issued, protecting all kinds of stores from theft, deterioration, evaporation, pilferage etc and maintaining a smooth and regular flow of stores to the production process. In order to achieve these objectives, the selection of location and organisation of the stores should be carefully planned.

Though the size of the firm, type of industry, policy of management etc, determines the size of the stores organisation, its location carries much weight. As far as possible stores should be located near the Receiving Department and should have easy access to all departments in order to save time as well as to reduce the transportation charges.

TYPES OF STORES :

Generally stores are found in three types.

- i. Centralised stores ii. Decentralised stores and iii. Centralised stores with substores.

4.4.1. CENTRALISED STORES :

It is a common practice amongst small and medium size concerns to have only one store for materials. This is generally called central store because it receives the materials as well as issues them to different departments from a single location. This form of stores is preferred because it is economical and it can have better control over the movement of the materials. Following are advantages and disadvantages of this form of stores.

ADVANTAGES :

1. Better Control : As all the stores are housed in one department, management can exercise better supervision over the movement of materials as well as can look after other affairs of the store effectively.

2. Economy in Cost : There will be less clerical cost because a limited number of personnel can do the entire accountive work. In addition the maintence cost of the store will be comparatively less as all elements of the store are housed at a single place.

3. Better lay-out of store : Since all the materials are to be kept at a single place, a useful planning can be chalked-out to place the materials in such a way that the available space of the store can be utilised to its maximum.

4. Expert service : For materials or products having technical complications, expert advice can be obtained easily for their better preservation.

5. Better forecasting of requirements : The up-to-date stock position of the materials can be gathered easily since stores are located at a single place. This can help the management to foresee the future requirements of materials easily and more accurately by observing the usage trend.

6. Less investment : As up-to-date information about the material position is available regularly, the management may not go for any extra purchase for future uncertainties. This may check any extra investment in inventories.

DISADVANTAGE :

1. High transaprtation Cost : When the store is located at a single place, it is quite impossible on the part of the organisation to setup all its departments nearer to that location for one reason or other. As a result, extra expenses are incurred in transporting material and other provisions to these departments which ultimately enhance the production cost of the organisation.

2. Delay and inconvenience : When different departments send their requirements for items in varieties, it becomes impossible on the part of the central store to respond them immediately because of its limited access. This deprives the department of their legitimate requirements in time which disrupts their normal course of activities..

3. High Risk : In case fire breaks out at the central store or any bottle neck develops in the transportation system, the production activities in different departments may be paralysed. This may bring a great uncertainties for the organisation.

4.4.2. DECENTRALISED STORES :

Under this type, independent stores are maintained in each and every department. The store keeper handles all the materials of the store. Department requiring materials can draw them from their respective store situated under the same roof. Decentralised store system is generally found in large organisations or organisations where its departments are well scattered.

Following are the advantages and disadvantages of decentralised store.

ADVANTAGES :

1. Saves time. There is no possibility of any delay or inconvenience to production department in receiving the materials from the store. Because for each production department there is a separate store to meet its needs.

2. Less Transportation Cost. Under this system of storing, the transportation cost is minimum because all the stores are situated under the same roof of production department or departments in need of stores.

3. Less Risk. In this form of storing of materials the risk of disruption of work of the entire organisation is minimum. This is because damage to any one store due to fire etc may not affect the activities of others since each has its own independent store to meet its requirements.

4. Less wastage. In decentralised store system the materials are purchased in smaller quantities which minimises the possibilities of theft, pilferage, evaporation etc to the materials.

DISADVANTAGES :

1. High cost of maintenance. It is a costly affair because under this system a large number of stores are to be set up throughout the organisation. This will require a good number of personnel for their functioning and a huge expenditure for their maintenance.

2. Less control over operation. There is complexity in controlling these stores by the organisation. Because the stores under this system are well scattered over the entire

organisation and it is not possible to keep a close watch on their course of activities by the head office. This laxity creates opportunity for corruption, frauds etc in these stores.

3. There may not be full use of storing provisions under this system. This is because these stores are larger in number and are well scattered which prevents the head office to know the up-to-date position of each store to make full use of their respective provisions.

4.4.3 CENTRAL STORES WITH SUB-STORES.

In an effort to compromise between a purely centralised store and a purely decentralised one, many concerns, particularly large organisations, having a number of departments situated at distant places, prefer centralised stores. Under this system, the central store would be located near the Receiving Department with a view to keep the cost of transportation to the minimum. Materials purchased will be kept in the central stores and issues are made to the sub-stores under the imprest system. Under this system for each item in stock, a quantity is determined and this is kept on hand in substores for issue at the beginning of the period say one week. At the end of the week, the store-keeper of each substore places requisitions with the central store for the number of articles required to bring the stock to the predetermined level. For example, if the imprest amount for a material is set at 250kg and at the end of a week the stock becomes 50 kg, then substore keeper will send a requisition to the central stores for 200 kg to ensure that at the beginning of the next week 250 kg are in stock. The substore keeper are made accountable to the chief store-keeper.

THIS SYSTEM HAS THE FOLLOWING ADVANTAGES.

- 1.** It combines the advantages of substores and centralised stores without compromising the centralised control.
- 2.** It facilitates day to day management by instant issue of stores. It ensures regular and timely issue of materials to the production departments.

4.5. STORES RECORDS.

One of the functions of the store-keeper is to maintain the store records by entering there in receipt, issue and balance of different items of the stores for their safe keeping of which he is responsible. Generally, a number of records are made by store keeper and

cost accounting department in this respect. Bin cards and Stores Ledger are the two basic records of inventory. Besides these a number of documents like goods received note, bill of materials, goods returns note etc. are also used for the purpose of recording the movement of stores to and from the stores department.

4.5.1. BIN CARDS.

Bin card consists of two terms Bin and Card. Bin refers to a rack, container or space where materials are kept. A separate bin is maintained for each item of material and is assigned an identification number. A Card is tied to or placed outside the bin to record the quantity of materials received, issued, returned and in hand in the bin. This card is called bin card or bin tag or stock card. The card also contains particulars regarding maximum level, minimum level, re-order level, danger level for each item of store.

Bin Cards are maintained by the store-keeper with the objective to provide a continuous record of the quantity of materials received, issued, returned and in hand.

On receipt of materials, an entry of the quantity received is made in the receipt column of the bin card. Likewise the issue of materials are recorded in the issue column. The balance in hand after each issue of materials is recorded in the next column. These entries are made on the basis of information furnished in different documents such as Materials Received Note, Materials Requisition Slip, Material Returned Note etc. The different levels indicated in the bin card helps the store keeper to keep a watch on the balance and prompt him to initiate the process for replenishment, as and when necessary. The balance as indicated in bin at any time should agree with the physical balance in the bins. Storekeeper is answerable for any difference between physical stock and bin card balance. In some organisation, two bin system is maintained— one bin constitutes the main or the regular bin from which materials are issued and the other bin contains the minimum stock from which issues are made when the stock in the regular bin gets exhausted. The idea of two bin system is to provide automatic information about reaching minimum stock level so that issue of material for regular production is stopped.

A specimen of a Bin Card is given below for better understanding.

PQR LTD.
BIN CARD

Bin No. –				Maximum Quantity –		
Description –				Minimum Quantity –		
Code No –				Re-order Level –		
Stores ledger folio –				Ordering Quantity –		
Location No –						
	Receipts		Issues		Balance	
Date	GRN No.	Quantity	MRN No.	Quantity	Quantity	Date of checking

GRN refers to Goods Received Note, MRN refers to Material Requisition Note.

ADVANTAGES :

Advantages of bin card are as follows :

1. It gives an up-to-date record of receipt, issue and balance of each type of materials in the store.
2. Location code of materials in the bin card facilitates an easy physical identification of each item of materials in the store.
3. It helps the store keeper to control the materials and keep the stock within the maximum and minimum levels prescribed which prevents any possibility of over or under stocking of materials.

4. It helps the storekeeper to know when fresh order should be placed when the balance of stock reaches re-order level.
5. It facilitates on the spot comparison of the physical stock of an item with its book record as shown in bin card. This prevents any form of misappropriation or fraud in the store.
6. There is less chance of mistake because entries are made at the same time as goods are received or issued by the person actually handling the materials.

DISADVANTAGE :

Following are the disadvantages of bin card.

1. The information furnished in the bin card is incomplete because it states only the quantity of materials and not its value.
2. The bin card is liable to be disfigured due to its proximity to materials and also because of its frequent handling.
3. The entries in the bin card may not be in a systematic form as the person passing entries in the bin card are ignorant of the system of clerical work.

4.5.2 STORES LEDGER :

The stores ledger is a subsidiary ledger to the cost ledger and is one of the basic records for material accounting. It is maintained by the cost accounting department with the objective to provide a continuous record of both the quantity and cost of materials received, issued, returned and balance of every item in hand. It is exactly like a bin card form except that, it contains a column for money value. It is written up with such documentary evidence as the purchase order, goods receives note, material requisition slip, material return and transfer note. It is usually in the form of loose leaves or cards and contains an account for every item of stores.

The stores ledger is the key to an effective system of inventory control as it provides the details necessary for checking physical stores, or pricing issues of material and for ascertaining inventory values. It discloses the closing inventory of every item both in terms of quantity and value at a point of time.

It is often contended that maintenance of bin card along with stores ledger is an unnecessary duplication of work. However, it may be noted that entries in the stores ledger are made after transactions are recorded in bin card. Thus stores ledger constitute a record check on the quantity recorded in bin card. Moreover, bin cards are not accounting records and are kept in the stores department. For costing purpose it becomes necessary to maintain stores ledger.

A specimen of stores ledger is given below for better understanding.

PQR LTD.
STORES LEDGER

Description -			Folio No -			Maximum Quantity -									
Code No -			Unit -			Minimum Quantity -									
Bin Card No -			Main sources of supply-			Re-order level									
Location -						Ordering size-									
Receipts			Issues			Balance		Stock Verification							
Date	Inv. and/or GRN No.	Quantity	Rate	Amount	Date	MRN. No	Quantity	Rate	Amount	Quantity	Rate	Amount	Rate	Initial	Remarks

Advantages :

The advantages of stores ledger are given below :

1. It provides complete information about materials i.e., quantity and cost in connection with its receipts, issues, returns and balance in hand.
2. It facilitates internal check- bin card and stores ledger act as a cross check on each other.
3. It enables the physical verification of stock. Actual physical stock can be compared with balance of stores as per stores ledger.
4. As it furnishes up-to-date information about the materials, the management is able to exercise good control over the inventory from time to time which may help the organisation to save both the amount of investment in stock and their cost.

Disadvantages :

Following are some of the disadvantages of store ledger.

1. As recordings are made in the stores ledger periodically, the possibility of clerical errors may remain undisclosed.
2. Sometimes discrepancies may be there between the bin card and stores ledger as regards the information furnished by them. This may need to prepare a separate statement to reconcile them which seems to be unnecessary and wastage of time.

Differences between Bin Card and Stores ledger :

The points of distinctions between bin card and stores ledger are as follows :

1. Bin Card is a record of quantity only where as stores ledger records both quantity and money value of materials.
2. Bin card is maintained by the store keeper where as the stores ledger is prepared by Cost Accounting Department.
3. Posting to bin card normally takes place before the transaction is made while in stores ledger, it is posted after the transaction.

4. Bin Card is a store recording documents, the stores ledger however is an accounting record.

5. Transfer of materials from one department to another or one job to another is not recorded in the bin card. However, transfers are recorded in the stores ledger for costing purpose.

6. In case of bin card every receipt and issue is individually entered but stores ledger usually contains the same information in a summarised form.

7. Bin cards are kept inside the stores while stores ledger is kept in costing department which is outside to the stores

8. Bin Card facilitates on the spot physical verification of the materials because of its proximity to materials. This is not the case with stores ledger because it has no proximity to materials since it is kept outside the stores.

4.6.(A) PHYSICAL STOCK-TAKING

Nowadays physical stock taking has become a common feature in each and every organisation to ensure the safety of their stock position. Physical stock taking means physical verification of every item in the store by counting, weighing or measuring.

Store records as discussed earlier gives information about the movement of materials and their balance at a particular point of time. It is possible that sometimes the balance of stock shown by stock records may differ from actual balance as ascertained by their physical verifications. Such discrepancies may be due to several reasons such as :

1. Sometimes stock records are not made up-to-date or information furnished in such records may be incorrect due to errors or frauds.

2. Sometimes due to carelessness of the storekeeper materials are misplaced which causes mixup of different sizes or groups.

3. There may be inaccurate counting, measuring or weighing of materials at the time of their receipts or issues.

4. There may be wastages of stores due to careless handling, faulty protection or natural causes.

-
5. There may be short or over issue of materials.

In view of the above reasons the physical stock taking carries much importance as it not only ensures the correct value of the stock but reveals the weaknesses in the system of custody and control of stock in an organisation.

The procedure or technique of stock taking of a concern is generally determined by the size, value and complexity of stock held. Basically there are two methods of stock taking-Periodical stock taking and Continuous stock taking.

1. Periodical Stock Taking :

In this system all the items of stock are physically verified periodically say once or twice in a year at the time of preparing the final accounts. This form of stock taking usually take a week and so which necessitates the shutdown of the factory to get the correct figures of closing inventory. Firms normally adopt this system of stock taking for slow moving and low value items as perpetual system is very costly. CIMA has defined periodical stock taking as “a process where by all stock items are physically counted and then valued”.

Following points should be considered for better and effective application of this form of stock taking :

1. Activities should be planned in such a way that there is minimum stoppage of production activities.
2. Printed stock taking instructions should be issued to all staff concerned well before the date of actual count.
3. Entire store should be divided into several areas and a team of stock checkers should be allocated to each area to count all items in that area, and enter them on printed stock sheets.
4. A “cut off” time to be set after which there will be no movement of stock until the counting time is over.
5. Stores record should be corrected to show the actual balance.

Advantages :

Following are the advantages of periodical stock taking.

1. It is a simple and economical method of stock taking and can be practised easily in small concerns.
2. As the factory activities are stopped under this system of stock taking, the value of work-in-progress can be ascertained more accurately.
3. This system of stock taking may not require personnel from outside the organisation because due to the stoppage of factory work for this form of stock taking, the personnel engaged in production, finance etc can be deputed to undertake this stock checking work. This may save the extra expenditure of the organisation.

Disadvantages :

Following are the disadvantages of periodical stock taking.

1. It preconditions the stoppage of factory for sometime to undertake this form of stock-taking which may prove too costly for the organisation how small that may be.
2. It is a weak system in view of the fact that physical verification are done only after a gap of six months or a year and during that period chances of detection of theft, pilferage loss etc are remote.
3. Under this system thorough checking of stock is not possible because the entire process of stock taking is carried out in a few days.

2. CONTINUOUS STOCK TAKING :

As per CIMA “continuous stock taking is the process of counting and valuing selected items at different times on a rotation basis”. In simple term it means continuous physical verification of the records of bin cards, stores ledger etc. with the actual stock. It consists of counting and verifying several items of stock daily round the year that all the items of stock are verified 3 to 4 times in a year. These verification works are being done by experienced technically trained persons not working in the store, as per programme planned to cover all items by rotation. High value items are checked more frequently than the stock with lesser value.

When discrepancies are detected during stock taking the individual bin card and store ledger accounts should be adjusted so that they agree with the physical stock e.g., if the physical stock is less than clerical or computed record, the quantity and value of stores ledger accounts and the quantity of bin card should be reduced and the difference in cost should be charged to factory overhead account for store losses.

While following this system of stock checking a pre-printed stock verification sheet having columns for quantity as per bin card, quantity as per physical count, difference and remark should be used. The stock checker should fillup all the columns of the sheet and should initial it with date. Whenever the physical count differs from recorded balance, he should prepare a stock difference memo for circulation to department concerned for necessary action.

Advantages :

Following are the advantages of continuous stock taking.

1. This form of stock taking can be pursued simultaneously with normal course of activities of the organisation. No stoppage of work is required. This saves much of the resources of the organisation.
2. Whole time specialised staff can be engaged in this type of stock taking which improves the quality of checking work.
3. Stores discrepancies are brought to the notice of the management and immediate corrective action are taken without having any wait till the end of the period.
4. Obsolete and slow moving items can be detected under this form of stock taking by keeping a close watch over the movement of store items.
5. Surprise checks are done frequently which acts as a morale check on the stores personnel to commit any error or fraud.
6. Interim financial statements can be prepared easily without waiting to the end of the financial year.

Disadvantages :

Following are some of the disadvantages of continuous stock taking.

1. It is a costly system because it requires large number of personnel and equipments to pursue the procedure.
2. It depends on the credibility of bin card and stores ledger record, without which the whole system may be a failure.
3. Any conflict or misunderstanding between stores personnel and stock checker may dislocate the very objective of continuous stock checking.

4.7(B) PERPETUAL INVENTORY SYSTEM :

Perpetual inventory system as defined by Wheldon as “a method of recording stores balance after every receipt and issue to facilitate regular checking and to obviate closing down for stock taking.” Thus this is a system of ascertaining current balance after recording every receipt and issue of materials through stock records.

The store record that are usually maintained to facilitate perpetual inventory are the bin card and stores ledger cards. In fact, these records are called perpetual inventory record and the method adopted to show the balance of every item of store after their receipts and issues is called perpetual inventory system.

In simple term perpetual inventory system means maintenance of such records as will reflect the receipts, issues and balance of all items in stock at all time. The perpetual inventory system is generally supplemented by a programme of continuous stock taking which ensures that physical stock agree with book figures. The objective of perpetual inventory record is to ensure that production is not interrupted due to want of materials, to facilitate regular checking, to avoid closing down for stock-taking and to provide a basis for verification of physical quantity in stock. In short, perpetual inventory system is involved with two steps- a) to ascertain the balance of stock of all items with regards to their quantity or values or both-held in store at all times and b) continuously physical verification of stock with regard to the balance shown by the store records without interrupting the normal production activities.

The above discussion concludes that perpetual inventory system comprises the following three :

- a) Bin card (quantitative perpetual inventory)
- b) Stores ledger (quantitative cum valued inventory)
- c) Continuous stock taking (physical perpetual inventory)

Thus the mechanism of the system lies in continuous reconciliation of bin card and stores ledger balances and also physical verification of stock. However, the success of this system depends on 1) keeping the bin card and stores ledger up-to-date, 2) reconcile bin card balance with that of stores ledger 3) verifying physical stock with bin card quantity continuously 4) reconciling discrepancies owing to physical verification and comparing with stores ledger 5) removing the causes of discrepancies by remedial action 6) correction of stock records.

Advantages :

Following are the advantages of perpetual inventory system.

1. In this system the stock records are kept up-to-date since inventory balance is struck after every receipt and issue. As such it is possible to compare the book balance with the balance emerging through physical verification of each item to ensure its precision.
2. Maintenance of stores ledger in addition to bin card enables cross checking of one against the other
3. Discrepancies are readily discovered and rectified. This gives an opportunity for preventing its recurrence in future.
4. Perpetual inventory coupled with continuous stock-taking overcomes the necessity of suspending production which arises normally in case of periodical stock taking at the end of the year.
5. As stock figures are readily available at all times, final accounts can be easily prepared for interim period.

6. As continuous stock taking, a part of perpetual inventory system, is performed without prior intimation, which acts as a morale check on the staff of the stores department to work honestly and to keep the records up-to-date.
7. Accurate and readily available inventory balance enables the organisation to make proper claim for insurance in case of fire.
8. A close and systematic review of perpetual inventory records bring to light the existence of obsolete, dormant and slow moving items.
9. The system helps in keeping the stock within the limit decided upon by management, so that excessive working capital is not sunk in the stock.

4.8 QUESTIONS

1. Choose the correct answer from the alternatives given in each case :

- a. Storing of materials is as important as :
I. issuing II. purchasing III. accounting IV. transferring
- b. Storing materials prevents :
I. over stocking II. excessive issue
III. transferring of materials IV. material damages
- c. Purchase requisition is issued when stock level reaches :
I. danger level II. reorder level
III. minimum level IV. maximum level
- d. When the material position goes beyond maximum level is called
I. over stocking II. under stocking
III. stock at par IV. normal stocking
- e. When only one store is maintained for the entire organisation is called :
I. centralised store II. decentralised store
III. store at head office IV. central store with substroe

- f. One of the advantages of centralised store is :
- I. better control II. less risk III. less wastage IV. saving of time
- g. Store ledger is maintained by :
- I. store keeper II. purchase department
III. inspection department IV. costing department
- h. Bin card records materials
- I. quantity and value II. quantity
III. value IV. size and quality
- i. Physical identification of materials in the store can be done easily by :
- I. stores ledger II. bin card
III. goods received note IV. material requisition note
- j. The timing of the issue of purchase requisition by store keeper becomes more accurate with the help of :
- I. stores ledger II. bin card
III. goods received note IV. material requisition note
- k. Which record is maintained inside the store ?
- I. stores ledger II. bin card III. debit note IV. credit note
- l. One of the defects of decentralised store is :
- I. duplication II. high risk
III. high transportation cost IV. delay in issuing materials
- m. In which form of stock taking the factory has to be shut-down temporarily :
- I. periodic stock taking II. physical stock taking
III. continuous stock taking IV. perpetual inventory system.

- n. The other name of bin card is :
- I. bin tag II. stores ledger
III. store record IV. store note
- o. Transfer of material from one department to other is recorded in :
- I. bin card II. stores ledger
III. goods received note IV. material requisition
- 2. Express in one word / term.**
- I. The material record maintained by costing department is called :
II. The material record maintained inside the store is called :
III. Name the stock taking system where the work of the factory is to be shut down for temporary period :
IV. Name the system where the current balance of materials can be ascertained easily after each receipt and issue of it :
- 3. Answer the following in one sentence :**
- I. What is store keeping ?
II. State any one important needs of store keeping ?
III. What is centralised storing ?
IV. State any one advantage of decentralised store.
- 4. Correct the underlined portion of each sentence.**
- I. Posting to bincard takes place after transaction is made.
II. The term bin card is the combination of three words.
III. There will be less wastages in case of centralised stores.
IV. Stoppage of factory work is necessary in case of continuous stock taking.

5. Fill up the blanks :

- I. Stores ledger is an _____ record.
- II. The other name of bin tag is _____.
- III. The system where only one store is maintained is called _____

6. Explain the following questions in 30 words.

- a) Explain any two needs of storing of materials.
- b) State any two advantages of storing of materials.
- c) What is centralised storing ?
- d) State any two advantages of decentralised storing.
- e) Briefly, state about central store with sub stores.
- f) What is bin card ?
- g) What is stores ledger ?
- h) State any two advantages of periodic store taking.
- i) Show any two differences between bin card and stores ledger
- j) What is continuous stock taking ?
- k) Describe any two advantages of Perpetual Inventory System.
- l) State any two reasons in support of Physical Stock Taking.
- m) Define store keeping.
- n) Why location of store carries much importance.

7. Answer the following questions in 50 words :

- a) Why different levels of materials are written in bin card ?
- b) Why costing department maintains stores ledger ?
- c) Why physical stock-taking is necessary ?
- d) Explain any two significance of store keeping.

- e) Describe in brief the necessity of centralised store with sub-store.
- f) Why in decentralised store risk is less ?
- g) What purposes the bin card serves as regards the storing of materials ?
- h) Show any two differences between bin card and stores ledger.

Long type of questions :

- 8. Define store keeping. Discuss its need and significance.
- 9. What is Bin card. Discuss its importance and state the way it differs from stores ledger.
- 10. Why physical stock Taking is necessary ? Explain your view in this regard with reason in its support.
- 11. What is Periodic Stock Taking / Discuss its advantages and disadvantages.
- 12. What is perpetual inventory system ? Discuss its advantages.

ANSWERS

- 1. a) II, b) I, c) II, d) I, e) I, f) I, g) IV, h) II, i) II, j) II, k) II, l) I, m) I, n) I, o) II
- 2. a) stores ledger, II) bin card, III) periodic stock taking, IV) perpetual inventory system,
4 before, II) two, III) decentralised IV) periodic
- 5. i) accounting, II) stock card, III) centralised store



CHAPTER - 5

PRICING THE ISSUE OF MATERIALS

STRUCTURE

- 5.0 Introduction
- 5.1 Valuation of Material issue
- 5.2 Methods of Pricing the Materials
 - 5.2.1 FIFO
 - 5.2.2 LIFO
 - 5.2.3 Simple Average
 - 5.2.4 Weighted Average
 - 5.2.5 Base Stock
 - 5.2.6 HIFO
 - 5.2.7 Specific Price
- 5.3 Questions

5.0 INTRODUCTION :

The success of an Industrial organisation manifests itself in a variety of ways. Scores of policies and other measures are need to be adopted. Effective control over issue of materials is one such important area of decision. The fact, is that no other aspects of evaluation and control is as crucial as that of the materials, as it covers more than 70 per cent of product cost. Therefore, issue of materials is an important function of store keeper. The materials are issued from the store normally on the basis of 1) Material requisition or 2) Bill of materials. Material requisition is an authorisation to a store keeper to issue materials or other stores. It is generally prepared by the foremen of the production department requiring the materials. It is prepared in triplicate and in different colours- the

original copy is sent to the store-keeper, the second copy is forwarded to costing department and the third is retained by the person issuing the material requisition i.e., foreman of the production departments. On the other side a bill of materials is a schedule of materials required for a job, process or operation. The object of a Bill of material is to provide in advance a complete list of materials required for a given job. It is prepared by the production planning department as soon as an order is received. It is an advance intimation or requisition to the stores department. Normally it is prepared in triplicate, in different colours, the first copy is sent to the stores department, the second copy is forwarded to costing department and the third copy is reatained by the production planning department.

5.1. Valuation of Materials Issue :

Materials are purchased with the objective of using or issuing them for production purpose. Normally, from the stores the materials are issued against the material requisition. These requisitions are passed on by the store-keeper after the issue of materials to cost accounting department for pricing so that issues can be valued and the amount can be entered in the stores ledger. Subsequently, the job or the work order for which issues are made is debited with the value of materials issued.

Need for Pricing :

Materials are frequently purchased at varying prices and are issued to different production departments according to their needs. Here, a difficulty arises regarding the price at which materials issued are to be charged. This is because same type of materials may have been purchased at different lots at different times, at different prices. If material is purchased for a specific job, pricing of such issue does not pose any problem. The price paid for the procurement of such material will be charged to that job. Frequent changes in the material prices, inflationary trend, nature of materials and its storage and the frequency with which materials are issued to production departments are some of the matters which further complicate the pricing of material issues. However, in order to ascertain the cost of production per article as accurately as possible and value the closing stock of raw materials reflecting its true valuation, the pricing of materials issue should be based on some accepted principles. The following points should be kept in view. while selecting a particular method for pricing of material issue.

1. As far as possible the method of pricing of material issue should recover the cost price of the materials.
2. Frequency of receipt and issue transaction be taken into account.
3. Frequent changes of the methods of pricing material issue should as far as possible be avoided.
4. The issue price should take into consideration management policy relating to the valuation of closing stock and degree of accuracy required.
5. Trend of market price of materials to be issued i.e., whether it is increasing or decreasing or stable, should be kept in view.
6. The nature of material and type of costing system should be considered.
7. The proportion of material cost to the total cost should be reviewed from time to time.
8. Inventory turn over rate and volume of material consumed should be viewed.
9. The method should be simple and should not involve much adjustments at the closing period.
10. The uniformity, if any, should be maintained within an industry.

5.2. Methods of Pricing Issue :

There are a number of methods used for pricing material issues. Each has its own advantages and disadvantages. It is not possible to say which method is the best. Each organisation should decide upon a particular method best suited to it. It is a matter of own judgement of the organisation. However, while selecting a method it is necessary to see that the method chosen is simple, effective and realistic, at the same time it is imperative to consider the effect of the method on production, cost and inventory valuations.

Different methods of valuation of material issues are as follows:

5.2.1 First-in First-out (FiFO)

In this method, it is assumed that the materials received first in the store are issued first. It does not, however mean that physical issue of the stock is actually in the

order of the first in first out. Thus, this method uses prices of the first batch of materials purchased for all issues, until all the materials from the batch are fully utilised. There after, the materials are issued at the next purchase price and so on.

Thus this method indicates three of its important features ie. a) materials are priced at the actual cost. b) material cost is charged to production at the oldest prices of materials and c) the closing stock is valued at the latest price paid.

This method is most suitable in times of falling prices because the issue price of materials to production will be high while the replacement cost of materials will be low. But in the event of rising prices if the method is followed, the charge to production will be low as compared to replacement cost of materials.

Illustration - 1

To illustrate the system of recording material issues under FIFO method, the following transactions are used :

Date	Quantity	Purchases Rate (Rs.)	Issues Quantity
2010			
Jan.1	500	2.00	-
Jan.10	300	2.10	-
Jan.15	-	-	600
Jan.20	400	2.20	-
Jan.25	-	-	300
Jan.27	500	2.10	-
Jan.31	-	-	200

Note : For convenience, the amount columns in the Stores ledger have been calculated and shown to the nearest rupee where ever necessary.

Stores Ledger Account Under FIFO

Date	Receipts				Issues				Balance		
	GR NO	Quantity	Rate (Rs.)	Value (Rs.)	SR No.	Quantity	Rate (Rs.)	Value (Rs.)	Quantity	Rate (Rs.)	Value (Rs.)
Jan.1	500	2.00	1000						500	2.00	1000
Jan.10	300	2.10	630						800	[500 300]	2.00 [1000 630] 1630
Jan.15					600	[500 100]	2.00 2.10	[1000 210]	200	2.10	420
Jan.20	400	2.20	880						600	[200 400]	2.00 [420 880] 1300
Jan.25					300	[200 100]	2.10 2.20	[420 220]	300	2.20	660
Jan.27	500	2.10	1050						800	[300 500]	2.20 [660 1050] 1710
Jan.31					200		2.20	440	600	[100 500]	2.20 [220 1050] 1270

Closing Stock- 600 Unit of the value Rs-1270/-

Advantages :

The advantages of the method are as follows :

1. Materials are issued at the actual cost and hence no unrealised profit/loss accrues to the organisation.
2. The method is based on a realistic assumption that materials which are received first are issued first.
3. Valuation of closing inventory is at cost and closer to current price because it represents the cost of recent purchase.
4. This method is simple, easy to understand and operate.
5. In the periods of falling prices, lower income is reported since the old cost (Which are higher than the current costs) are matched with the current revenue. As a result, income tax liability is reduced.
6. This method is useful when prices are falling. This is because high cost materials are issued first and low cost materials are retained in the organisation which may give a better strength to the organisation to face future uncertainties well.

Disadvantages :

The method suffers from the following short comings.

1. As the materials are issued at old prices. The cost of production does not show the current economic value.
2. It makes the cost comparison of two jobs difficult because similar jobs may be charged with materials at different prices. For example, materials purchased @ Rs10 may be issued to job A but materials issued to similar job B may be from a later supply which is @ Rs12. This makes comparison difficult because two similar jobs started at the same time may show different costs.
3. When transactions are numerous and price fluctuations are regular, the method involves more calculations and increases the possibilities of errors.

4. In periods of rising prices, higher income is reported since old cost (Which is lower than current cost) is matched with current revenues. As a result income tax liability is increased.
5. When prices are rising the issue price does not reflect the market price as materials are issued from the earliest consignment.

5.2.2 Last-in First-out-(LIFO)

This method is just the reverse of FIFO method. It is based on the assumption that-the last materials purchased are the first materials issued. Thus the price of the last batch of materials purchased is used first for all issues until all the units from this batch have been issued after which the price of the previous batch materials purchased is used. It should be noted that physical flow of materials may not conform to LIFO assumption.

Thus the method is associated with three of its important facets such as a) issue materials are priced at actual cost b) material cost charged to production is at the latest price and c) closing stocks is valued at the oldest price and is completely out of line with current price.

This method is suitable in times of rising prices because materials will be issued from the latest consignment at a price closer to current price level. But in the event of falling prices if this method is followed the charge to production will be low as compared to replacement cost of materials.

To describe the system of recording material issues under LIFO method illustration-1 has been used.

Stores Ledger Account Under LIFO

Date 2010	Receipts				Issues				Balance			
	GR No	Quantity	Rate (Rs.)	Value (Rs.)	SR No.	Quantity	Rate (Rs.)	Value (Rs.)	Quantity	Rate (Rs.)	Value (Rs.)	
Jan.1	500	2.00	1000						500	2.00	1000	
Jan.10	300	2.10	630						800	500 300	2.00 2.10	1000 630
Jan.15				600 [300 300]	2.10 2.0	630 [1230 600]	2.00		2.00		1630	
Jan.20	400	2.20	880						600	200 400	2.00 2.20	400 8.80
Jan.25				300	2.20	660			300	200 100	2.00 2.20	1280
Jan.27	500	2.10	1050						800	200 100 500	2.00 2.20 2.10	620 1670 1050
Jan.31				200	2.10	420			600	200 100 300	2.0 2.20 2.10	400 220 630

Closing Balance 600 Unit Rs-1250/-

Advantages :

Following are the advantages of the LIFO methods:

1. The cost of issues tend to be nearer current market price because it represents cost of recent purchases.
2. When prices are rising the higher prices of most of recent purchases are charged to production. This reduces profit figure and result in income tax savings.
3. As materials are issued at actual cost, it does not result in any unrealised profit or loss.
4. Closing stock will be valued at earlier prices and will not therefore, show any unrealised profit in the income statement.
5. As production is charged at the recent prices because materials are issued from the latest consignment, it facilitates the fixation of selling prices at a most competitive mode.
6. Like FIFO method this is simple to operate and is useful when transactions are not too many and prices are fairly steady.

Disadvantages :

The method has the following disadvantages :

1. The closing stock is valued at the old prices and does not represent the current economic values.
2. In the period of falling prices, closing stock is valued at old prices which are at higher level and thus profit would be higher resulting more income tax liability.
3. Like FIFO method it makes cost comparison of jobs difficult because materials cost of similar jobs may differ because of issues are being made at difference prices.
4. It involves a lot of calculation works when the transactions are larger in number and there are violent fluctuations in the prices of materials.

5.2.3. Simple Average Method :

Under this method (at the time of material issue), the average price is calculated by adding the different prices of materials in store and divided the same by the number of prices used in the total. It does not take into account quantities of materials while computing average price. For instance, when 500 units are purchased @ Rs 21 per unit and 300 units are purchased @ Rs 19 per unit, the simple average price will be = $(21+19) \div 2 = \text{Rs } 20$. This method is based on the assumption that the identity of the materials, when put into store is lost and materials are uniform lots.

To describe the system of recording material issues under simple average price method illustration I has been used.

Store ledger Account under Simple Average Method.

Put the solution of the problem here

Advantages :

The method bears the following advantages :

1. It is simple to understand and easy to operate.
2. It smooths-out price fluctuations specially when fluctuations are within the narrow limit.
3. Clerical work is reduced since every issue of materials will be charged at the same rate until a fresh purchase is made.
4. This method becomes useful when purchases are numerous and quantities purchased are uniform.

Disadvantages :

Following are the disadvantages of the methods.

1. Materials are not charged at actual cost. Thus unrealised profit or loss will usually arise out of pricing.
2. It is unscientific because it ignores the quantity of materials purchased while calculating average price.
3. It increases the clerical work. The average price will have to be calculated on the occasion of each issue of materials.

Stores Ledger Account Under Simple Average method

	Receipts			Issues			Balance				
	Quantity	Actual NO	Rate (Rs.)	Value (Rs.)	Actual No.	Cummulative	Rate (Rs.)	Value (Rs.)	Quantity	Rate (Rs.)	Value (Rs.)
Date 2010	500	500	2.00	1000					500	2.00	1000
Jan.1											
Jan.10	300	800	2.10	630					800		
Jan.15	-	-	-	-	600	600	2.05	1230	200		400
Jan.20	400	1200	2.20	880	-	-	-	-	600		1280
Jan.25	-	-	-	-	300	300	2.15	645	300		635
Jan.27	500	1700	2.10	1050	-	-	-	-	800		1685
Jan.31	-	-	-	-	200	1100	2.15	430	600		1255

Closing Balance 600 Unit Rs-1255/-

4. The value of closing stock may sometimes appear to be absurd. For instance, if 100 units of Rs 10 each and 1000 units at Rs 2 each are held in store at a total value of Rs 3000 when 600 units are issued at a simple average price of Rs. 6 each, the closing stock of 500 units will be valued at a negative value of Rs. 600 which is absurd.
5. Sometimes by adopting the simple average price, i.e., issue price, the recovery of cost price of materials in production not be possible, for example the purchase price of material in stock is Rs. 68000 ($1000 \times 10 + 2000 \times 11 + 3000 \times 12$) whereas the recovery from the production according to simple average price method i.e $\frac{10+11+12}{3} = 11$ will be Rs 66000 (total quantity 6000 units issued @ Rs 11 per units). Thus there is under recovery of Rs. 2000.

5.2.4. Weighted Average Methods :

This method gives due weight to the quantity held at each price when calculating the average rate. The weighted average price is calculated by dividing the value of materials in hand by the number of units in hand. Thus, it takes into consideration both quantities and money value for arriving at the issue rate. Whenever a new consignment is received a new weighted Average Price is calculated by adding the value of consignment with cost of stock in hand. The rate thus calculated is used to price all issues until a new consignment is received. The calculation of the weighted average rate can be explained by the following example.

$$\frac{q_500 \times 6^r + q_1000 \times 6^r.50 + q_2000 \times 7^r.50 + q_4000 \times 8^r}{q_500 + q_1000 + q_2000 + q_4000} = \frac{56500}{7500}$$

$$= 7.53 \text{ per unit}$$

q = quantity r = rate

Advantages :

Following are the advantages of the method.

1. This method evens-out the effect of fluctuations in purchasing prices. It is thus, particularly beneficial where price fluctuations are wide so extreme prices are ironed out.

Stores Ledger Account under Weighted Average Method

	Receipts			Issues			Balance			
	Date	Quantity	Rate (Rs)	Value (Rs)	Quantity	Rate (Rs)	Value (Rs)	Quantity	Rate (Rs)	Value (Rs)
2010										
Jan 1	500	2.00	1000	—	—	—	—	500	2.0	1000
10	300	2.10	630					800	2.0375	1630
15	—	—	—	600	2.0375	1223	200		2.0375	407
20	400	2.20	880	—	—	—	—	600	2.1450	1287
25	—	—	—	300	2.1450	643	300		2.1450	644
27	500	2.10	1050	—	—	—	—	800	2.1175	1694
31	—	—	—	200	2.1175	424	600		2.1175	1270

Closing stock of 600 units of the value of Rs 1270

2. The new issue is calculated only at the time of each new purchase and not at the time of each issue. This reduces the work of making calculations.
3. This method recovers the cost of materials from production.
4. No unrealised profit or loss arises by the use of this method since it is based on actual cost.
5. The method eliminates the necessity for adjustments in stock valuations.

Disadvantages :

Following are some of the disadvantages of this method.

1. It increases the clerical work because a new weighted average price is required to be calculated on the receipt of a new lot.
2. To avoid errors, the average price must be calculated to a sufficient number of decimal points. This makes the operation of the method some-what tedious.
3. It cannot be used in job order industry where each individual order must be priced at each stage upto completion.
4. Issue prices may not be at the current prices.
5. Excessive high or low prices for materials paid in the past are reflected for a considerable time.

5.2.5. Base-Stock Method:

In this method, a minimum quantity of materials i.e. base stock, is always held at original cost. Any issue of materials above the base stock quantity is priced using only one of the usual methods i.e. FIFO or LIFO at actual cost. This method is suitable for certain industries such as tanning, smelting, brass, copper, mining, lead, oil refinery where a) raw materials being manufactured are basic and homogenous b) cost of finished products comprises of some basic raw materials e.g. hides, crude oils, non-ferrous metals etc and c) processing time is longer or it is required to maintain a fixed stock of raw materials in process.

The base stock method though theoretically sound, is not often met within practice. It offers the advantages of simplifying valuation of inventory because base stock values are fixed. But the inventory valuation may not reflect the current market prices. Other merits and demerits of this method depend upon whether FIFO, LIFO or any other method that is used along with this method.

5.2.6. Highest-in First-out (HIFO) Method :

In this method materials issued to the production are charged at the highest price paid for the materials. This is regardless of the order in which materials are received in the stores. This highest rate is continued to be used until the material at that highest price is exhausted after which next highest price is used.

The HIFO method has the advantage that in fluctuating market the highest cost of materials is recovered first and inventory valuation is kept at the lowest which may create secret reserve. This method is not popular but is used in 'cost plus contracts' with advantage.

5.2.7. Specific Price Method :

This method is used where materials are purchased and set aside for particular job or work order. In such situation the job is charged with the specific price paid for the materials. Those materials which have not been purchased for specific jobs are issued according to FIFO or LIFO or any other method.

Of course, this method has only a limited application. But it enjoys the advantages of pricing the materials at actual costs and this is desirable from costing point of view. Another advantage of this method is that the jobs bear the actual cost of materials. This method is generally applied in job order industries where non-standard materials are purchased for specific jobs.

5.3 Question

1. Choose the correct answer from the alternatives given below :

- a. Control of material issue is crucial as it covers the production cost to the extant of :
 - (i) 70 percent, (ii) 60 percent, (iii) 80 percent, (iv) 50 percent
- b. Store keeper is empowered to issue materials when he receives :
 - (i) purchase requisition, (ii) purchase order, (iii) material requisition, (iv) indent letter.
- c. The copies of material requisition is generally prepared in :
 - (i) duplicate, (ii) triplicate, (iii) single, (iv) quadruplicate
- d. Bill of materials is generally prepared by :
 - (i) foremen, (ii) production manager,
 - (iii) material incharge, (iv) production and planning department
- e. The issued materials are generally valued by :
 - (i) stores department , (ii) costing department
 - (iii) accounts department , (iv) purchase department
- f. FIFO method is suitable when prices are :
 - (i) rising, (ii) falling, (iii) stable,(iv) fluctuating
- g. LIFO method is suitable when prices are :
 - (i) rising, (ii) falling, (iii) stable, (iv) fluctuating
- h. In both LIFO and FIFO method the pricing of material is based on :
 - (i) average cost, (ii) actual cost, (iii) deferred cost, (iv) current cost
- i. In base stock method the minimum quantity of material is always held at :
 - (i) original cost, (ii) average cost, (iii) current cost, (iv) deferred cost
- j. When for a specific job a requisition letter is prepared for material is called :
 - (i) purchase order, (ii) requisition letter, (iii) bill of materials, (iv) Bill of requisition

- k. Which method of issuing of material is suitable when price is fluctuating in the market.
 - (i) LIFO, (ii) FIFO, (iii) HIFO, (iv) Base Stock Method
- l. In which method of material issue the quantity of the material is considered in fixing its price.
 - (i) LIFO, (ii) Base Stock Method,
 - (iii) Weighted Average method, (iv) Simple Average method.
- m. In which method of material issue the closing stock may show an absurd value.
 - (i) HIFO, (ii) Base Stock Method,
 - (iii) Simple Average Method, (iv) Weighted Average Method
- n. In which method of material issue either FIFO or LIFO method may be used for the valuation of materials :
 - (i) HIFO, (ii) Specific price method, (iii) LIFO, (iv) Base Stock Method
- o. Among all methods of valuation of material issue in which method the clerical work is more complex :
 - (i) HIFO, (ii) Simple Average Method.
 - (iii) Weighted Average Method, (iv) Base Stock Method

2. Answer the following as per the instructions given :

a) Express the following in one word / term.

- (i) The requisition letter which is issued for a specific job or order for material is called :
- (ii) The document which authorises the store keeper to issue material is called :
- (iii) The method of material issue in which a minimum stock is kept aside for future contingency is called :
- (iv) The method in which materials are always issued at old price is called :

b) Answer the following questions in one sentence each :

- (i) What is material requisition ?
- (ii) What is Bill of materials ?
- (iii) What is Specific price method ?
- (iv) What is HIFO Method

c) Correct the underlined part of each sentence.

- (i) Between LIFO and FIFO method the approach to value the material price is same.
- (ii) Bill LIFO and FIFO method adept the average price to value the issue price of materials.
- (iii) Bill of material and material requisition are interchangeable terms.
- (iv) LIFO method of pricing the issue of meterials is suitable when the prices are falling.

d) Fill the blanks :

- (i) Bill of materials is generally prepared in _____
- (ii) FIFO method is suitable when prices are _____
- (iii) Sometimes under simple average method the closing stock may show _____ figure.

3. Answer the following questions in 30 words.

- (i) What is the objective of material requisition ?
- (ii) When Bill of materials is issued ?
- (iii) When LIFO method of material issue is suitable ?
- (iv) What is te objective of base stock method ?
- (v) What is specific price method ?
- (vi) Mention any two advantages of LIFO method.

- (vii) State any two disadvantages of FIFO method.
- (viii) Why material valuation is necessary ?
- (ix) Why HIFO method is suitable when prices are fluctuating.
- (x) Why weighted average method is more suitable amongst all other methods. of material issue.

4. Answer the following in 50 words.

- (i) What is the need of pricing the material issue ?
 - (ii) Briefly state about the base stock method of material issue.
 - (iii) State any two disadvantages of weighted average method.
 - (iv) State any two disadvantages of FIFO method of material issue
 - (v) Why weighted average method of material issue is an improvement over simple average method ?
 - (vi) Why specific price method of material issue has a limited application as far as material issue method is concerned.
5. What is FIFO method of material issue ? Show a comparative study between FIFO method and LIFO method of material issue.
6. What is weighted average method of material issue. Explain its procedure by taking any imaginary example and also discuss its advantages and disadvantages.
7. Show the stores ledger entries under the LIFO method of pricing issues in connection with the following transactions :

Date	Particulars	Units	Price Rs.
2008			
April 1	Balance	400	2.50
2	Purchased	275	2.70
4	Issued	200	—
6	Purchased	275	2.80

11	Issued	200	—
19	Issued	275	—
22	Purchased	275	2.90
27	Issued	200	—

[Ans. Closing inventory 275 units valued @ Rs. 2.50 and 75 units valued @ Rs. 2.90]

8. Prepare Stores Ledger Account under FIFO method :

1.1.2006	Opening stock 200 units @ Rs. 3
2.1.2006	Received 300 units @ Rs. 4
4.1.2006	Issued 250 units
6.1.2006	Received 100 units @ Rs. 2
7.1.2006	Issued 50 units @ Rs. 3
8.1.2006	Received 300 units @ Rs. 3
10.1.2006	Issued 200 units.

[Ans. Closing stock — 100 units @ Rs. 2 = 200]

— 300 units @ Rs. 3 = 900

Total Rs. 1,100

9. Prepare a stores ledger account from the following information adopting First-in-First-out Method of pricing of issues of materials :

2009 March

- | | |
|---|--------------------------------------|
| 1 | Opening Balance 500 tonnes @ Rs. 200 |
| 3 | Issue 70 tonnes. |
| 4 | Issue 100 tonnes. |
| 8 | Issue 80 tonnes. |

- 13 Received from supplier 200 tonnes @ Rs. 190
 14 Returned from Department A 15 tonnes @ Rs. 200.
 16 Issue 180 tonnes.
 20 Received from supplier 240 tonnes @ Rs. 195.
 24 Issue 300 tonnes.
 25 Received from supplier 320 tonnes @ Rs. 200
 26 Issue 115 tonnes.
 27 Returned from Department B 35 tonnes @ Rs. 200.
 28 Received from supplier 100 tonnes @ Rs. 200

[Ans. Closing stock 565 tonnes at Rs. 1,12,450]

[Hint : The returned materials on 14th March have been issued first on 16th March].

10. Prepare a stores Ledger Account for the month of March 2015 under :

- (i) LIFO Method
- (ii) Simple Average Price Method

<i>Receipts dated</i>	<i>Quantity</i>	<i>Rate</i>
1-3-15	800 units	25 per unit.
19-3-15	1,000 units	23 per unit.
31-3-15	400 units	21 per unit.

<i>Issues dated</i>	<i>Quantity</i>
3-3-15	1,000 units
11-3-15	800 units
23-3-15	600 units
25-3-15	200 units
31-3-15	200 units

On 1st March 2015 opening stock was 1,250 units at Rs. 27 per unit.

[Ans.] Closing Stock	(i)	250 units @ Rs. 27 =	Rs. 6,750
		200 units @ Rs. 23	4,600
		200 units @ Rs. 21	4,200
		<hr/>	<hr/>
	Total	650 units	Rs. 15,550
		<hr/>	<hr/>
	(ii)	650 units at Rs. 14,950]	

[Hint- On 31st March, there is a receipt of 400 units @ Rs. 21. On this date there is also an issue of 200 units. It is assumed materials were issued after materials were received.]

11. The following transactions took place in respect of material 'X' during the month of January 2008 :

Date	Particulars	Quantity (kg.)	Rate per unit (Rs.)
January 2	Received	2,000	10
6	Received	300	12
9	Issued	1,200	—
10	Received	200	14
11	Issued	1,000	—
22	Received	300	11
31	Issued	200	—

Show the stores ledger entries, the value of issue and value of closing stock under (a) LIFO, (b) Simple average and (c) Weighted average pricing systems.

[Ans.] Closing stock 400 units, (a) Rs. 4,100, (b) Rs. 4,253-34. (c) Rs. 4,365]

Answer :

Q.1. (a) I, (b) III, (c) II, (d) IV, (e) II, (f) II, (g) I, (h) II, (i) I, (j) IV,
(k) III, (l) III, (m) III, (n) IV, (o) III

Q.2.(a)(i) Bill of materials, (ii) Material repusition, (iii) Base stock method, (iv) FIFO
(c) (i) Opposite, (ii) Actual cost, (iii) Opposit, (iv) rising
(d) (i) advance, (ii) falling, (iii) absurd



CHAPTER - 6

CONTROL OF MATERIAL

STRUCTURE

- 6.0 Introduction
- 6.1 Meaning and Definition
- 6.2 Need
- 6.3 Techniques
 - 6.3.1 EOQ
 - 6.3.2 Stock Level
 - 6.3.3 ABC Analysis
 - 6.3.4 VED Analysis
 - 6.3.5 Stock Turn Over
- 6.4 Material loss
 - 6.4.1 wastes
 - 6.4.2 scrap
 - 6.4.3 spoilage
 - 6.4.4 defects
- 6.5 Questions

6.0 Introduction:

An organisation can not be effective without proper and efficient control of its materials. This is because material is the largest single element of cost. An efficient system of material control brings a significant economy in the total cost of production. Material is as much cash as cash itself and any theft, waste and excessive use of material

are immediate and direct material losses. Any laxity in the method of control allows the losses of materials to remain unnoticed. Therefore, efficient system of material control is very much imperative for each and every organisation.

6.1. Meaning and definition:

Material control means a systematic control over the purchasing , storing and using of materials to minimise the cost of material without disrupting the normal course of operation. In other words, it involves the planning organizing and controlling the process of procurement, storage and usage of materials so as to achieve the objective of efficiency and economy in material cost. Material control may be defined as "systematic control and regulation of purchase, storage and usage of materials in such a way so as to maintain an even flow of production and at the same time avoiding excessive investment in inventories". Thus, the definition specifies the three important aspects of material control i.e. purchase of materials, storage of materials and issue of materials. Further, the twin objective of material control as specified in the definition are (i) avoidance of production delays by maintaining an uniform flow of materials to the production process and (ii) prevent excessive investment in material stock.

In simple terms the system of control should be comprehensive enough to cover the flow of materials starting from the point when someone in the organisation makes a request for purchase upto the stage when the materials are consumed.

6.2. Need :

Though the need of material control is to allow uninterrupted production prcess as well as to prevent excessive investment in material, it is also associated with other important needs of material control which are enumerated below ;

- 1. Ensure balance stock level :** The level of materials should be maintained in such a way that there is no possibility of shortage or excess balance of materials in the organisation. Shortage of materials disrupts the production process and excess balance of materisals on the other sided, block investment without any productive use.

2. **Economy in purchases :** Purchase of materials should be at the most favourable terms with a view to effecting maximum economy in the cost. Similarly, materials with right quality consistent with the standard prescribed in respect of the finished goods, should be bought.
3. **Minimum wastage :** Proper storage conditions must be ensured to different types of materials. Losses of materials may occur due to deterioration, obsolescence, theft, evaporation etc. All efforts should be made to keep these losses at minimum.
4. **Information about materials :** There should be a system to give complete and upto date accounting information about the material requirements and the sources of its availability. This is because sometimes inadequate information may cause problem to get materials in time or new purchases are made when such materials are already in the stock.
5. **Check misappropriation of materials :** Sometimes employees misappropriate the materials easily since misappropriation of cash is taken more seriously than the misappropriation in kind. Therefore , this requires an intensive internal check of materials which is a part of material control.
6. **Material Report to management :** The material control system should be so designed so as to serve the purpose of accurate and upto date report to management about purchase, consumption and stock of materials to support useful managerial decisions.

Essentials of material control :

The needs of material control outlined above can be achieved by adhering to the following conditions ;

- (a) Proper co-ordination : There should be proper co- ordination and co – operation between various departments involved in the functioning of material control.
- (b) Proper purchase system: There should be central purchasing department under the control of a competent and expert purchase manager.
- (c) Proper storage system: There should be proper storage system to ensure a place for every thing and every thing in its place and avoidance of losses

during storage and minimum storage cost.

- (d) Proper issue system : There should be proper system for the issue of materials to ensure the delivery of materials of required quantity, in the required quality at the required time upon requisition to the department making requisition .
- (e) Internal check system : An efficient system of internal audit and internal check should be operated so that all transactions involving materials are checked by reliable and independent persons.
- (f) Proper accounting system : There should be proper system of accounting to determine the cost of materials at the time of receipt and consumption.
- (g) Standardisation : The material control procedure should be standardised and standard forms with regard to Purchase Requisition, Purchase Order, Material Requisition Note, Material Return Note etc should be maintained.
- (h) Proper reporting system : There should be proper reporting to management regularly of purchases, issues, inventory balance, returned to vendors, defective, spoil and obsolete items.
- (i) Finally, scheduling of material requirements and preparation of material budget should be pursued for better material control .

6.3 Techniques of Material Control:

The following are the different techniques of material control.

6.3.1. Economic Order Quantity (EOQ)

Since inventory policy aims at minimizing total inventory costs , the exact quantity of any item of material to be purchased at a time to achieve this objective is one of the fundamental problem faced by purchase manager. The purchase of large quantities of material naturally increases the cost of carrying the inventory. On the other hand, if purchases are made in small quantities, the ordering cost will go up. Hence a decision is

to be taken to strike a balance between the total carrying cost and total ordering cost.

The quantity thus to be ordered at a time to achieve the above objective of equating the cost of ordering with cost of storage or carrying is known as Economic Order Quantity (EOQ) or Reorder quantity or Economic lot size. In other words, economic order quantity is that size of the order which gives maximum economy in purchasing any material and ultimately contributes towards maintaining the materials at the optimum level and at minimum cost.

Ordering cost includes cost of placing an order, cost of chasing the order, transportation and receiving cost, setting up of production run etc. Cost of carrying or storage of materials consists of rent of godown and other cost of storage, audit and stock taking cost, risk of obsolescence, deterioration, evaporation, salaries of store staff, interest of capital tied up, insurance cost etc.

These two costs, ie ordering cost and carrying cost however hold a different character. This is because if purchases are made in huge quantities material storage cost will increase against ordering cost. Similarly , if the order size is small, ordering cost will increase in comparison to carrying cost. Hence, carrying cost and ordering cost move in opposite direction. The saving in one type of cost may be more than offset by the rise in the other set of costs. Therefore, it is necessary to determine that order quantity for which the aggregate of the two costs is minimum.

Determination of EOQ:

EOQ can be determined in different ways viz (I) by Algebraic equation (II) Graphically (III) by Tabular method :

(I) Algebraic Method :

The formula used for determining EOQ is as follows ;

$$\text{EOQ} = \sqrt{\frac{2AB}{CS}}$$

Where A = Total annual consumption or requirements (units)

B = Cost of ordering per order

C = Cost of per unit

S = Inventory carrying cost per unit

EOQ = Economic Order Quantity

Illustration 7.1

Following information relating to a type of raw material an organisation avails :
Determine the EOQ.

Annual demand = 2400 units

Unit price = Rs. 2.40

Ordering cost per order = Rs. 4.00

Storage cost = 2% per annum

Interest rate = 10% per annum

Solution:

$$\text{EOQ} = \sqrt{\frac{2AB}{CS}} \quad \text{when EOQ= Economic Order Quantity}$$

A = Annual usage = 2400 unit

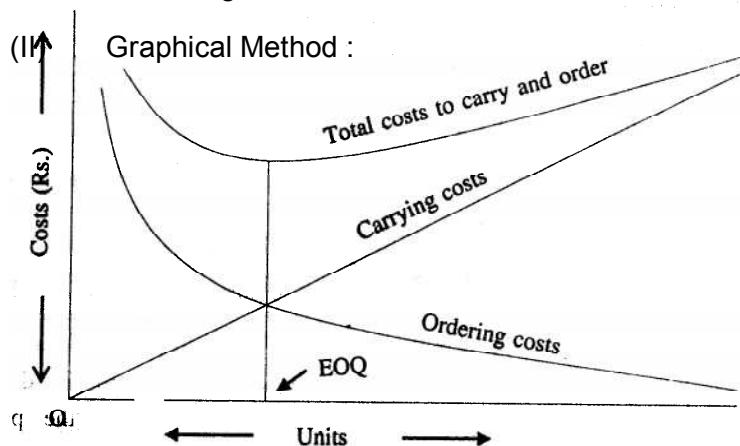
B = buying cost per order Rs. 4.00

C = Cost per unit = Rs. 2.40

S = storage cost or carrying cost = (2% + 10%) 12%

$$\text{EOQ} = \sqrt{\frac{2 \times 2400 \times 4}{2.40 \times 12\%}} = 258 \text{ unit}$$

Note : storage cost includes interest also.



[Graph representing the Economic Order Quantity]

- (III) Tabular Method : Economic order quantity can also be determined with the help of tables prepared for this purpose. The table shows various cost for different ordering quantities thus enabling to find out the most economic size of the quantity where the total cost is the least. This is illustrate below :

Illustration 7.2

Annual consumption = 6000 units

Cost of ordering = Rs 12 per order

Cost of material = Re1per unit

Carrying cost = 10% of average inventory.

No. of order Per year	unit per order	value per order(Rs.)	average Inventory cost value	ordering cost (Rs.)	carring cost (Rs.)	total cost (Rs.)
1	6000	6000	3000	12	300	312
2	3000	3000	1500	24	150	174
3	2000	2000	1000	36	100	136
4	1500	1500	750	48	75	123
5	1200	1200	600	60	60	120
6	1000	1000	500	72	50	122
7	857	857	429	84	43	127
8	750	750	375	96	38	134

Average inventory value is $\frac{1}{2}$ of the value of order. It is observed from the above that 1200 units per order is the ideal size as the total cost at this level is the least where

carring cost equates with ordering cost.

6.3.2. Stock Levels:

Setting of various stock levels is one of the techniques of inventory control. The main objective of fixing stock level is to guard against the danger of overstocking or under stocking of materials. The various levels for effective material control are maximum level, minimum level, Re – order or ordering level and danger level. These levels serve as basis for initiating action in time so that quantity of each item of materials is controlled. However, it must be noted that these levels are not permanent and liable to be changed in accordance with the needs of the organisation. Sometimes, even the shortage of space or the availability funds may also determine stock levels. From the management point of view, there has to be a proper balance between excessive inventory and the risk of stoppage of production due to non- availability of materials. The modern inventory management involves the use of scientific and statistical tools in fixing stock levels.

Following are the different levels of stock to be earmarked for proper control of stock.

1. Maximum Stock Level :

Maximum level is that level of stock above which the stock in hand should not be allowed to exceed. It is the largest quantity of a particular item of material which may be held in the store at any time. The fixation of maximum level is necessary to avoid unnecessary blocking up of capital in inventories and to save the shortage of space. While fixing this level the following factors are to be taken into consideration.

1. Rate of consumption of materials
2. Risk of obsolescence and deterioration
3. Storage space available
4. Cost of storage and insurance.
5. Available fund needed
6. Seasonal considerations e.g., bulk purchase during at low price

7. Re-order quantity
8. Restrictions imposed by government or local authorities in respect of certain materials in which there are inherent risks of fire, explosion etc.

The maximum stock level is computed by the following formula:

$$\text{Maximum level} = \text{Re-order level} + \text{Re-order Quantity} - \\ (\text{minimum consumption} \times \text{minimum re-order period})$$

2. Minimum Stock Level :

The minimum level indicates the lowest quantity balance of an item of material which must be maintained in hand at all times. It is that level below which stock should not normally be allowed to fall. This stock level is maintained primarily to avoid stoppage of production due to the deficiency of stock. It is essentially a safety stock and is not normally touched. In fixing this level following factors are considered.

- a. Rate of consumption of materials
- b. The maximum time required to acquire fresh supplies.
- c. Re-order level.

The minimum level is computed by the following formula : Minimum level = Re-order level - (Normal Consumption X Normal Re-order period)

3. Re-order Level or Ordering Level :

It is that level of material at which purchase requisition is initiated for getting fresh supplies. The re-order level is fixed between the maximum and minimum levels in such a way that by placing a fresh order at this point the new supplies will be received just before the minimum level is reached. In other words the re-order level is fixed slightly above the minimum level of stock to guard against possible disruption in supplies, increase in consumption due to changing demand and other factors. While fixing this level following factors should be taken into consideration.

1. Maximum rate of consumption

2. Maximum Re-order period
3. Minimum level
4. Lead time – the expected time lag between the date of placing the order and the date of actual receipt of materials.

The formula to calculate the re-order level is:

$$\text{Re-order Level} = \text{Maximum consumption} \times \text{Maximum re-order period}$$

Or

$$\text{Minimum level} + (\text{Normal consumption} \times \text{normal Re-order period})$$

4. Danger Level :

It is a level which is never expected to happen in normal circumstances. However, if it occurs normal issues are stopped and material are issued for important Jobs only. This level is fixed some what below the minimum level. When the stock reaches the danger level, urgent actions are taken for replenishment of the stock so that stoppage of production can be avoided. Purchase of materials on urgent basis results in higher purchasing cost. Its formula is :

$$\text{Danger Level} = \text{Average / normal consumption} \times \text{Maximum re-order period under emergency condition}$$

5. Average Stock Level :

Average stock level indicates the average stock held by the organisation. This level of stock may be computed by using any one of the following formula:

$$\text{Average Stock Level} = \text{Minimum level} + \frac{1}{2} \text{ Reorder quantity}$$

Or

$$\underline{\text{Maximum level} + \text{Minimum level}}$$

Illustration 7.3**From the following information calculate**

- (a) Re-order level (b) Minimum level (c) maximum level (d) Average level (e) Danger Level.

Rate of consumption : minimum 250 units per week , maximum 750 units per week,
Normal 400 units per week

Re- order period – minimum 3 weeks , maximum 7 weeks , normal 4 weeks , for emergency purchase 2 weeks

Re- order quantity = 2000 units

Solution :

- (a) Re-order level = Maximum Rate of consumption X Maximum Re – order period
 $= 750 \text{ units} \times 7 \text{ weeks} = 5250 \text{ units}$
- (b) Minimum Level = Re- order level – (normal rate of consumption X normal re- order period)
 $= 5250 \text{ units} - (400 \text{ units} \times 4 \text{ weeks}) = 3650 \text{ units}$
- (c) Maximum Level = Re – order level + Re- order quantity – (minimum rate of consumption X minimum re- order period)
 $= 5250 \text{ units} + 2000 \text{ units} (250 \text{ units} \times 3 \text{ weeks}) = 6500 \text{ units}$
- (d) Average stock level = $\frac{1}{2}$ (maximum stock level + minimum store level)
 $= \frac{1}{2} (3650 \text{ units} + 6500 \text{ units}) = 5075 \text{ units}$
- (e) Danger level = Normal rate of consumption X lead time for emergency purchase.
 $= 400 \text{ units per week} \times 2 \text{ weeks} = 800 \text{ units}$

Illustration -7.4

Find out the Re- order quantity if consumption is 70 -100 units per day, delivery

period is 2-6 days and maximum level is 810 units.

Solution :

$$\begin{aligned}\text{Re-order level} &= \text{maximum consumption} \times \text{maximum re-order period} \\ &= 100 \times 6 = 600 \text{ units}\end{aligned}$$

$$\text{Maximum level} = \text{Re-order level} - \text{Re-order quantity} - (\text{Minimum consumption} \times \text{minimum re-order period})$$

$$810 = 600 - \text{Re-order level} - \text{Re-order quantity} - (70 \times 2)$$

$$\begin{aligned}\text{Re-order quantity} &= 810 - 600 + (70 \times 2) \\ &= 210 + 140 = 340 \text{ units}\end{aligned}$$

6.3.3. ABC Analysis

ABC analysis is a system of inventory control. It was introduced for the first time by General Electric Company of USA. In ABC technique materials are analyzed according to their value so that costly materials are given greater attention and care by the management. Accordingly, items of high values are subject to closer control than the items of low value.

In this method all the items of materials are classified according to their value into high, medium and low which are known as A.B.C items respectively. ABC technique is also sometimes called as Always Better Control technique. Group A consists of the items which constitute 70% to 80% of inventory value, but only 5% to 10% of the total quantity in the stock. Similarly, items constituting 20% to 25% of the inventory value by only 20% to 30% of the total quantity are grouped in B category. The rest items representing 5% to 10% of inventory value but 60% to 70% of the total quantity are grouped in C category.

This type of classification of materials into three categories based on value calls for different degree of control over inventory. Thus Category A item are subject to strict control, while Category B item would demand lesser control and category C items gets still less control. The rules regarding purchasing, storing and issuing of various Categories

of items should be formed according to this value and importance.

Advantages :

1. It ensures closer and stricter control on costly items in which a large amount of capital is tied up.
2. Investment in inventory is regulated and funds can be utilized in the best possible way.
3. It helps to maintain enough safely stock for C category items.
4. Selective control helps in maintaining high stock turn over rate.
5. With proper re-order quantities, it minimises the cost of placing orders and inventory carrying cost.
6. Obsolete stock can be traced-out easily.

6.3.4. VED ANALYSIS :

VED analysis is another technique of stock control. It is generally used for the proper management of spare parts. In this technique spare parts are classified in to three categories – vital, essential and desirable – keeping in view the technicality to production. The spares, the stock-out of which even for a short period will stop production and where the cost of stock-out is very high are known as vital. The spares, the absence of which can not be tolerated for more than a few hours or a day, are considered an essential. The desirable spares are those spares which are needed but their absence can be tolerated even for a week without stoppage of production. Thus, on the basis of above classification attention will be given under this technique to the three categories of spares as per the weightage of care they deserve.

6.3.5. Stock Turn Over :

Stock turnover ratio is one of the techniques of inventory control. It expresses the number of times in a year stock is used up and replaced. In other words stock turn over ratio is an indicator of the relationship between the cost of material consumed and the average stock held. A high stock turn over ratio indicates fast moving materials and a low ratio indicates slow moving materials. The turn over of different materials may be compared

to detect these items which do not move regularly. This will enable the management to avoid keeping capital locked up in undesirable items of materials.

The objective of stock turnover ratio is to determine the efficiency with which stock are maintained. In other words, the objective is to find out (a) fast moving stock i.e., stock in great demand (b) slow moving stock i.e. stock in low demand (c) dormant stock i.e. stock having no demand at present (d) obsolete stock i.e. stock is no longer in demand.

The formula to calculate the stock turn over ratio is :

$$\text{Stock turn over ratio} = \frac{\text{Cost of material consumed during the period}}{\text{Cost of average stock held during the period}}$$

Where

- (I) Cost of material consumed = (Opening stock + purchase) – closing stock
- (II) Average stock $\frac{1}{2}$ (opening stock + closing stock)

The stock turnover ratio can be calculated in terms of days.

$$= \frac{\text{days of period (365days)}}{\text{Stock Turnover Ratio}}$$

Usefulness of Stock Turn Over Ratio:

On the basis of stock turn over ratio the management can have necessary corrective measures to.

- (I) Prevent the understocking of fast moving stock items.
- (II) Prevent the overstocking of slow moving stock items.
- (III) Retain or scrap the dormant stock items.
- (IV) scrapping or discard of obsolete stock items.

Illustration 7.5

From the following data for the year ending March 31, 2011, compute

- (I) Cost of materials consumed
- (II) Average stock

(III) Stock Turn Over Ratio

(IV) Which of the two items of stock is fast moving ?

	<u>Material A</u>	<u>Material B</u>
	Rs.	Rs.
Opening Stock	40,000	36,000
Purchases during the year	2,08,000	1,08,000
Closing stock	24,000	48,000

Solution:

(a) Materials Consumed = (Opening stock + Purchase) – Closing Stock

$$\text{Material A} = (40,000 + 2,08,000) - 24,000 = 2,24,000$$

$$\text{Material B} = (36,000 + 1,08,000) - 48,000 = 96,000$$

(b) Average Inventory = $\frac{\text{Opening stock} + \text{Closing stock}}{2}$

$$\text{Materials A} = \frac{40,000 + 24,000}{2} = 32,000$$

$$\text{Materials B} = \frac{36,000 + 48,000}{2} = 42,000$$

(c) Stock Turnover Ratio = $\frac{\text{material consumed during the year}}{\text{Average inventory}}$

$$\text{Materials A} = \frac{224,000}{32,000} = 7 \text{ times per annum}$$

$$\text{Material B} = \frac{96,000}{42,000} = 2.3 \text{ times per annum}$$

(or) No. of days average stock consumed

$$= \frac{\text{No. of days in a year (365 days)}}{\text{Stock Turn over Ratio}}$$

$$\text{Material A} = \frac{365}{52} = 7 \text{ days (approximately)}$$

Material B = 365 = 159 days (approximately)

2.3

- (d) material A is fast moving as compared to material B as it takes only 52 days to consume the average stock of A, whereas the consumption of average stock B takes 159 days. Considering the low turnover ratio of materials stock level of B may be refixed and if its rate of consumption does not change, its purchases may be reduced.

6.4. Material Loss:

Material loss represents the difference between the quantity of material purchased and the material content of the final output. Normally, such losses occur in the process of receiving, storing and use of the material. As these losses increase the cost of production it is imperative to know not only the nature of these losses but the method of their treatment. Broadly, these losses may be divided into two categories – normal loss and abnormal loss. Normal loss is that type of loss which is bound to be there and is unavoidable. For example, loss in the weight of the coal due to the flying of its dust portion during transportations, loss during loading and unloading of them etc. Abnormal losses are those losses which arise due to abnormal reasons such as inefficiency, theft, fire, accident, breakage etc. Hence appropriate measures should be taken to prevent such losses in order to reduce cost of production.

The type of material losses which arise for different reasons, their prevention and accounting treatments are discussed below:

6.4.1.(a) Waste :

Waste may be defined as “that portion of a basic raw material lost in processing, having no recovery value”. Thus waste is a type of material arising in production process which has little or no value. Waste may be visible or invisible. Visible wastage is that, which can be seen, handled and collected. Examples of visible wastes are saw dust, ash, sand etc. Invisible wastage, on the other side, is the disappearance of a portion of the raw material in the course of manufacturing. They may take the form of evaporation, shrinkage, smoke etc.

Waste has the effect of increasing the product cost. Thus waste should be reduced by all means. Allowances for normal waste should be made on the basis of past experiences, technical factors, nature of products etc. In case the actual wastage is more than predetermined wastage responsibilities should be assigned for such reasons.

When the waste is a part of the normal loss, the cost will be absorbed by the units of goods produced. On the other side, if it is a part of abnormal process loss, it is transferred to Costing Profit and Loss Account. In case any amount is realised by the sale of waste it should be treated as "other income" and be credited to Costing Profit and Loss Account.

6.4.2 (b) Scrap :

It is incidental material residue from certain types of manufacturing process, usually of small amount and of low value, recoverable without further processing. It is always visible. Small pieces of cloth, cut piece of metal sheet etc. are example of scrap.

Like waste ,scrap also increases the cost of production. Although scrap has a sale value yet its value is very low in comparision to the cost of raw materials. Therefore, scrap should be kept as possible as low by setting standard of scrap , determining the responsibility for scrap and by keeping proper records of scrap.

The accounting treatment of scrap is slightly different from that of waste. In the first place the sale proceeds of the scrap will be deducted from the material cost which reduces the overall cost of materials. A second alternative is to treat the sale value of scarp as income and credited to costing profit and loss account after taking into the cost of its disposal and marketing. This alternative is particularly suitable when the scrap has relatively small saleable value. Another treatment of scrap value is to credit the same to production overhead of the department to which the scrap is related. However, when the actual scrap is in excess of normal quantity allowed , the cost of scrap is transferred to Costing Profit and Loss Account.

6.4.3.(c) Spoilage :

Spoilage is the term used for materials which are badly damaged in the course of manufacturing process and which can not be repaired or rectified. The spoiled units are either sold as scrap or used again as raw material if possible.

Spoilage should not be considered as scrap. Scrap occurs as a result of the manufacturing processes ,where as spoilage occurs due to some defect in materials or manufacturing process, which could have been avoided. Further, scrap only involves loss of material whereas spoilage involves loss of not only materials but labour also.

Normal spoilage should be determined in advance and it should be periodically compared with actual spoilage in the Spoilage Report. Causes of any abnormal spoilage should be investigated and remedial measures should be taken immediately .

The cost of normal spoilage should be borne by the units of goods produced. Abnormal spoilage caused due to inefficiency is transferred to costing Profit and Loss Account.

6.4.5 (d) Defective :

Defective may be referred as that portion of production which is below the specification or desired quality and which can be rectified by additional expenditure of material, labour and overhead known as rectification cost. The difference between spoilage and defective is that the former can not be rectified and sold as good unit, the latter can be rectified by incurring additional cost and can be brought back to the level of standard product.

On the basis of past experience standard for defective work and rectification cost should be determined. The causes of any defectiveness over and above the normal and standard should be investigated and corrective steps should be taken. If it was found that defective is due to bad workmanship, suitable measures should be initiated to minimize the defective work.

Cost of rectification of the normal defectiveness should be charged to specific job or process if identification of such job or process is possible. Otherwise it should be charged to works overhead. The cost of abnormal defective should be transferred to the costing Profit and Loss Account.

6.5 Questions

1. Choose the correct answer from the alternatives given in each question;
 - (a) Material control is associated with its purchase, storage and;
 - (i) receipt (iii) inspection
 - (ii) issues (iv) accounting
 - (b) Uninterrupted production and reasonable investment in inventory are two prime objectives of :
 - (i) material control (iii) material purchase
 - (ii) material storing (iv) issue of material
 - (c) Proper balance of stock level ensures reasonable investment in material and :
 - (i) production process (iii) purchase of material
 - (ii) issue of material (iv) storing of materials.
 - (d) Wastage of material can be prevented if proper steps can be taken in connection with:
 - (i) storing (iii) inspection
 - (ii) issuing (iv) purchasing
 - (e) Proper storing of materials prevents two things – losses of materials and:
 - (i) storage cost (iii) problem in its receipts
 - (ii) problems in its issue (iv) proper maintenance
 - (f) To cheek misappropriation of material from store there is a necessity of:
 - (i) internal check (iii) alertness of the storekeeper
 - (ii) maintenance of proper accounts (iv) instalation of screening system
 - (g) The other name of economic order quantities is:
 - (i)re-order quantity (iii) purchase requisition
 - (ii) material requisition (iv) optimum quantity.

- (h) The other name of carrying cost is :
- (i) storage cost (iii) receipt cost
(ii) issue cost (iv) inspection cost
- (i) The quantity of material at which its carrying cost equates with its ordering cost is called :
- (i) economic lot (iii) minimum quantity
(ii) maximum quantity (iv) average quantity .
- (j) The characteristic of carrying cost and ordering cost is diagonally :
- (i) opposit (iii) identitical
(ii) positive (iv) lateral
- (k) Maximum level of material is fixed with the objective of :
- (i) preventing further purchase (iii) avoiding emergency
(ii) blocking fund (iv) making proper use of store space.
- (l) The other name of minimum level is :
- (i) safety level (iii) re-order level
(ii) primary level (iv) danger level
- (m) Re-order level is always higher to ;
- (i) minimum level (iii) average level
(ii) danger level (iv) maximum level
- (n) The level of material which is never expected under normal circumstance is called.
- (i) minimum level (iii) average level
(ii) re-order level (iv) danger level
- (o) The difference in material quantity between its purchase and its content in the final product is called :

- | | |
|------------------------|----------------|
| (i) material loss | (iii) scrap |
| (ii) material consumed | (iv) defective |

2. Express in one word /term.

- (i) The quantity of material at which its carrying cost equates with ordering cost is called:
- (ii) The level of material at which the storekeeper issues the purchase requisition is called:
- (iii) The raw-material cost in its processing having no recovery value is called:
- (iv) The material residue which emerges during the manufacturing process is called :

3. Answer the following in one sentence each :

- (i) What is material control ?
- (ii) What is material report ?
- (iii) What is spoilage ?
- (iv) What is EOQ ?

4. Correct the underlined portion of each sentence:

- (1) The other name of re-order quantity is called economic quantity.
- (2) The minimum level is also called danger level.
- (3) The total cost is maximum where the ordering cost equates with carrying cost
- (4) The residue which emerges in the manufacturing process is called waste.

5. Fill up the gaps :

1. Re-order level is always _____ the minimum level .
2. Defective can be brought back to _____ through rectification .
3. the spare, stock-out of which stops production work completely is called _____.

Answer

Q1. (a) ii (b) i (c) l (d) l (e) l (f) l (g) i (h) i (i) i(j) l (k) l (m) l (n) iv (o) i

Q2. EQR (ii) Re-order levele (iii) waste (iv) Scrop

Q.4. Economic order quantity (ii) safety level (iii) least (iv) scrop

Q5. (i) above (ii) standard (iii) vital

6. Answer the following in 30 words :

- (i) Mention any two needs of material control.
- (ii) What is EOQ?
- (iii) What is carrying cost ?
- (iv) What in ordering cost ?
- (v) How EQO in determined ?
- (vi) What is Re-order level?
- (vii) State any two factors to be considered to fix maximum level.
- (viii) What is lead time ?
- (ix) Briefly, state about ABC analysis.
- (x) What is scrap?
- (xi) What is Stock Turn Over Ratio?
- (xii) What is spoilage ?
- (xiii) What is Defective ?
- (xiv) State any two conditions essential for good material control.

7. Answer the following questions in 50 words :

1. State any two needs of material control.
2. Why total cost is minimum when EOQ is determinid ?
3. State the factors to be considered to set re – order level .

4. What is VED analysis ?
5. Explain the role of stock turnover ratio in material control.
6. What is the accounting treatment of scrap ?
7. What is the difference between scrap and spoilage ?
8. What is the difference between spoilage and defective?
8. Define material control. Discuss its need for effective material control.
9. What are the essential conditions for a good material control.
10. Explain ABC Analysis in detail and discuss its advantages.
11. Illustrate the Stock Turn Over Ratio and explain its usefulness.
12. Write notes on;
 - a. Wastage
 - b. Scrap
 - c. Spoilage
 - d. Defective

Practical Questions

1. The following information is in respect of particular material:

Re-order quantity	3,600 units
Maximum consumption	900 units per week
Minimum consumption	300 units per week
Normal consumption	6000 units per week
Re-order period	3 to 5 weeks.

Calculate the following :

- (a) Re-order level. (b) Minimum stock level. (c) Maximum stock level .
- (Ans. (a) 45,000 units (b) 21,000 units (c) 7,200 units)

14. In a manufacturing company, a material is used as follows:

Maximum consumption	- 12,000 units per week
Minimum consumption	- 4,000 units per week
Normal consumption	- 8,000 units per week
Re-order quantity	- 48,000 units
Time required for delivery	- Minimum 4 weeks ; Maximum 6 weeks

Calculate : (a) Re-order level ; (b) Minimum level; (c) Maximum level;
 (d) Danger level; (e) Average stock level;

(Ans. (a) 72,000, (b) 32,000 (c) 1,04,000 (d) 16,000 (e) 56,000

15. The following information is available in respect of material No. 30;

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

Calculate :

(a) Re-order level;	(c) Maximum level; and
(b) Minimum level;	(d) Average stock level.

(Ans. (a) 2,400, (b) 900, (c) 2,900, (d) 1,900)

16. Calculate the (a) re-order , (b) maximum level, (c) Minimum level of stock from the information given below:

Re-order quantity	4,000 units
Minimum stock level to allow for emergencies	5 weeks
Average delivery time for suppliers	4 weeks

Maximum stock level allowed by management 20 weeks

Average rate or consumption 250 units

Minimum consumption in 4 weeks 800 units

(Ans. (a) 2,250 , (b) 5,450, (c) 1,250)

17. In manufacturing its products, a company uses three raw materials A,B, and C in respect of which the following apply :

Raw Materials	Usage per unit of Output	Re-order quantity	Price per kg.	Delivery period	Order level	Minimum level
	(kg)	(kg)	(paise)	weeks	(kg)	(kg)
A	10	10,000	10	1 to 3	8,000	—
B	4	5,000	30	3 to 5	4,750	—
C	6	10,000	15	2 to 4	—	2,000

Weekly production varies from 175 to 225 units, averaging 200. What would you expect the quantities of the following to be .

- (a) Minimum stock level of A.
- (b) Maximum stock level of B
- (c) Re –order level of C, and
- (d) Average stock level of A ?

(Ans. (a) 4,000, (b) 7,650, (c) 5,400, (d) 9,000)

18. Orkey Co. uses three types of material X, Y and Z for production of 'K' product. The following information is given to you :

	Materials		
	X	Y	Z
Normal usage (units)	200	150	180
Minimum Usage ,,	100	100	90

Maximum Usage ,,	300	250	270
Re-order Quantity ,,	750	900	720
Re-order Period (months)	2 to 3	3 to 4	2 to 3

Calculate for each material (a) Re- order level, (b) Minimum level, (c) Maximum level, (d) Average stock level.

[Ans.]	X (Units)	Y (units)	Z (units)
(a)	900	1,000	810
(b)	400	475	360
(c)	1,450	1,600	1,350
(d)	925	1,038	855]

19. From the following compute :

(i) Re-order level; (ii) Re- order quantity (iii) Average stock level .

Normal usage	100 units per day.
Minimum usage	60 units per day.
Maximum usage	130 units per day.
Minimum level	1,400 units.
Maximum level	7,800 units
Re- order period	20 to 30 days

[Ans. (i) 3,900 units , (ii) 5,100 units (iii) 4,600 units ,]

20. From the figures given below, calculate Economic Order Quantity and number of orders to be placed per year.

Total consumption of material per years	10,000 kg
Buying cost per order	Rs. 50
Unit cost of material	Rs. 2 per kg.

Carrying and storage cost 8% on average inventory
[Ans. EOQ 2,500; 4 orders per year]

21. From the following particulars , find out the Economic Order Quantity :

(i) Annual demand 12,000 units
(ii) Ordering cost Rs. 90 per order
(iii) Inventory carrying cost per annum Rs. 15 per unit

22. Following information relating to a type of raw material is available :

Annual demand	2,400 units
Unit price	Rs. 2.40
Ordering cost per order	Rs. 4.00
Storage cost	2% per annum
Interest rate	10% per annum
Lead time	Half month

Calculate Economic Order Quantity and total annual inventory cost in respect of the particular raw material;

(Ans. EOQ 258 units; Annual cost Rs. 5837.15)

23. From the following information, find out the Economic Order Quantity.

Annual consumption	12,000 units (360days)
Cost per unit	Re. 1
Ordering cost	Rs. 12 per order
Inventory carrying charge	24%
Normal lead time	15 days
Safety stock	30days consumption.

- (b) Also find out (i) when should the order be placed ; and (ii) what should be the idea inventory level immediately before the ordered material is received .

(Ans. (a) 1,095 units (b) (i) 1,500 units (ii) 1,000 units)

24. A company uses 10,000 units per annum of an item costing Rs. 5 each. The cost of processing the order is Rs. 100 and stockholding cost amounts to 20% per year of the average value of inventory. How much the company should buy at a time (in a single order) to minimize the inventory costs?

[Ans. EOQ 1,414 units]

25. Your factory buys and uses a component for production at Rs. 10 per pieces. Annual requirement is 2,000 number. Carrying cost of inventory is 10% p.a and the ordering cost is Rs. 40 per order. The purchase manager agrees that as the ordering cost is very high, it is advantageous to place a single order for the entire annual requirement. He also says that if we order 2,000 at a time, we get a 3% discount from the supplier. Evaluate this proposal and make your recommendation.

(Ans. EOQ 400 units , Discount proposal should not be accepted)



CHAPTER - 7

LABOUR

STRUCTURE

- 7.1 Meaning of Labour
- 7.2 Classification of Labour
- 7.3 Payment of Wages
- 7.4 Characteristics of an ideal wage payment system
- 7.5 Systems of wage payments - Time wage or Day rate system
- 7.6 Systems of wage payments - Piece rate or piece work system
- 7.7 Distinction between time wage system and piece rate system
- 7.8 Applications
- 7.9 Questions

7.1 MEANING OF LABOUR

Labour is the second important component of production. The total cost constitutes a major element of cost in the total cost of production of a manufacturing organisation. Unlike material cost, it is very difficult to control labour cost as it involves human factor. As the labour cost occupies a significant portion of the total cost of production, effective control over it may be exercised so as to minimise the cost of production.

The cost of labour is the sum of all wages paid to workers as well as the cost of employee benefits extended by an employer. It is the cost of wages paid to workers during an accounting period on daily, weekly, monthly or job basis and also payroll and related taxes and benefits paid by the employer. The total labour cost may include the cost of labour expended in producing the goods or bonus and other benefits given to workers or the cost of time lost due to breakdown of machine or other expenses related to

labour. Now it becomes necessary to learn the different types of labour costs for cost accounting purposes.

7.2 Classification of labour / Types of labour

Labour may be classified into two important groups :

- (i) direct labour,
- (ii) indirect labour.

(i) Direct labour

Direct labour is that labour which can be conveniently identified with the specific job, contract or work order. It includes all labour directly engaged in converting raw materials into finished products or in altering the composition or condition of the product. **Direct labour cost** is the remuneration paid to such labour which is charged to a single cost unit. For example, the wages paid to workers engaged in making bricks in a kiln is direct labour cost. The wages paid is direct labour cost because the cost can be conveniently identified with the product i.e. bricks.

Wages paid to direct labour are treated as direct labour cost and included in **prime cost**. Some of the examples of direct labour cost are :

- (a) Wages paid to carpenter in making furniture.
- (b) Wages paid to weaver for weaving clothes.
- (c) Wages paid to workers engaged in construction work.
- (d) Wages paid to workers engaged in the production of goods.

(ii) Indirect Labour

Indirect labour is that labour which cannot be conveniently identified with the specific job, contract or work order. It includes all labour which is not directly engaged in the production of goods or services. Unlike direct labour they are not directly engaged in converting raw materials into finished products or in altering the composition or condition of the product. Indirect labour cost is cost of such indirect labour which is not incurred directly in the production of goods or services but indirectly helps in the production of goods or services.

Wages paid to indirect labour are treated as indirect labour cost and included in **production overheads**. Some of the examples of indirect labour cost are :

- (a) Salaries paid to foreman.
- (b) Wages paid to employees of personnel department.
- (c) Wages paid to employees of engineering department
- (d) Wages paid to employees of stores department.
- (e) Cost of supervisory work.

7.3 PAYMENT OF WAGES

Wages payable to workers is a delicate and important factor in the production of an industry. The amount of wages determines the attitude of workers towards their work and the employer. The workers always aim at earning more and more wages whereas the employer tries to keep the labour cost as low as possible. So, there is always a conflict between employees and employer in this regard.

The wage rate and the amount of wages should be such that the workers get an incentive to work harder and more efficiently and at the same time, the production increases at a faster rate lowering the cost of production per unit. So, the system of remuneration to workers in an organisation should be carefully determined so that it is acceptable both to the workers and the employer.

Before formulating a wage payment system, it is essential to analysis the various characteristics of an ideal wage payment method. The important characteristics of an ideal wage payment system are enumerated below :

7.4 Characteristics of an ideal wage payment system.

Labour is an important factor of production. So the cost of labour should be given much importance. In order to emphasize on labour cost, an ideal wage payment system should be introduced in an organisation. Before devising an ideal wage payment system, we should discuss about the various characteristics of an ideal wage payment system. Such characteristics are :

1. The wage system should be devised in such a manner that it meets the requirements of both the employees and the employer. It should be fair to all.
2. A minimum wage should be guaranteed to all the workers.
3. It should be within the jurisdiction of labour laws and regulations.
4. It should also be in conformity with the trade union's agreement.
5. The system should be flexible and must contain provisions for adjustment of changes in wages in accordance with changes in the cost of living index.
6. It should be practicable i.e., it should be determined keeping in view the paying capacity of the organisation, the wage rate in similar industries etc.
7. The system should have scope for skilled workers to earn more than unskilled workers. Adequate incentives should be given to efficient workers so that they are encouraged to work efficiently.
8. The system should be simple to understand and easy to operate.
9. It should be such that the labour turnover, absenteeism of workers are minimised.
10. It should ultimately lead to increase in production and decrease in the cost of production per unit.

7.5 SYSTEMS OF WAGE PAYMENTS

There are two principal systems of wage payment.

They are :

- (A) Time wage or Day rate-system and
- (B) Piece rate or piece work system.

(A) TIME WAGE OR DAY RATE SYSTEM

Under time wage system a worker is paid wages at a fixed rate per hour or per day or per week or per month. He is paid wages on the basis of time worked without considering the output produced. Wages are calculated on the basis of the unit of time. If a worker is paid on the basis of hours worked and he has worked for 8 hours in a particular day and the wage rate per hour is rupees 4 per hour, then

His earnings = Hours worked × Wage rate per hour

$$= ₹(8 \times 4)$$

$$= ₹32$$

So, the formula for calculating wages under this system is :

Wages = Actual time worked × Time rate

Advantages of time wage system

- (i) It is very simple to understand and easy to operate. It is very widely implemented.
- (ii) Workers give greater attention on the quality of their job. It ensures quality and workmanship.
- (iii) The system minimises bad quality of output, damages to machines and equipments.
- (iv) It ensures time wages to the workers and provides a regular and steady income to them.
- (v) Below average workers are benefited as the payment of wages is made on the basis of time worked but not on the basis of their performance.

Disadvantages of time wage system.

- (i) Time wage system does not give incentive to workers. The wages paid to workers is hardly related to their actual performance.
- (ii) The workers may work slowly and may claim overtime wages. This increases the cost of production per unit.
- (iii) Because of slow working of workers, continuous strict supervision is required which increases the labour cost unnecessarily.
- (iv) There is no difference between efficient and inefficient workers. There is no extra monetary reward for more efficient workers.
- (v) Due to lack of initiative efficient workers may leave their jobs and hence labour turnover, absenteeism etc. may arise in the organisation.

Suitability of time-wage system

- (i) The time-wage system is suitable where the output can not be accurately measured, counted and standardised. The work is usually non-standardised and non-repetitive in nature.
- (ii) Where, there is greater emphasis on the quality of work rather than on the quantum of production.
- (iii) When volume of production is beyond the control of labour.
- (iv) Where the unit of output cannot be fixed.
- (v) Where supervision is good and continuous.

7.6 SYSTEMS OF WAGE PAYMENTS

(B) PIECE RATE OR PIECE WORK SYSTEM

Under piece rate system a worker is paid wages at a fixed rate per unit produced or job completed. The worker is paid wages on the basis of units produced but not on the basis of time taken by him to perform the work. Under this system wages are calculated on the basis of units of production and the worker is allowed to earn more than that of normal time rate wages. The formula for finding a worker's earnings under piece rate system is as under :

$$\text{Wages / Earnings} = \text{Units Produced} \times \text{Rate per unit}$$

If a worker is paid ₹ 4 per unit and he produces 100 units in a day of 8 hours, then

$$\text{His earnings} = \text{Units produced} \times \text{Rate per unit}$$

$$= (100 \times 4) \text{ rupees}$$

$$= ₹ 400$$

The rate per hour may be converted into rate per unit. Suppose the normal rate per hour is 20 and the estimated production per hour is 5 units. Then the rate per unit

$$\begin{aligned}
 &= \frac{\text{Rate per hour}}{\text{Estimated production per hour}} \\
 &= \frac{20}{5} \\
 &= ₹ 4 \text{ per unit}
 \end{aligned}$$

Advantages of piece-rate system

- (i) This system is also simple to understand and easy to operate.
- (ii) As there is a direct link between performance and remuneration, each worker tries to produce more.
- (iii) It increases the volume of production and decreases cost of production. Thereby it reduces labour cost per unit and also overhead cost per unit.
- (iv) As the reward is directly linked with performance, the tendency of workers to work slowly is automatically eliminated.
- (v) The workers themselves take the responsibility of time and output. Hence less amount of supervision is required.
- (vi) As the worker's remuneration is linked with his performance the idle time cost is reduced to minimum.
- (vii) As cost per unit is available, the labour cost of production is easily calculated.

Disadvantages of piece-rate system

- (i) It is not easy to set standard rate per unit. A fair standard is very difficult to establish.
- (ii) The workers feel insecure as time wage is not guaranteed.
- (iii) The quality of product may not be maintained as the workers are paid on the basis of units of output. The workers produce more and more in a stipulated time to earn more wages. Consequently substandard units of output may be produced.
- (iv) In an attempt to produce more, there may be more wastage of materials, more wear and tear of machines and tools. This may ultimately result in increased cost of production.

- (v) To earn more the workers may work faster for a longer period which may result in excessive anxiety, fatigue, ill-health on the part of the workers. It may also account for more accidents in the production process.
- (vi) To prevent these adverse effects on production and workers, a rigid system of supervision is needed.
- (vii) This system is usually not appreciated by trade unions and workers.

Suitability of piece-rate system.

- (i) The piece-rate system is suitable where a fair piece-rate can be suitably fixed.
- (ii) The work can be precisely measured, standardised and of repetitive nature.
- (iii) When the quantity of work is given more emphasis than the quality.
- (iv) Where worker's punctuality is assured and the flow of production is uninterrupted.
- (v) Where the management is confident in remunerating and maintaining the piece-rate.

7.7 DISTINCTION BETWEEN TIME WAGE SYSTEM AND PIECE RATE SYSTEM

The two systems of wage payment can be distinguished on the basis of the following points.

(i) Basis of wage calculation

Under time wages system a worker is paid wages on the basis of time worked. He is paid at fixed rate per hour or per day or per week or per month.

Under piece rate system a worker is paid wages on the basis of units produced. He is paid at fixed rate per unit produced.

(ii) Suitability of jobs

The time wage system is suitable where the job is non-standardised and non-repetitive in nature. The piece rate system is suitable to jobs of repetitive nature.

(iii) Maintenance of quality

Under time wage system the quality of work is well maintained whereas under piece rate system the quality of work may be low.

(iv) Wastage and maintenance cost

There may be less wastage of materials and less damage to machinery and equipment under time wage system where as under piece-rate system there will more wastage of materials and more damage to machinery. Consequently cost of maintenance is less in time wage system and it is high in piece rate system.

(v) Security

Under time wage system a worker is assured of his wages which gives him a sense of security of earnings. In piece rate system the worker is not assured of wages of the time he has worked. He feels insecure as regards his earnings.

(vi) Supervision

Under time wage system there is no relation between wages and performance. Hence to maintain the quality of production a high degree of supervision is necessary. Under piece rate system the wages are linked with the performance, so less supervision is required.

(vii) Motivation

Under time wage system efficient and inefficient workers are paid the same wages. There is no motivation for the workers to produce more and earn more. But there is a direct link between performance and wages in piece rate system and hence the workers are motivated to produce more and earn more.

(viii) Preference of trade unions

Trade unions prefer time wage system as it assures wages for time worked. They oppose piece rate system as it does not provide a sense of economic security to the workers.

After examining the features of the two systems, their advantages and disadvantages, their suitability of application and their points of distinctions; let us now work out some practical problems.

7.8 APPLICATIONS :

Example 1. Calculate the wages of a worker who has worked in a production department as per the following schedule.

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Hours worked	8	7	8	7	9	4

Wage rate per hour = ₹ 4

Solution :

The total hours worked by the worker

$$= (8 + 7 + 8 + 7 + 9 + 4) \text{ hours}$$

$$= 43 \text{ hours}$$

The time wage rate = ₹ 4 per hour

∴ Total wages = Hours worked × Wage rate per hour

$$= 43 \times 4$$

$$= ₹ 172$$

Example 2 : In a week a particular worker produces 72 units of a product. Calculate his total wages if he is paid ₹ 2.50 per unit of the product.

Solution :

Number units or pieces produced by the worker during the week = 72 units

Piece rate = ₹ 2.50 per unit

∴ Total wages = Number of units produced × Piece rate per unit

$$= 72 \times 2.50$$

$$= ₹ 180$$

Example 3. During a week a worker gets ₹ 480, working 80 hours under time wage system. Find the time rate of wage payment.

Solution :

$$\begin{aligned}
 & \text{Total wages under time wage system} \\
 & = \text{Actual time worked} \times \text{Time rate} \\
 \Rightarrow & ₹ 480 = 80 \text{ hours} \times \text{Time rate} \\
 \therefore & \text{Time rate} = \frac{480}{80} \\
 & = ₹ 6 \text{ per hour}
 \end{aligned}$$

Example 4. A worker gets ₹ 2,100 under piece rate system. Find the wage rate per 100 units if he produces 4,200 units of the product.

Solution :

$$\begin{aligned}
 & \text{Total wages under piece rate system} \\
 & = \text{Number of units produced} \times \text{piece rate per unit} \\
 \Rightarrow & ₹ 2,100 = 4200 \text{ units} \times \text{piece rate per unit} \\
 \Rightarrow & ₹ 2,100 = 42 \text{ units} \times \text{piece rate per 100 units} \\
 \therefore & \text{Piece rate per 100 units} = \frac{2100}{42} \\
 & = ₹ 50 \text{ per 100 units.}
 \end{aligned}$$

Example 5. Among two workers A and B, A works under time wage system and B works under piece rate system. During a week, A works for 72 hours and B produces 144 units. The time rate and the piece rate are ₹ 8 per hour and ₹ 4 per piece.

Compare their weekly wages.

Solution :

$$\begin{aligned}
 & \text{A's total weekly wages under time rate system} \\
 & = \text{Actual hours worked during the week} \times \text{Time rate} \\
 & = 72 \text{ hours} \times 8 \text{ rupees} \\
 & = ₹ 576 \dots \dots \dots \text{(i)}
 \end{aligned}$$

B's total weekly wages under piece rate system

$$\begin{aligned}
 &= \text{No of units produced} \times \text{piece rate} \\
 &= 144 \text{ units} \times ₹ 4 \text{ per unit} \\
 &= ₹ 576.(ii)
 \end{aligned}$$

Both A and B get the same amount of wages during the week.

7.9 QUESTIONS

1 Choose and write the correct answer among the given alternatives in each bit :

(a) Under piece rate system, a worker is paid wages :

- (i) at a fixed rate per unit
- (ii) at rate per hour
- (iii) on actual hours worked
- (iv) at both time rate and piece rate.

(b) Under time wage system, a worker is paid wages :

- (i) on the basis of actual time worked
- (ii) on the basis of actual units produced
- (iii) on the basis of time allowed
- (iv) at a fixed amount.

(c) The amount of wages a worker will get who produces 25 units and gets ₹ 4 per piece.

- (i) ₹ 6.25
- (ii) ₹ 100
- (iii) ₹ 200
- (iv) ₹ 150

(d) The amount of wages a worker will get who produces 200 units and get ₹ 5 per 10 pieces :

- (i) ₹ 40
- (ii) ₹ 1,000
- (iii) ₹ 2,000
- (iv) ₹ 100

(e) The amount of wages a worker will get who works 8 hours per day for a week of 5 days and get ₹ 8 per hour :

- (i) ₹ 64
- (ii) ₹ 40
- (iii) ₹ 320
- (iv) ₹ 400

2. Express each of the following in one word/term :

- (i) The labour which is conveniently identified with the job.
- (ii) The labour which can not be conveniently identified with the job.
- (iii) A wage rate at which a worker is paid wages on the basis of time worked.
- (iv) A wage rate at which a worker is paid wages on the basis of units produced.
- (v) The wage payment system suitable for non-repetitive job.

3. Answer the following question in one sentence each:

- (i) Give one example of direct labour.
- (ii) Give one example of indirect labour.
- (iii) What is time wage system ?
- (iv) What is piece rate system ?
- (v) Name the two important systems of wage payment.

4. Rectify the underlined portions of the following sentences :

- (i) Material is the second important component of production.
- (ii) Wages paid to weaver for weaving clothes are indirect labour cost.
- (iii) Under time wage system, a worker is paid wages on the basis of production.
- (iv) Time wage system is suitable for jobs which are standardised and of repetitive nature.
- (v) ₹ 42 will received by a worker who works for 6 days of 8 hours each and paid at ₹ 7 per hour.

5. Fill in the blanks :

- (i) Piece rate = _____ produced × Rate per unit.
- (ii) Piece rate is also known as payment by_____.
- (iii) Wages or salaries paid to storekeeper, clerical staff constitute _____ labour cost.
- (iv) _____ labour cost is a part of prime cost.
- (v) _____ labour cost is a part of production overhead.

6. Answer each of the following questions within 30 words :

- (i) What is direct labour ?
- (ii) What is indirect labour ?
- (iii) Write any two advantages of time wage system.
- (iv) Write any two disadvantages of time wage system.
- (v) Write any two advantages of piece rate system.
- (vi) Write any two disadvantages of piece rate system.
- (vii) Name the two systems of wage payment.
- (viii) State any two situations where time wage system is suitable.
- (ix) State any two situations where piece rate system is suitable.

- (x) Point out any two distinctions between time wage system and piece rate system of wage payment.

7. Answer each of the following questions within 50 words :

- (i) Distinguish between time wage system and piece rate system of payment of wages.
- (ii) Explain the advantages of time wage system.
- (iii) Explain the advantages of piece rate system.
- (iv) Explain the disadvantages of time wage system.
- (v) Explain the disadvantages of piece rate system.
- (vi) Explain the suitability of time wage system.
- (vii) Explain the suitability of piece rate system.
- (viii) State any four characteristics of an ideal wage payment system.
- (ix) Write the formula for determining the wages under time any system and piece rate system.
- (x) Calculate the wages of a worker under time wage system from the following :

Actual time worked = 48 hours

Rate per hour = ₹ 8

LONG QUESTIONS

8. Write the characteristics of an ideal wage payment system.
9. Explain time wages system with example.
10. Explain piece rate system with example.
11. Point out the advantages and disadvantages of time wage system of wage payment.
12. Point out the advantages and disadvantages of piece rate system of wage payment.
13. Discuss the suitability of time wage system.
14. Discuss the suitability of piece rate system.

15. Compare the time wage system with piece rate system.
16. A worker is paid wage at ₹ 8 per hour. Calculate his wages for a day in which he works for 9 hours.
17. A worker produces 400 units in a particular week. If the piece rate is ₹ 4 per unit, find the wages he will get for the week.
18. The workers of an industry worked for the following hours during a week. Calculate their wages.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Hours A	8	8	7	9	7	4
Worked B	8	7	8	9	8	4
by workers C	8	7	7	8	8	4
D	8	7	8	8	7	4

19. During a week a worker gets ₹ 960, working 80 hours under time wage system. Find the time rate of his wage payment.
20. During a week a worker gets ₹ 480 at ₹ 6 per hour. How many hours has the worker worked during the week ?
21. A worker gets ₹ 4,200 at ₹ 50 per 100 units. How many unit does he produce ?
22. A worker is given an option to choose time wage system or piece rate system for his remuneration. From the following particulars determine the most preferable method for the worker :

Rate per hour = ₹ 6 per hour

Piece rate = ₹ 5 per unit

Actual hours worked = 38 hours

Actual units produced = 46 units
23. Explain the accounting treatment of direct and indirect labour cost.



ANSWERS

1. (a) i (b) i (c) ii (d) iv (e) iii
2. (i) Direct labour (ii) Indirect labour
(iii) Time rate (iv) Piece rate
(v) Time wage system
4. (i) Labour (ii) Direct
(iii) Production (iv) Piece rate
(v) ₹ 336
5. (i) Units (ii) Result
(iii) Indirect (iv) Direct
(v) Indirect



CHAPTER - 8

LABOUR ACCOUNTING

STRUCTURE

- 8.1 Introduction
- 8.2 Labour cost and its control
- 8.3 Time-keeping
- 8.4 Time-booking
- 8.5 Distinction between time-keeping and time-booking
- 8.6 Idle time and overtime
- 8.7 Casual workers and outworkers
- 8.8 Labour turnover - meaning, causes, effects and remedial measures
- 8.9 Questions

8.1 INTRODUCTION

The total labour cost is broadly classified into two categories : (i) direct labour cost and (ii) indirect labour cost. Both of them have a great impact on the quality and quantity of production. Labour cost is a major element of cost and depends on a human element. So, the accounting and control of labour cost should be given much importance. If there is no proper accounting and effective control of labour cost, it may lead to inefficiency of labour, wastage of materials, unnecessary overtime work, unusual idle time etc, consequently high labour cost may increase the cost of production and may cause loss of profit to the organisation. So, it is quite essential to analyse the various items of labour costs and carefully study their behaviour and control.

8.2 LABOUR COST AND ITS CONTROL

Labour costs are the benefits available to the workers either in monetary form or other fringe benefits.

(a) Monetary benefits.

These include (i) basic wages or salary (ii) dearness allowance (iii) employer's contribution to provident fund (iv) employer's contribution to Employees' State Insurance (ESI) scheme (v) production bonus (vi) profit bonus (vii) old age pension (viii) retirement gratuity (ix) holiday and vacation pay.

(b) Fringe benefits.

These include (i) subsidised food (ii) subsidised housing (iii) subsidised or free transport (iv) subsidised or free clothing (v) supply of water, fuel, electricity at a concessional rate (vi) medical facilities (vii) recreational facilities etc.

In order to control these constituents of labour cost, the management regulates related functional activities through several departments. Through these departments the management utilises the labour economically which accounts for minimisation of production cost. The following six departments, with their co-ordinated efforts, accumulate and analyse the labour costs and ultimately control the labour cost. They are :

1. Personnel department
2. Engineering department
3. Rate or Time and motion study department
4. Time-keeping department
5. Pay-roll department
6. Cost accounting department

Functions of the above departments

Departments	Functions
1. Personnel department	Recruitment, training, promotion and placement of employees.
2. Engineering department	Preparation of plans and specification of each job, supervision of production activities, maintenance of safety and efficient working conditions.
3. Rate or Time and motion study department	Making time and motion studies, job analysis, job evaluation, setting wage rates.
4. Time-keeping department	Recording of arrival and departure time of workers, recording of time spent by workers on jobs.
5. Pay-roll department	To prepare pay-roll or wage sheet for each department. To maintain pay-roll record of each employee and distribute wages and salaries.
6. Cost accounting department	Classification, collection of labour cost, allocation, apportionment and absorption of indirect labour cost, analysis of labour cost reports.

8.3 TIME-KEEPING

Recording the arrival and departure time of each worker is time-keeping. The attendance of workers is maintained under time-keeping for various purposes. The important purposes are :

- (i) To prepare pay rolls of workers.
- (ii) To meet the statutory requirements by recording the daily attendance of workers.

- (iii) To ensure discipline and punctuality among workers.
- (iv) To ascertain overtime, idle time, late attendance.
- (v) To compute labour cost, overhead rate based on labour hours.

Methods of time-keeping

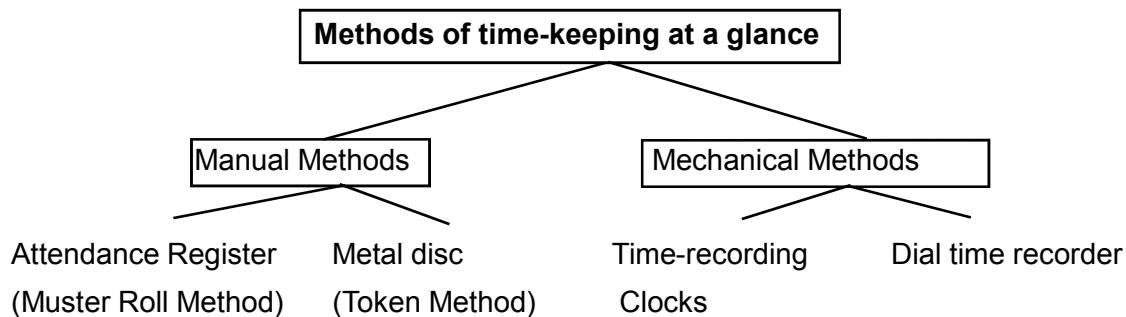
Broadly there are two methods of time-keeping, namely, manual methods and mechanical methods. The usual methods of time-keeping under the broad head are as below :

(i) Manual Methods

- (a) Attendance Register / Muster Roll Method and
- (b) Metal disc/Token Method

(ii) Mechanical Methods

- (a) Time-recording clocks and
- (b) Dial Time Recorder



(i) MANUAL METHODS

(a) Attendance Register / Muster Roll Method

It is very popular and the oldest method of taking attendance of workers. Under this method an attendance register or muster roll is kept either at the office of the factory gate or in each department to record the time of arrival or departure of each worker. The record is made either by the time-keeper or the worker himself. The attendance register contains name, identity number, department of the worker and the time of arrival and departure of the worker.

This method is very simple and inexpensive. It is suitable for small organisation where number of workers is not large. It is widely used in government departments. There may be collusion between workers and the time-keeper and may lead to dishonest practices. It is also not suitable for large factories.

(b) Metal disc/Token method

This manual method of time-keeping is also very simple and inexpensive. Under this method each worker is assigned with an identification number and tokens or metal discs bearing such identification numbers of workers are hung on a board at the factory gate. As soon as the worker arrives, he removes his token from the board and puts in a box kept at the factory gate. This records the worker's arrival in time. After the scheduled reporting time the box is removed and is replaced by another box to record the late comers. The late-comers collect their tokens and personally hand over to the time-keeper. The tokens which are not removed from the board records the absentee workers.

Though this method is simple and economical, yet there are several drawbacks of the method. This method needs strict supervision to ensure that no worker removes and puts the token of fellow workers who come late or are absent. As there is no provision for recording exact time of arrival, it may cause problem in time keeping. The time keeper may deliberately commit error and cause disputes among the workers.

(ii) MECHANICAL METHODS

(a) Time recording clocks

This is a mechanical method of recording attendance. Under this method each worker is given a time card/clock card bearing his identification number. These time or clock cards are serially arranged in a tray and kept at the gate office. When a worker arrives at the factory gate he picks up his time or clock card from the tray and punches in the time recording clock that records his exact time of arrival. The same process is repeated when the worker leaves the factory.

This mechanical device records the exact time of arrival and departure and prints in red to record late arrival, early leaving and overtime. This method provides quick and accurate time of arrivals and departures. It requires high capital investment and close supervision to prevent fraudulent entries. A specimen of time card is given below :

ABC Ltd

Time Card

Name of the worker.....		Department				
Worker's token no		Week ending.....				
Day	Normal		Over-time		Total time	
	in	out	in	out	Normal time	Over-time
Monday AM. P.M						
Tuesday AM. P.M						
Wednesday AM. P.M						
Thursday AM. P.M						
Friday AM. P.M						
Saturday AM. P.M						
Calculation or wages	Normal hours worked	Over time Rate	Amount Deductions	Net amount payable		
Time Keeper.....			Pay Roll Clerk.....			
Foreman.....			Worker.....			

(b) Dial Time Recorders

This is also a mechanical device to record the attendance time of workers. It consists of about 160 holes around a dial. A worker, with the help of a radial arm in the centre of the dial, dials his identification number and his attendance time is automatically recorded in the roll inside the recorder. The roll paper inside the dial time recorder provides an account of the worker's timing and may be used for pay roll purposes.

This mechanical device also records correct attendance time and prevents disputes of recorded time. The system is economical and is also used in further future applications

like preparation of payroll, calculation of idle time, overtime etc. The system requires an initial capital outlay and very less future expenditures.

8.4 TIME-BOOKING

Recording the time spent by a worker on various jobs, orders and process is time-booking. The time spent on jobs should be carefully recorded so as to ascertain correct labour cost of jobs or processes. The important objectives of time booking are :

- (i) To ensure that the time paid for is effectively utilised.
- (ii) To ascertain the labour cost of each job or process.
- (iii) To prevent wastage of time by a worker inside the factory and to minimise the cost of idle time.
- (iv) To record and compare the actual time with the standard time allowed for the jobs.
- (v) To determine overhead absorption rate based on direct labour hours and machine hours.

Time booking is a very important work which needs documents of prescribed forms to adequately record the work time. The following forms explain the different methods of time-booking. They are :

- (i) Daily Time Sheet,
 - (ii) Weekly Time Sheet,
 - (iii) Job Cards
 - (iv) Combined Time and Job Card
 - (v) Piece Work Card
- (i) Daily Time Sheet

In daily time sheet each worker records the time spent on each job or work order. At the end of the day all these sheets are countersigned by their respective foremen and collected from the workers.

This method is simple and is suitable for small organisations. It may involve huge clerical work to calculate wages for a very large number of daily time sheets. A specimen of daily time sheet is given below :

ABC Ltd

Daily Time Sheet

Name of worker.....			No.....					
Worker's no.....			Date.....					
Department.....								
Job or Work Order No	Work done	Description of work done	Time		Total hours		Cost	
			in	out	ordinary	overtime	Rate ₹	Amount ₹
Total hours.....			Worker.....					
Total cost.....			Foreman.....					

(ii) Weekly Time Sheet

In weekly time sheet a worker is provided with a weekly time sheet to record his time spent on the job for the week. It is an improvement over the daily time sheet since the number documents to be prepared is considerably reduced. It provides the record of attendance inside the factory for all the working days of the week. This method is suitable where the worker is to work on a few jobs.

In this method strict supervision is required, otherwise the worker may manipulate the timing. It will be better if the filling of the sheet is done by departmental clerk or the foreman. A specimen of the weekly time sheet is given below :

ABC Ltd.

Weekly Time Sheet

Worker's Name.....								No.....		
Worker's No.....								Date.....		
Department.....										
Day	Job No1		Job No-2		Job No-3		Total	time	Rate	Amount
	On	Off	On	Off	On	Off	Ordinary	Over-time	₹	₹
Mon										
Tues										
Wednes										
Thurs										
Fri										
Sat										
Total										
Worker										
Cost clerk										Foreman

Figure - 3

(iii) Job Cards

A job card is a card which records the time spent by a worker on the job. Generally two types of job cards are used, namely

- (a) Job card for each job
- (b) Job card for each worker

a) Job card for each job

A job card is prepared for a specific job and it passes from worker to worker along with the job. It is adopted where a job passes through different workers with different

grades for completion. Along with job order number and starting and completion time of the job, the details of works done by each worker are also recorded in this job card. It facilitates computation of labour cost of each job and attendance time of workers. A specimen of job card for each job is given below :

ABC Ltd								
Job card for each job								
Job Order No.....								
Job Description.....						Completed on..... at....		
Day	Worker's No.	Department	Work	Time	Total	Wage	Amount	
		Name	done	On Off	Time	Rate ₹	₹	
Mon								
Tues								
Wednes								
Thurs								
Fri								
Sat								
Checked and verified				Total time		Total amount for the job		
Dept. Foreman.....								

Figure - 4

b) Job card for each worker

This job card makes a complete record of time spent by each worker on different jobs during a particular period. It facilitates reconciliation between time shown by time card and the time booked against jobs. A labour cost of different jobs is prepared for all job cards or workers. A specimen of job card for each worker is as under :

ABC Ltd**Job card for each worker**

Name of worker.....			No.....				
Worker's No.....			Week ending.....				
Department.....							
Day	Job no.	Description	Time		Hours	Wage	Amount
			On	Off			
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							
Sunday							
Cheeked and Verified.....			Total Hours.....				
Worker.....			Normal.....				
Foreman.....			Overtime.....				

Figure - 5**(iv) Combined Time and Job Card**

In combined time and job card recording time at the gate of the factory and time on job are made in one such card. It is suitable for small organisations where there is no necessity of recording attendance time and job time separately. This combined time and job card serves the purpose of time keeping and time booking. A specimen of combined time and job card is given as under :

ABC Ltd.

Combined Time and Job Card

Name of worker.....		No.....	
Worker's No.....		Week ending.....	
Department.....			
Day	Job No.	Time	Time
		On	Off
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			
Worker.....		Total.....	
Entered in wage sheets by		Foreman.....	

Figure - 6

(v) Piece-work Card

The piece work card records the units manufactured by a worker and the relevant time spent by him. It is suitable for organisations where workers are paid their wages on piece-rate system. The recording of time spent along with units produced helps to calculate bonus based on time saved and to apportion overhead expenses on the basis of labour hours. A specimen of piece-work card is given below :

ABC Ltd.

Piece-Work Card

Day	Job	Job	units	Time	Wage	Amount
	No.	Particular	Produced Reported	Accepted taken	Rate ₹	₹
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						
Worker.....			Total wages.....			
Entered in wage sheet by.....			Foreman.....			

Figure - 7

8.5.1 Distinction between time keeping and time booking

The distinction between time-keeping and time booking can be enumerated as below :

Basis of distinction

Time - keeping -

1. Meaning:- It is the recording of the arrival and departure time of each worker. It records entry and exist time of a worker.

2. Objectives:- It provides attendance time for pay roll preparation and for fulfillment of statutory requirements.

3. Methods :-

(I) Manual Methods

- a) Attendance Register/Muster Roll
- b) Metal disc/token method

(II) Mechanical Methods

- a) Time recording clock
- b) Dial time recorder

Time- Booking :- It is the recording of time spent on various jobs or processes by each worker. It records the job time of a worker.

It enables to ascertain the labour cost of a job or process.

- (i) Daily time sheet.
- (ii) Weekly time sheet.
- (iii) Job Cards
- (iv) Combined time and job card
- (v) Piece-work card

8.5.2 Reconciliation of Gate time with job time

It is necessary to reconcile the time recorded at the gate of factory with that of time recorded on jobs. The reasons for disagreement of the two times may be time lost due to machine breakdown, power failure, non-availability of raw materials and instructions etc. The excess of time recorded over time booked usually represents idle time. Sometimes it is compared with idle card for determination of idle time cost.

8.6.1 IDLE TIME

Idle time is that time for which the worker is paid but the employer obtains no production benefit. It is quite essential for the management to identify the reasons for such idle time otherwise the management loses control over the labour cost. Before analysing the reasons for idle time, let us see an idle time card.

ABC Ltd.**Idle Time Card**

Worker's Name.....		Department.....						
Worker's No.....		Period						
Reasons for idle time	Job	Time		Time		cost		Remarks
		No	From	To	Lost	Rate ₹	Amount ₹	
1. Waiting for materials								
2. Waiting for tools								
3. Waiting for instructions								
4. Machine breakdown								
5. Power failure								
6. Inspection								
7. Strikes and lockouts								
8. Flood, fire etc.								
9. Any other reasons								
Worker.....		Foreman.....						

Figure - 8**8.6.1.1 Causes of idle time**

The causes of idle time may be normal or abnormal. The time lost due to normal causes is known as normal idle time. Similarly, the time lost due to abnormal causes is known as abnormal idle time. Some of the important normal and abnormal causes of idle time are as below :

(a) Normal Causes - The following times are treated as due to normal causes :

- (i) Time taken to reach from factory gate to place of work.
- (ii) Time taken to pick up the work.

- (iii) Time gap between two jobs.
 - (iv) Setting time of machines and machine maintenance time.
 - (v) Time taken for personal needs and tea breaks.
- (b) **Abnormal Causes** - The following times are treated as due to abnormal causes :
- (i) Time lost due to machine breakdown.
 - (ii) Time lost due to power failure.
 - (iii) Time lost due to waiting for instructions.
 - (iv) Time lost due to waiting for raw materials and tools.
 - (v) Time lost due to strikes and lock outs.

8.6.1.2 Treatment of Idle Time Cost

The labour cost of idle time is treated differently for different types of idle time. The treatment of idle time cost for normal idle time and abnormal idle time are shown separately below :

(A) Treatment of Normal Idle Time Cost

In cost accounting normal idle time cost is treated in two ways.

(i) Normal idle time cost of direct workers is treated as direct wages and is charged to cost of production. For example, a worker is paid ₹ 9 per hour for 8 hours in a day. His job card shows he has spent 7 hours on job and 1 hour is lost due to routine work. Under this method the whole amount of ₹ 72 (8×9) is treated as direct wages i.e. the cost of idle time ₹ 9 (1×9) is also treated as direct wages.

But the cost of normal idle time of indirect workers is treated as factory overhead and is distributed through absorption of factory overhead.

(ii) The other of treatment of normal idle time cost is considering the whole amount of cost of normal idle time as factory expenses. The entire amount is included in factory overhead and is recovered as indirect wages.

(B) Treatment of Abnormal Idle Time Cost

Abnormal idle time cost is directly transferred to Costing Profit and Loss Account without affecting the cost of production. As abnormal idle time cost is an abnormal expense it is not included in the cost of a unit or activity and hence it is not allowed to form a part of cost of production.

The controllable abnormal idle time should be taken care of by the management. Steps should be taken to reduce it to normal idle time. On the whole idle time should be reduced to minimum.

At times idle time is confused with idle capacity. Idle capacity is the unused capacity of a plant, equipment or department. It is the unused production potentiality where as idle time is the time for which a worker does not work but is paid.

8.6.2 OVERTIME

Overtime is the time spent by a worker on the job over and above the normal working hours. A worker is supposed to work for a given time per day or per week. The time worked by a worker over and above this given time per day or per week is termed as overtime. According to the Factories Act, 1949, a worker is entitled to overtime when he works for more than 9 hours a day or 48 hours a week. The Act also provides for payment of overtime wages at double the usual rate of wages.

$$\text{Overtime Wages} = (\text{Overtime hours} \times \text{Normal rate of wages}) + (\text{Overtime hours} \times \text{Extra rate of wages})$$

The wages paid at normal rate as well as at extra rate for the overtime are together treated as overtime wages.

8.6.2.1 Effects of overtime payment

The payment for overtime may have an adverse effect on production due to the following reasons :

- (i) The extra payment over normal wages at a higher rate increases cost of production.
- (ii) The workers may work at a reduced efficiency as they are already exhausted in normal working hours.

- (iii) Workers may work at a reduced efficiency in normal working hours to work overtime and earn more.
- (iv) Regular overtime work may have an adverse effect on the health of the workers.

8.6.2.2 Situations which cause overtime work.

- (i) When it is required to increase the output as a general production policy.
- (ii) When it is desired at customer's request to complete the work within a specified time.
- (iii) When it is required to make-up the short-fall in production due to abnormal condition like flood, earthquake etc.
- (iv) When it is required to increase the output to meet the increased market demand.
- (v) When it is required to meet seasonal demand.

8.6.2.3 Treatment of overtime wages

The overtime wages are treated as direct wages or indirect wages depending on the wages paid to direct labour or indirect labour.

- (a) The overtime labour cost from direct labour is treated as a part of cost of the job and is charged directly to the job or work.
- (b) The overtime labour cost from indirect labour is treated as production overhead and is distributed through absorption of factory overhead.
- (c) However, overtime wages/premium, arising due to abnormal reasons such as machine breakdown, power failure etc, are excluded from cost of production and is charged to the Costing Profit and Loss Account.

After acquiring knowledge on the meaning and treatment of idle time cost and overtime cost, let us apply it to the practical problems.

Example 1. Calculate the normal and abnormal idle time of a 6 days week of a worker from the following unformation :

- (i) Hours as per time card 48 hours
- (ii) Hours booked as per job card 40 hours

- (iii) Daily allowance for personal needs and maintenance of machine 40 minutes.
- (iv) Time unaccounted for is caused by power failure.

Solution :

Hours as per time card	48 hours
Less Normal idle time being daily allowance of 40 minutes.	4 hours
($40 \times 6 \times 1/60$)	44 hours
Less Hours booked as per job card	40 hours
Abnormal idle time due to power failure	4 hours

Example 2.

Calculate the normal and overtime wages of a worker during the following week :

Days	Hours Worked
Monday	11 hours
Tuesday	9 hours
Wednesday	10 hours
Thursday	10 hours
Friday	8 hours
Saturday	4 hours
Total	52 hours

Normal working hours per day = 8 (Saturday 4 hours)

Normal wage rate per hour = ₹ 4

Overtime wage rate :– (i) Upto 9 hours at single rate

(ii) Over 9 hours in a day at double rate.

(iii) On Saturday upto 5 hours at single rate and over
5 hours at double rate.

Solution :

Calculation of Normal and Overtime wages of the worker

Day	Actual hours worked	Normal hours	Normal wages at ₹ 4 per hour	Hours at Single rate	Hours at double rate	Overtime wages
Monday	11	8	32	1	2	$(1 \times 4 + 2 \times 4 \times 2) = ₹ 20$
Tuesday	9	8	32	1	—	$1 \times 4 = ₹ 4$
Wednesday	10	8	32	1	1	$(1 \times 4) + (1 \times 4 \times 2) = ₹ 12$
Thursday	10	8	32	1	1	$(1 \times 4) + (1 \times 4 \times 2) = ₹ 12$
Friday	8	8	32	—	—	—
Saturday	4	4	16	—	—	—
	52	44	₹ 176			₹ 48
\therefore Normal Wages = ₹ 176 Overtime wages = ₹ 48						

8.7.1 CASUAL WORKERS

Casual workers are those who are engaged casually and are not a part of regular labour force. They are engaged when there is extra load of work in the factory or when some of the regular workers are absent. They are employed for a temporary period, like for a few days or hours.

Payment to casual workers are usually made on daily basis. If their work is identified with specific jobs, the wages paid to them is treated as direct wages and is charged to the cost of the job. If the wages paid to these casual workers of indirect labour, then the same is treated as production overhead.

A competent authority should be entrusted with the work of employment of casual workers. Payment to casual workers should also be done by a person other than foreman.

Job cards and time cards should be issued to them so that future reference can be conveniently made though they do not appear in the pay roll of the factory.

8.7.2 OUT WORKERS

Outworkers are those workers who work outside the factory premises. They take materials from the factory and prepare finished goods at their own premises with their own tools.

Two types of outworkers are usually employed :

- (a) Workers who are on the pay roll of the factory.
- (b) Workers who are not on the pay roll of the factory.

(a) Workers who are on the pay roll of the factory are sent to customer's premises to do jobs as per their specifications. Job cards are issued to them to record their works. Such outworkers do repair work, plumber's work, sanitary work servicing work, electric work etc.

(b) Workers who are not on the pay roll of the factory do their jobs at their own premises with their own tools. Materials are supplied to them and they perform the jobs at their own premises and deliver the finished products to the manufacturing units. Such outworkers are usually paid on piece rate system. In such cases proper supervision as to quality and quantity of products, time schedule of completion etc. should be strictly made.

8.8.1 LABOUR TURNOVER

Labour turnover may be defined as the rate of change in the composition of labour force of an organisation. It is the percentage change in the labour force in relation to the average number of workers employed during a period. It indicates how frequently the workers are either leaving the organisation or entering the organisation or both. A high labour turnover rate indicates that the labour force in the organisation is not stable. It is not desirable because high labour turnover may result in high labour cost.

8.8.2 Causes of labour turnover

The causes of labour turnover may be very large and can be categorised under two broad heads, namely,

(a) Avoidable causes.

(b) Unavoidable causes.

(a) **Avoidable Causes** – The avoidable causes of labour turnover include:

- (i) Low wages and allowance in the present organisation.
- (ii) Dissatisfaction with the job, working hours, working conditions.
- (iii) Unsatisfactory and unfair placement and promotion of the workers in the organisation.
- (iv) Unsatisfactory relation with fellow workers or supervisors.
- (v) Inadequate accommodation, medical facilities, recreational facilities.
- (vi) Lack of training facilities.
- (vii) Lack of job security.

These causes of labour turnover are avoidable in the sense that management can control these factors to a great extent and can reduce the labour turnover rate.

(b) **Unavoidable Causes** – The unavoidable causes of labour turnover are:

- (i) Better job opportunities elsewhere.
- (ii) Retirement and death.
- (iii) Domestic family responsibilities- to look after old parents, to look for children's better education etc.
- (iv) Permanently incapable to work due to accident or illness.
- (v) Dismissal or discharge due to inefficiency, negligence, long absence or insubordination.
- (vi) Marriage, specially women workers leave jobs, to undertake their household duties.

These causes of labour turnover are not within the control of management and hence unavoidable.

8.8.3 Measurement of Labour Turnover.

The definition of labour turnover indicates that it is the rate or ratio of change in the composition of labour force to the average number of workers employed. Depending on this concept the labour turnover can be measured by the following three methods :

(1) Separation Method – Under this method the labour turnover is measured by dividing the total number of separations during a period by the average total number of workers in the pay roll. Separation means workers who have left the organisation during the period.

$$\text{Labour turnover} = \frac{\text{Number of separations in a period}}{\text{Average total number of workers in a period}}$$

(2) Flux or Separation-cum-Replacement method – Under this method labour turnover is measured by dividing the total number of separations and replacements by the average total number of workers during a period.

$$\text{Labour turnover} = \frac{\text{Number of separations} + \text{Number of replacements}}{\text{Average total number of workers in a period}}$$

(3) Replacement Method

Under this method labour turnover is measured by dividing the number of replacements by average total number of workers in a period. Replacement means number of workers recruited in place of those who had left.

$$\text{Labour turnover} = \frac{\text{Number of workers replaced during the period}}{\text{Average total number of workers in a period}}$$

In all the above-mentioned labour turnover rates,

the average total number of workers =

$$\frac{\text{No of workers at the beginnings of the period} + \text{No of workers at the end at that period}}{2}$$

The cost of labour turnover consists prevention costs and replacement costs. It is usually treated as factory overhead.

Example 4 : From the following data find out the labour turnover rate by applying :

a) Separation method

b) Flux method

c) Replacement method

Number of employees at the beginning of April, 2017	250
Number of employees at the end of April, 2017	400
Number of employees discharged during April, 2017	10
Number of employees resigned during April, 2017	20
Number of employees replaced during April, 2017	25

Solution :

a) Labour turnover rate according Separation method

$$\begin{aligned}
 &= \frac{\text{Number of Separations}}{\text{Average no of workers during the month}} \times 100 \\
 &= \frac{10 + 20}{(250 + 400) / 2} \times 100 \\
 &= \frac{30}{325} \times 100 \\
 &= 9.23\%
 \end{aligned}$$

b) Labour turnover rate according to Flux method

$$\begin{aligned}
 &= \frac{\text{No. of separations} + \text{No. of replacement}}{\text{Average no. of workers during the month}} \times 100 \\
 &= \frac{(10 + 20) + (25)}{(250 + 400) / 2} \times 100 \\
 &= \frac{55}{325} \times 100 \\
 &= 16.92\%
 \end{aligned}$$

(c) Labour turnover rate according to replacement method

$$= \frac{\text{No. of replacements}}{\text{Average no. of workers}} \times 100$$

$$= \frac{25}{(250+400) / 2} \times 100$$

$$= \frac{25}{325} \times 100$$

$$= 7.69\%$$

8.8.4 Effects of high labour turnover

High labour turnover has adverse effects on cost of production and profits of an organisation due to the following reasons :

- (i) Loss of production due to frequent changes in labour force.
- (ii) Extra cost of training, selection and retirement.
- (iii) Increased cost of machinery and tools due to faulty handling by new workers.
- (iv) Increased cost of scrap; wastage, spoilage and defective work.
- (v) Increases cost due to industrial accidents and consequent compensation.
- (vi) Lowers the quality of output due inexperience of labour force.
- (vii) Increases cost of supervision needed for new workers.

8.8.5 Remedial measures to reduce high labour turnover

High labour turnover is not desirable, hence the following remedial measures should be taken to minimise the labour turnover.

- (i) Job analysis and evaluation of jobs should be properly made to ascertain the requirements of each job.
- (ii) A standardised fair policy for recruitment, promotion training, performance appraisal must be formulated.
- (iii) A satisfactory level of wages and salaries should prevail.
- (iv) Welfare schemes like canteens, medical, recreational facilities should be introduced.
- (v) Pension, gratuity, provident fund, accident compensation facilities should be provided to the workers.

- (vi) A good grievance procedure should be there to settle worker's grievances.
- (vii) Healthy working conditions must be there in the organisation.
- (viii) Worker's participation in management prevents high labour turnover.
- (ix) Leaving workers should be adequately heard for their reasons of leaving.
- (x) Different incentive plans should be implemented to retain the efficient and experienced labour force.

8.9 QUESTIONS

1. Choose and write the correct answers from the alternatives given under each bit :

- (i) The process of recording the arrival and departure time of each worker is known as :
 - (a) Time booking
 - (b) Time keeping
 - (c) Time study
 - (d) Labour turnover
- (ii) The process of recording the time spent by each worker on the job is known as :
 - (i) Time booking
 - (ii) Time keeping
 - (iii) Time study
 - (iv) Labour turnover
- (iii) The time for which payment is made but no output is obtained is known as :
 - (a) Overtime
 - (b) Idle time
 - (c) Time booked
 - (d) Arrival time

(iv) The extra time worked by a worker over and above the normal working hours is known as :

- (a) Overtime
- (b) Normal idle time
- (c) Abnormal idle time
- (d) Time booked

(v) The workers who are not on the payroll of the factory but are engaged to meet the extra load in the factory, are known as :

- (a) Casual workers
- (b) Out workers
- (c) Regular workers
- (d) Permanent workers

(vi) The workers who work outside the factory premises are known as :

- (a) Casual workers
- (b) Outworkers
- (c) Temporary workers
- (d) Outsourced workers

(vii) The rate of change in the composition of labour force of an organisation is known as :

- (a) Labour unrest
- (b) Labour employment
- (c) Labour replacement
- (d) Labour turnover

(viii) According to the Factories Act, 1949 overtime wages are due if the worker works for more than :

- (a) 8 hours a day
- (b) 9 hours a day
- (c) 10 hours a day
- (d) 6 hours a day

(ix) Time recording clock is a

- (a) Manual method of time keeping.
- (b) Mechanical method of time keeping
- (c) Method of time booking
- (d) Time referring clock

(x) A job card is :

- (a) a daily record of time spent by a worker on the job.
- (b) a record of attendance of a worker.
- (c) A record of arrival and departure of each worker.
- (d) a record of job particulars.

2. Express/ Answer each of the following in one word/term :

- (i) A system of recording the arrival and departure time of each worker.
- (ii) A daily record for each worker in respect of time spent by him on each job.
- (iii) That time for which the worker is paid without giving any production to the employer.
- (iv) The rate of change in the composition of the labour force of an organisation.
- (v) A system of recording the time spent by each worker on various jobs, orders or processes.

3. Answer each of the following questions in one sentence :

- (i) What is meant by direct labour ?
- (ii) What is daily time sheet ?
- (iii) Write the flux method formula for measuring labour turnover.
- (iv) State any one reason for allowing overtime work to the workers.
- (v) What is a job card ?

4. Rectify the underlined portions of each of following sentences :

- (i) Attendance register is a mechanical method of time keeping.
- (ii) Time card is a record for each job in respect of time spent by workers on that job.
- (iii) Job card is a periodic statement which shows gross wage, deductions and net wages.
- (iv) The difference between the time as per time card and the time as per job card is known as overtime.
- (v) Casual workers are those who work outside the factory premises.

5. Fill in the blanks :

- (i) Disc method is a manual method of time _____ .
- (ii) Overtime premium paid under _____ conditions are charged to Costing Profit and Loss Account.
- (iii) Shortage of raw materials is an _____ cause of labour turnover.
- (iv) Dial time record is a mechanical method of _____ .
- (v) The casual workers are usually paid on _____ basis.

6. Answer each of the following questions within 30 words :

- (i) What is time keeping ?
- (ii) What is time booking ?

194 Cost Accounting =

- (iii) Name two manual methods of time keeping.
- (iv) Name two mechanical methods of time keeping.
- (v) What is labour turnover ?
- (vi) Who are outworkers ?
- (vii) Who are casual workers ?
- (ix) What is a job card ?
- (x) How do you treat the cost of normal idle time ?

7. Answer each of the following questions within 50 words :

- (i) What is time recording clock ?
- (ii) Write three methods of time booking .
- (iii) Distinguish between time keeping and time booking.
- (iv) Explain the working of outworkers who are not on the payroll of the factory.
- (v) Give a format of a job card.
- (vi) How do you exercise control over casual workers ?
- (vii) Write the avoidable causes of labour turnover.
- (viii) Write the effects of labour turnover.
- (ix) Explain any one method of measuring labour turnover.
- (x) Write three remedial measures to minimise labour turnover.

LONG QUESTIONS

- 8. Distinguish between :
 - (a) Time keeping and Time booking.
 - (b) Casual workers and Outworkers.
- 9. What do you understand by idle time ? How is it treated in cost accounts ?
- 10. Explain the various methods of time keeping.

11. Give formats for the following :
- Job Card
 - Time and job card.
12. What is meant by overtime ? How is it treated in cost account ?
13. What is labour turnover ? Describe the various causes of labour turnover.
14. What are the effect of labour turnover ? How can it be reduced ?
15. Calculate the labour turnvoer rate from the following information applying.

- Separation method
- Flux method
- Replancement method

(i) Number of workers at the beginning of the month = 200

(ii) Number of workers at the end of the month = 260

During the month 48 workers were newly recruited, 10 discharged and 6 workers left. Out of new recruitment 20 workers are recruited against vacancies of leaving workers and the rest were engaged for an expansion scheme.

$$[\text{Hints : a)} \frac{6 + 10}{(200 + 260) / 2} \times 100 \quad \text{b)} \frac{48 + 6 + 10}{(200 + 260) / 2} \times 100]$$

$$\text{c)} \frac{10}{(200 + 260) / 2} \times 100]$$

16. Calculate the normal and abnormal idle time of a worker from the following information :

- | | |
|---|------------|
| (i) Hours as per time card | 48 hours |
| (ii) Hours booked as per job card | 42 hours |
| (iii) Daiy allowance for personal
needs and maintenance of machine | 40 minutes |
| (iv) Time unaccounted for is caused by power failure. | |

17. Calculate the normal and overtime wages of a worker during the following week :

Days	Hours worked
Monday	10
Tuesday	10
Wednesday	8
Thursday	9
Friday	11
Saturday	8
Total	56 hours

Normal working hours in a day = 8

Normal rate per hour = ₹ 4

Overtime wage rate :- Upto 9 hours at single rate and over 9 hours in a day at double rate.

ANSWERS

- 1.(a) (i) b (ii) a (iii) b (iv) a (v) a (vi) b
(vii) d (viii) b (ix) a
2. (i) Time keeping
(ii) Daily time sheet
(iii) Idle time
(iv) Labour turnover
(v) Time booking
4. (i) Manual
(ii) Job
(iii) Pay roll

- (iv) Idle time
 - (v) Out
5. (i) Keeping
- (ii) Abnormal
 - (iii) Unavoidable
 - (iv) Time keeping

□□□

CHAPTER - 9

INCENTIVE PLANS

STRUCTURE

- 9.1 Meaning of incentive
- 9.2 Factors to be considered for introduction of a good incentive plan
- 9.3 Essentials of a good incentive system.
- 9.4 Types of incentive plans
- 9.5 Objectives of incentive plans.
- 9.6 Halsey Premium plan
- 9.7 Rowan Premium plan
- 9.8 Comparison of Halsey & Rowan plans
- 9.9 Application of Halsey & Rowan plans.
- 9.10 Questions

9.1 MEANING OF INCENTIVE

Traditionally wage plans are based on output of the employees. Today the objective of payment for output has changed. Wage plans relate earnings to productivity and use premiums, bonuses etc, to compensate superior performance of the employees. The wage plans offer an attraction for extra payment for efficiency or more production. It provides monetary or non-monetary incentives to workers through different plans. Incentive means a thing that motivates or encourages someone to do something extra. The motivation to the workers to stimulate their extra efforts is known as incentive. This may be provided individually or collectively to workers in the form of different incentive plans.

The objective of incentive plan is to provide inducement or supplemental reward that serves as a motivational device for a desired action. It aims at increasing the production

by giving an inducement to the workers in the form of higher wages. The incentive plan benefits both employees and employer. In time wage system the worker does not get any reward for the time saved. In piece rate system he gets full payment for the time saved. But under incentive plans both the employee and the employer share the labour cost of the time saved. The worker is paid for a fraction of the time saved which means that wages for the other portion of the time saved is saved by the employer. The benefits of incentive plans will be discussed in detail, later in this chapter.

9.2 FACTORS TO BE CONSIDERED FOR INTRODUCTION OF A GOOD INCENTIVE PLAN

To introduce a good effective incentive plan for wage payment, several factors need to be considered. They are :

- (i) Is there any need for increasing output ? If the situation warrants increase in production, then the incentive plans should be taken up.
- (ii) The plan to be implemented should be reasonable both to the employer and the employees.
- (iii) Standard time should be carefully determined by time and motion study.
- (iv) Similarly an attainable standard of performance can be fixed for various jobs. It should not be frequently changed.
- (v) The plan should result in enhanced production and lower cost of production per unit.
- (vi) Working environment should be taken into consideration for the implementation of such plans.
- (vii) Quality of output should not be effected adversely due to extra efforts of the workers.
- (viii) Attitude of trade unions and workers towards such incentive plans needs to be considered.
- (ix) Different incentive plans should be considered for different categories of workers. So that there is no undue resentment amongst them.

- (x) Adequate control system should operate in order to get better result of the plans.

9.3 ESSENTIALS OF A GOOD INCENTIVE SYSTEM

A good incentive system for payment of wages should have the following essential characteristics :

- (i) The incentive plan should be simple to understand and easy to operate. The workers should properly understand the plan and the relevant office should find it easy to operate.
- (ii) It should be fair to both employer and employees.
- (iii) Incentive plans should be able to attract workers for improving their performance.
- (iv) Incentive should be sufficient enough to tempt the workers to achieve it. It should not be too high or too low to distract the workers. The standards set should be attainable with extra efforts.
- (v) It should not overstrain workers. They should not be compelled to work for long hours or at a much faster speed.
- (vi) The plan should be discussed with workers and their trade unions in advance. It should have willing support of workers.
- (vii) The objectives of the plan should be clearly communicated to the employees, so that there may be no undue resentment among them.
- (viii) All parameters for the incentive system like input materials, work place, methods of working etc should be standardised.
- (ix) Workers should not be allowed to suffer in their earnings for reason like insufficient material, improper tools, faulty materials etc., which are beyond their control.
- (x) There should be scope for the management to change standards when new methods and equipment are introduced.
- (xi) Quality of the product should not be allowed to be affected.
- (xii) The plan should allow enough scope for earnings to the workers.

9.4 TYPES OF INCENTIVE PLANS

The incentive plans are designed to encourage and motivate workers for higher efficiency and greater output. Under these plans the workers are rewarded in recognition of their achievement of specific results during a specified time period. Broadly, there are two types of incentive plans, namely:

- (i) Individual incentive plans.
- (ii) Group incentive plans.

Under individual incentive plans an individual worker is rewarded either on time basis or on production basis. But under group incentive plan, a group of workers is rewarded on some suitable basis.

When the individual incentive plans are designed on time basis, the efficiency of workers is judged by the time of completion of a particular job. Among the various individual incentive plans based on time basis, some are discussed below.

9.5 OBJECTIVES OF WAGE INCENTIVE PLANS

Before implementing wage incentive plans it is essential to know the objectives of such plans. The objectives are :

- (i) To secure a better utilisation of manpower, better productivity and performance control.
- (ii) To motivate the workers to apply extra effort to magnify their earnings.
- (iii) To improve profit through reduction of the labour cost per unit.
- (iv) To avoid the additional capital outlay for increasing production capacity.

9.6 HALSEY PREMIUM PLAN

Hasley premium plan was introduced by F.A. Hasley in 1891. It has the following main features :

- (i) The worker is guaranteed hourly wages for the actual time taken by him to complete the job.
- (ii) A standard time is fixed for the worker for the completion of the assigned job.

- (iii) If the worker finishes his job before standard time, he is given bonus equal to 50% (usually) of the wages of the time saved.
- (iv) On the whole a worker is paid normal wages at the agreed rate for actual time plus the bonus for the time saved.
- (v) In practice the percentage of bonus may vary from $33\frac{1}{3}\%$ to $66\frac{2}{3}\%$

Formula for computation of total earning under Halsey plan

$$\begin{aligned}\text{Total earnings} &= (\text{Normal wages} + \text{Bonus}) \\&= \text{Time taken} \times \text{Rate} + \%(\text{Standard time} - \text{Actual time}) \times \text{Rate} \\&= \{T \times R\} + \{\%(S - T) \times R\}\end{aligned}$$

Where,

S = Standard time or time allowed

T = Time taken or Actual time

R = Rate per hour or Hourly wage rate.

% = Percentage of bonus (Usually 50%)

Example 1.

Time allowed = 8 hours

Time taken = 6 hours

Rate per hour = ₹ 10 per hour

Assuming percentage of bonus as 50% calculate bonus and total earnings under Halsey premium plan.

Solution:

S = Time allowed = 8 hours

T = Time taken = 6 hours

R = Rate per hour = ₹ 10 per hour

% = Percentage of bonus = 50%

(i) Bonus under Halsey premium

$$\begin{aligned}
 &= 50\% (S - T) \times R \\
 &= \frac{50}{100} (8 - 6) \times 10 \\
 &= ₹ 10
 \end{aligned}$$

(ii) Total earnings under Halsey premium plan

$$\begin{aligned}
 &= \text{Normal wages} + \text{Bonus} \\
 &= T \times R + 50\% (S - T) \times R \\
 &= 6 \times 10 + \frac{50}{100} (8 - 6) \times 10 \\
 &= 60 + 10 \\
 &= ₹ 70
 \end{aligned}$$

9.6.1 Advantages of Halsey Premium Plan

- (i) It is an easy and simple device to operate.
- (ii) Slow workers are guaranteed a fixed time wage whereas efficient workers have the scope to earn extra wages.
- (iii) The labour cost per unit is reduced as wages for the time saved is not fully paid to the workers.
- (iv) Increased production due to incentive may reduce overhead cost per unit. Hence, the cost of production is also reduced.
- (v) As incentive is given only to efficient workers, the inefficient workers may be motivated to work hard to come at par with efficient workers to earn incentive.

Disadvantages of Halsey Premium Plan

- (i) Workers do not get the full benefit of their efforts.
- (ii) The quality of work may decline as the workers hurry through the work to earn incentives.
- (iii) More wastage of raw materials may result due to hurry in working process.
- (iv) There may be discontent among the workers in the fixation of standard time and hourly wage rate.

9.6.1 Halsey-Weir Premium Plan

Under Halsey Weir Premium Plan all the features of Halsey Premium Plan are same except that the percentage of bonus is usually taken as 30% instead of 50%.

Example 2.

$$\text{Rate per hour} = ₹ 10 \text{ per hour}$$

$$\text{Time allowed for the job} = 10 \text{ hours}$$

$$\text{Time taken} = 8 \text{ hours}$$

Calculate the bonus and total earnings under Halsey Weir Premium Plan assuming the percentage of bonus 30%.

Solution :

$$S = \text{Time allowed for the job} = 10 \text{ hours}$$

$$T = \text{Time taken} = 8 \text{ hours}$$

$$R = \text{Rate per hour} = ₹ 10 \text{ per hour}$$

$$\% = \text{Percentage of bonus} = 30\%$$

(i) Bonus under Halsey Weir Premium Plan

$$= 30\% (S - T) \times R$$

$$= \frac{30}{100} (10 - 8) \times 10$$

$$= ₹ 6$$

(ii) Total earnings under Halsey Weir Premium Plan

$$= \text{Normal wages} + \text{Bonus}$$

$$= [T \times R] + [30\% (S - T) \times R]$$

$$= 8 \times 10 + \frac{30}{100} (10 - 8) \times 10$$

$$= 80 + 6$$

$$= ₹ 86$$

9.7 ROWAN PREMIUM PLAN

Rowan Premium Plan was introduced by Jones Rowan. It has the following main features :

- (i) It guarantees the hourly wage for the actual time taken.
- (ii) Standard time is fixed for completion of each job.
- (iii) A worker is paid bonus on the basis of time saved along with normal wages.
- (iv) Bonus is that proportion of the wages of the time taken which the time saved bears to the standard time allowed for the work.

Formula for computation of total earnings under Rowan Premium Plan

Total earnings = Normal wages + Bonus

$$\begin{aligned} &= [\text{Time taken} \times \text{Rate}] + \frac{\text{Time saved}}{\text{Standard time}} \times \text{Normal Wages} \\ &= [T \times R] + \frac{S - T}{S} \times T \times R \end{aligned}$$

Where, S = Standard time or Time allowed

T = Time taken or Actual time

R = Rate per hour or Hourly wage rate

Example 3

Calculate bonus and total earnings under Rowan Plan.

Time allowed = 12 hours

Time taken = 8 hours

Hourly Rate = ₹10 per hour

Solution :

(i) Time allowed = 12 hours

Time taken = 8 hours

Hourly Rate = ₹10 per hour

Bonus under Rowan Premium Plan

$$\begin{aligned}
 &= \frac{S - T}{S} \times T \times R \\
 &= 8 \times 10 + \frac{12 - 8}{12} \times 8 \times 10 \\
 &= 80 + 26.67 \\
 &= ₹ 106.67
 \end{aligned}$$

Advantages of Rowan Premium Plan :

- (i) Like Halsey plan it also guarantees hourly wages to workers.
- (ii) It encourages moderately efficient workers. The worker is not encouraged to rush through the work because bonus increases at a decreasing rate at higher rate of efficiency.
- (iii) It reduces labour cost per unit as the wages for time saved is shared by the employer and the worker.
- (iv) It is quite useful to workers who complete their works in time less than 50% of time allowed.

Disadvantages of Rowan Premium Plan

- (i) The plan does not provide adequate incentive to a very efficient worker who can save time more than 50% of the time allowed.
- (ii) There may be difficulty in fixing standard time.
- (iii) The shorting of wages of time saved may not be accepted by workers.

10.8 COMPARISON BETWEEN HALSEY AND ROWAN PLANS

Bonus, earning per hour and labour cost per unit under both the plans vary depending upon the time saved.

Bonus, earning per hour and labour cost per unit remain **same** under both plans when time saved is 50% of standard time. They are **higher** in Rowan plan than Halsey plan when time saved is less than 50% of the standard time. They are **lower** in Rowan

plan the Halsey plan when time saved is more than 50% of this standard time. Let us verify the above situations through an example.

Example 4

Standard time = 12 hours

Rate per hour = ₹ 9 per hour

Actual time taken (i) 8 hours (ii) 6 hours (iii) 5 hours Calculate total earnings in the three situations under both Halsey plan and Rowan plan.

Solution

S = Standard time = 12 hours

R = Rate per hour = ₹ 9 per hour

T = (i) 8 hours (ii) 6 hours (iii) 5 hours

Situations :

(i) Time saved is less than 50% of standard time.

(ii) Time saved is 50% of standard time.

(iii) Time saved is more than 50% standard time.

Halsey Plan :

Total earnings	Total earnings	Total earnings
$(i) = T \times R + \frac{50}{100}(S - T) \times R$ $= 8 \times 9 + \frac{1}{2}(12 - 8) \times 9$ $= 72 + 18$ $= ₹ 90$	$(ii) = T \times R + \frac{50}{100}(S - T) \times R$ $= 6 \times 9 + \frac{1}{2}(12 - 6) \times 9$ $= 54 + 27$ $= ₹ 81$	$(iii) = T \times R + \frac{50}{100}(S - T) \times R$ $= 5 \times 9 + \frac{1}{2}(12 - 5) \times 9$ $= 45 + 31.5$ $= ₹ 76.5$

Rowan Plan :

Total earnings	Total earnings	Total earnings
$(i) = T \times R + \frac{S-T}{S} \times T \times R$ $= 8 \times 9 + \frac{12-8}{12} \times 8 \times 9$ $= 72 + 24$ $= ₹ 96$	$(ii) = T \times R + \frac{S-T}{S} \times T \times R$ $= 6 \times 9 + \frac{(12-6)}{12} \times 6 \times 9$ $= 54 + 27$ $= ₹ 81$	$(iii) = T \times R + \frac{S-T}{S} \times T \times R$ $= 5 \times 9 + \frac{(12-5)}{12} \times 5 \times 9$ $= 45 + 26.25$ $= ₹ 71.25$

Example 5

Time allowed = 20 hours

Time taken = 16 hours

Rate per hour = ₹ 8 per hour

Calculate the effective rate of earnings under Halsey Premium plan and Rowan Premium Plans.

Solution :

S = Time allowed = 20 hours

T = Time taken = 16 hours

R = Rate per hour = ₹ 8 per hour

(i) Calculation of effective rate of earning under Halsey plan.

$$\begin{aligned}
 \text{Total earnings} &= T \times R + \frac{50}{100} (S-T) \times R \\
 &= 16 \times 8 + \frac{1}{2} (20-16) \times 8 \\
 &= 128 + 16 \\
 &= ₹ 144 \dots\dots\dots
 \end{aligned}$$

Effective rate of earnings

$$= \frac{\text{Total earnings}}{\text{Actual time taken}}$$

$$\begin{aligned}
 &= \frac{144}{16} \\
 &= ₹ 9 \text{ per hour}
 \end{aligned}$$

(ii) Calculation of effective rate of earnings under Rowan Plan :

$$\begin{aligned}
 \text{Total earnings} &= T \times R + \frac{S - T}{S} \times T \times R \\
 &= 16 \times 8 + \frac{20 - 16}{20} \times 16 \times 8 \\
 &= 128 + 25.60 \\
 &= ₹ 153.60
 \end{aligned}$$

Effective rate of earnings

$$\begin{aligned}
 &= \frac{\text{Total earnings}}{\text{Actual time taken}} \\
 &= \frac{153.60}{16} \\
 &= ₹ 9.60 \text{ per hour}
 \end{aligned}$$

Example 6.

The time allowed for a job is 20 hours. A worker completes the job in a certain time at ₹ 8 per hour. He earns a bonus of ₹ 16 under Halsey plan at 50% rate.

Calculate his total earnings under Rowan Plan.

Solution :

$$\text{Bonus under Halsey plan} = 50\% (S - T) \times R$$

$$\begin{aligned}
 \Rightarrow 16 &= \frac{50}{100} (20 - T) \times 8 \\
 \Rightarrow 16 &= \frac{1}{2} (20 - T) \times 8 \\
 \Rightarrow 16 &= 4(20 - T)
 \end{aligned}$$

$$\begin{aligned}\Rightarrow 16 &= 80 - 4T \\ \Rightarrow 4T &= 80 - 16 \\ \Rightarrow T &= \frac{64}{84} \\ &= 16 \text{ hours}\end{aligned}$$

Now his total earnings under Rowan Plan

$$\begin{aligned}&= T \times R + \frac{S - T}{S} \times T \times R \\ &= 16 \times 8 + \frac{20 - 16}{20} \times 16 \times 8 \\ &= 128 + 25.60 \\ &= ₹ 153.60\end{aligned}$$

Example 7. From the following particulars calculate the total earnings of workers X and Y under Halsey plan.

Wage rate per hour = ₹ 6 per hour

Standard time per unit = 12 minutes

The actual time taken and the output were as under :

	X	Y
Output	166 units	200 units
Time taken	30 hours	38 hours

Solution :

Calculation of total earnings of worker X and Y.

Worker	X	Y
Output in times	166	200
Standard time (in hours)	$\frac{166 \times 12}{60} = 33.2$	$\frac{200 \times 12}{60} = 40$
Actual time	30 hours	38 hours

$$\text{Total earnings} = T \times R + 50\%(S-T) \times R$$

$$(x) \quad 30 \times 6 + \frac{50}{100} (33.2 - 30) \times 6 \\ = 180 + 9.6$$

$$= ₹ 189.60$$

$$(y) \quad 38 \times 6 + \frac{50}{100} (40 - 38) \times 6 \\ = 228 + 6$$

$$= ₹ 234$$

Example 8

In a factory, the standard time for a job is 24 hours and the basic wage rate is ₹ 6 per hour. A bonus of 50% of time saved is given to workers beside normal wages for actual time worked.

Calculate the wages and effective rate of earning per hour of a worker who completes his 20 hours.

Solution

S = Standard time = 24 hours

T = Actual time taken = 20 hours

R = Basic wage rate = ₹ 6 per hour

Bonus = 50% or time saved

$$\therefore \text{Total wages} = T \times R + 50\%(S - T) \times R$$

$$\begin{aligned} &= 20 \times 6 + \frac{50}{100} (24 - 20) \times 6 \\ &= 120 + \frac{1}{2} \times 4 \times 6 \\ &= 120 + 12 \\ &= ₹ 132 \end{aligned}$$

Example 9

In a factory the particulars relating two workers are given below :

X : Time taken to produce 100 units is 7 hours

Y : Time taken to produce 100 units is 9 hours.

The standard output per hour = 10

The wage rate per hour = ₹ 10 per hour

Calculate their total earnings under Rowan Plan.

Solution : Standard time for producing 100 units = $\frac{1}{10} \times 100 = 10$ hours

(∴ 10 units are produced in 1 hour)

T = Rate per taken = ₹ 10

Calculation of total earnings under Rowan Plan.

Worker	X	Y
Actual Time (T)-	7 hours	9 hours
Standard time (S)-	10 hours	10 hours

Total earnings under Rowan Plan

$$= T \times R + \frac{S - T}{S} \times T \times R$$

$$(x) \quad 7 \times 10 + \frac{10 - 7}{10} \times 7 \times 10 = 70 + 21 = ₹ 91$$

$$(y) \quad 9 \times 10 + \frac{10 - 9}{10} \times 9 \times 10 = 90 + 9 = ₹ 99$$

Example 10.

During first week of April, 2016 the workman, Mr Kalyan, manufactured 30 articles. He receives wages for a guaranteed 48 hour week at the rate of ₹ 4 per hour. The estimated time to produce an article is 100 minutes and under incentive scheme the time allowed is increased by 20%.

Calculate his gross wages according to Rowan premium bonus. [C.A. Inter modified]

Solution :

Standard time to produce one article under incentive scheme

$$= (100 + \frac{20}{100} \times 100)$$

$$= 120 \text{ minutes}$$

$$\text{Standard time to produce 30 articles} = \frac{30 \times 120}{60} \text{ hours}$$

$$\Rightarrow S = 60 \text{ hours}$$

$$\text{Actual time taken to produce 30 articles} = 48 \text{ hours}$$

$$\Rightarrow T = 48 \text{ hours}$$

$$R = \text{Rate per hour} = ₹ 4 \text{ per hour}$$

∴ Gross wages according to Rowan Plan.

$$\begin{aligned} &= T \times R + \frac{S - T}{S} \times T \times R \\ &= 48 \times 4 + \frac{60 - 48}{60} \times 48 \times 4 \\ &= 192 + \frac{12}{60} \times 192 \\ &= 192 + 38.4 \\ &= ₹ 230.40 \end{aligned}$$

Example 11.

Worker A, B and C work under Halsey, Halsey-Weir and Rowan Plan respectively. Each of them completed their job in 20 hours for which time allowed was 24 hours. Hourly wage rate is ₹ 6 per hour.

Calculate their earnings assuming bonus under Halsey plan at 50% of time saved and under Halsey-Weir 20% of time saved.

Solution :

$$S = \text{Standard time} = 24 \text{ hours}$$

$$T = \text{Time taken} = 20 \text{ hours}$$

(A) Calculation of total earnings of worker A under Halsey Plan:

$$\begin{aligned} \text{Total earnings} &= T \times R + 50\%(S - T) \times R \\ &= 20 \times 6 + \frac{50}{100} (24 - 20) \times 6 \\ &= 120 + \frac{1}{2} \times 4 \times 6 \\ &= 120 + 12 \\ &= ₹ 132 \end{aligned}$$

(B) Total earnings of worker B under Halsey-Weir plan

$$\begin{aligned}
 &= T \times R + 30\%(S - T) \times R \\
 &= 20 \times 6 + \frac{30}{100} (24 - 20) \times 6 \\
 &= 120 + \frac{3}{10} \times 4 \times 6 \\
 &= 120 + 7.20 \\
 &= ₹ 127.20
 \end{aligned}$$

(C) Total earnings of worker C under Roman Plan.

$$\begin{aligned}
 &= T \times R + \frac{S - T}{S} \times T \times R \\
 &= 20 \times 6 + \frac{24 - 20}{24} \times 20 \times 6 \\
 &= 120 + \frac{4}{24} \times 20 \times 6 \\
 &= 120 + 20 \\
 &= ₹ 140
 \end{aligned}$$

Example 12

Calculate the prime cost of a production on which material cost amounts to ₹ 4,340 direct expenses amount to ₹ 1,000 and the labour cost as per the following particulars :

Wage rate per hour = ₹ 10

Standard output per hour = 5

To produce 200 units each, the four workers took the following time in hours :

A	B	C	D
10	20	30	40

The workers are paid under Halsey premium plan.

Solution :

S = Standard time for producing 200 units

$$= \frac{1}{5} \times 200$$

$$= 40 \text{ hours}$$

Statement showing labour cost of workers under Halsey premium plan.

Worker -	A	B	C	D
Actual time (T)-	10	20	30	40
Standard time (S) -	40	40	40	40
Hourly Rate (R)-	10	10	10	10

$$\text{Total earnings} = T \times R + 50\%(S-T) \times R$$

$$A : 10 \times 10 + \frac{50}{100} (40 - 10) \times 10 = 100 + 150 = 250$$

$$B : 20 \times 10 + \frac{50}{100} (40 - 20) \times 10 = 200 + 100 = 300$$

$$C : 30 \times 10 + \frac{50}{100} (40 - 30) \times 10 = 300 + 50 = 350$$

$$D : 40 \times 10 + Nil = 400$$

$$\text{Total Labour Cost} = ₹ 1,300$$

$$\therefore \text{Prime cost} = \text{Material cost} + \text{Labour cost} + \text{Direct expenses}$$

$$= ₹ 4,340 + ₹ 1,300 + ₹ 1,000$$

$$= ₹ 6,640$$

9.10 QUESTIONS

1. Choose and write the correct answer from the given alternatives in each bit :

- (i) Halsey premium plan is an incentive plan, based on
- (a) Output
 - (b) Time
 - (c) Experience
 - (d) both time and output
- (ii) When time saved by a worker is equal to 50% of standard time, bonus under Halsey and Rowan are
- (a) Same
 - (b) More in Halsey plan than in Rowan plan
 - (c) More in Rowan plan than in Halsey plan
 - (d) No relation with Hasley and Rowan plan.
- (iii) The total earnings of a worker under Halsey premium plan is equal to
- (a) Normal wages
 - (b) Bonus under the Halsey Plan
 - (c) Normal wages + Bonus
 - (d) Normal wages + Overhead
- (iv) Though bonus rate varies from $33\frac{1}{3}\%$ to $66\frac{2}{3}\%$ in Halsey premium plan, the bonus is usually taken as
- (a) 35%
 - (b) 40%
 - (c) 45%

- (d) 50%
- (v) If a worker cannot save 50% or more than 50% of time allowed, the more beneficial plan for him is
- (a) Halsey premium plan
 - (b) Rowan premium plan
 - (c) Halsey-Weir premium plan
 - (d) Both Halsey and Rowan plan.
- (vi) The formula for calculating bonus under Rowan plan is
- (a) $T \times R + 50\%(S - T) \times R$
 - (b) $30\%(S - T) \times R$
 - (c) $\frac{(S - T)}{S} \times R$
 - (d) $\frac{(S - T)}{S} \times T \times R$
- (vii) The formula for calculating bonus under Halsey Plan is
- (a) $T \times R + \frac{S - T}{S} \times R$
 - (b) $\frac{S - T}{S} \times R$
 - (c) $\frac{S - T}{S} \times T \times R$
 - (d) $50\%(S - T) \times R$
- (viii) If the standard time for producing one article is 3 hours and the actual time taken for producing 12 articles is 40 hours the time saved is
- (a) 36 hours
 - (b) 3 hours
 - (c) 4 hours

- (d) 6 hours
- (ix) The standard time and actual time of a worker are 8 hours and 6 hours respectively. The hourly rate is ₹ 10 per hour. Then the difference of bonus under Halsey plan and Rowan plan is
- (a) ₹ 5
 - (b) ₹ 10
 - (c) ₹ 15
 - (d) ₹ 2.50
- (x) The bonus paid to workers in production under Halsey premium plan is
- (a) A part of labour cost
 - (b) A part of office overhead cost
 - (c) A part of material cost
 - (d) A part of production on cost.

2. Express/Answer the following in one word / term :

- (i) A plan which compensates workers for their extra efforts and skill.
- (ii) An incentive plan which provides a bonus equal to wages 50% of time saved.
- (iii) An incentive plan where bonus is equal to .
- (iv) The percentage of bonus allowed on time saved under Halsey-Weir premium plan.
- (v) The time allowed for actual production.

3. Answer the following questions within one sentence each :

- (i) Name two wage incentive plans.
- (ii) Write the formula for calculating bonus under Halsey premium plan.
- (iii) Write the formula for calculating bonus under Rowan premium plan.
- (iv) Write two objectives of wage incentive plans.

- (v) Which incentive plan do you prefer and why ?

4. Rectify the underlined portions of the following sentences :

(i) When time saved is more than 50% of standard time the bonus is higher in Rowan plan.

(ii) In Rowan plan bonus increases at an increasing rate at higher levels of efficiency.

(iii) Quality of work does not suffer much in Halsey premium plan.

(iv) In Rowan plan bonus is equal to

$$\frac{\text{Time saved}}{\text{Time taken}} \times \text{Time taken} \times \text{Rate}$$

(v) In Halsey premium plan wages are paid on output basis.

5. Fill in the blanks.

(i) Both Halsey and Rowan premium plan are designed on _____ basis.

(ii) Bonuses under Halsey and Rowan plans are equal when the time saved is equal to _____ % of standard time.

(iii) In incentive premium plans both the worker and the employer _____ the labour cost of the time saved.

(iv) _____ of work does not suffer much in Rowan plan as bonus increases at a decreasing rate at higher levels of efficiency.

(v) Halsey-Weir plan is the same as the _____ plan except that the bonus paid to workers is 30% of the time saved.

3. Answer the following questions within 30 words each :

(i) Write any two features of Halsey premium plan.

(ii) Write any two advantages of Halsey premium plan.

(iii) Write any two disadvantages of Halsey premium plan.

(iv) Write two important features of Rowan premium plan.

(v) Write any two advantages of Rowan premium plan.

- (vi) Write any two disadvantages of Rowan premium plan.
- (vii) Write the formula for calculating total earnings under Halsey premium plan and Rowan premium plan.
- (viii) If time allowed is 10 hours time taken is 8 hours and time rate is ₹10 per hour, find the total earnings under Rowan plan.
- (ix) If time allowed is 8 hours, time taken is 6 hours and time rate is 10 per hour, find the total earnings (at 50% bonus) under Halsey plan.
- (x) Write two factors to be considered before introducing an incentive plan.

7. Answer the following question within 50 words each.

- (i) Explain Halsey premium plan.
- (ii) Explain Rowan premium plan.
- (iii) Write three characteristics of a good incentive plan.
- (iv) Write the advantages of Halsey premium plan.
- (v) Write the disadvantages of Halsey premium plan.
- (vi) Write the advantages of Rowan premium plan.
- (vii) Write the disadvantages of Rowan premium plan.
- (viii) What do you mean by incentive?
- (ix) Write three objectives of incentive plan.
- (x) If time allowed is 8 hours, time taken is 6 hours and time rate is ₹ 10 per hour, calculate the bonuses under Halsey plan and Rowan plan.

LONG QUESTIONS

- 8. Compare between Halsey premium plan and Rowan premium plan.
- 9. Write the factors to be considered before introducing an incentive plan.
- 10. Explain the characteristics of a good incentive plan.
- 11. Discuss the merits and demerits of Halsey premium plan.

12. Discuss the merits and demerits of Rowan premium plan.
13. A worker completes his job in 14 hours for which time allowed is 16 hours. The wage rate per hour is ₹ 8 per hour. Calculate his total earnings under Halsey premium plan.
14. Standard time = 24 hours

Time taken = 20 hours

Rate per hour = ₹ 8 per hour

Calculate the bonus, total earnings under Rowan plan.

15. Calculate the effective rate of earnings from the following particulars :

Time allowed = 24 hours

Time taken = 18 hours

Rate per hour = ₹ 8 per hour

Bonus = 50% of time saved under Halsey plan.

16. A worker completes a job in a certain time. The standard time allowed for the job is 8 hours and the hourly rate of wages is ₹ 8. The worker gets a bonus of ₹ 8 under Halsey plan at 50% of time saved.

Calculate his total earnings under Rowan plan.

17. Calculate the labour cost per unit under (i) Halsey plan and (ii) Rowan plan from the following particulars :

Time allowed- Hours per 100 units 30

Wages per unit ₹ 4

Hourly rate ₹ 8

Actual time taken in hours 50

Actual units produced 200

(Hints : Time allowed for 200 units is 60 hours

Time taken for 200 units is 50 hours

$$\text{Total earning} = 50 \times 8 + \frac{1}{2} \times 10 \times 8 = 440 \text{ rupees}$$

$$\text{Labour cost per unit} = \frac{440}{200} = 2.20 \text{ rupees}$$

18. The standard time allowed for a job is 20 hours. The hourly wage rate is ₹ 8 per hour. Because of saving in time a worker, A gets an effective rate of earning of ₹ 9 per hour under Halsey Premium Plan (50%. bonus).

Calculate the actual time taken by the worker for completion of the job.

$$\{ \text{Hints : } T \times \text{effective rate} = T \times 8 + \frac{50}{100} (20 - T) \times 8 \}$$

19. The standard time allowed for a job is 20 hours. The hourly wage rate is ₹ 8. Because of saving in time a worker, A gets an effective rate of earning of ₹ 9.60 per hour under Rowan premium plan.

Calculate his total earnings under Halsey premium plan assuming 50% bonus in it.

20. The standard time allowed for a job is 20 hours and actual time taken by a worker is 18 hours. If a worker, B earns an hourly wage of ₹ 4.95 under Rowan premium plan because of saving in time, calculate the guaranteed wage rate per hour.
(Hints : ₹ 4.95 is effective rate per hour)

21. From the following particulars calculate the total earnings of each of the workers under Halsey plan and Rowan plan :

Standard time for the job = 20 hours

Standard rate per hour = ₹ 8

Actual time taken :

A - 24 hours, B = 20 hours, C = 16 hours.

22. The bonus received by a worker under Rowan premium plan is ₹ 30. If the time allowed and time taken are 16 hours and 10 hours respectively, find the wage rate

per hour.

23. What is the standard time allowed for a job for which a worker, X taken 18 hours to complete and earns ₹ 198 under Rowan Premium Plan ? The hourly wage rate is ₹ 10.
24. Mr X has 10 skilled workers. He is planning to increase the labour productively and seeking your advice whether to introduce Halsey plan (with 50% bonus) or Rowan plan of wage payment. The following particulars relate to the month of January, 2017 :

Hourly rate of wage payment	₹ 4
Average time for producing 1 unit by one worker	2 hours
Number of working days in the month	25
No of working hours per day per worker	8
Actual production during the month	200 units

Calculate the direct rate labour cost per unit under Halsey and Rowan plan and this advise Mr. X.

25. Compare bonuses under Halsey and Rowan plan when time saved is less or more than 50% of standard time.

(Hints : explain with the help of illustrations)



CHAPTER - 10

OVERHEAD

(CONCEPT, CLASSIFICATION, CODIFICATION AND COLLECTION)

STRUCTURE

- 10.1 Meaning of overhead
- 10.2 Definition of overhead
- 10.3 Features of overhead
- 10.4 Importance of overhead
- 10.5 Classification of overhead
 - 10.5.1 According to functions
 - 10.5.2 According to behaviour
 - 10.5.3 According to elements
- 10.6 Codification of overhead
- 10.7 Collection of overhead
- 10.8 Questions
- 10.9 Answers

10.1 MEANING OF OVERHEAD

We know that total cost is broadly divided into two parts i.e. direct cost and indirect cost. The total of direct costs (e.e. direct materials, direct labour and direct expenses) is called Prime Cost. The total of all indirect costs (i.e. indirect materials, indirect labour and indirect expenses) is called overhead. The word 'indirect' indicates that the cost accountant is either unable or unwilling to allocate to particular cost units. Overhead cannot be wholly charged or debited to a particular job. Simply speaking, any expenditure incurred over and above prime cost is overhead. Overheads are incurred jointly for a number of

departments. So, these are to be distributed among these departments on some suitable bases.

Overhead is also known as 'on cost', 'supplementary cost', 'burden', 'non-productive cost', 'loading', 'overhead expenses', 'indirect cost' etc.

10.2 DEFINITIONS OF OVERHEAD

Overhead means all indirect expenses, i.e. indirect material cost, indirect labour cost and other indirect expenses. Let us try to understand the following definitions that explain the nature and features of overhead :

CIMA, London : "An aggregate of indirect materials, indirect wages and indirect expenses".

Blocker and Weltmer : "Overhead costs are the operating costs of a business enterprise which cannot be traced directly to a particular unit of output."

Harper : "Overheads are those costs which do not result from the existence of individual cost units."

Wheldon : "Overhead may be defined as the cost of indirect materials, indirect labour and such other expenses including services as cannot conveniently be charged direct to specific cost units. Alternatively, overheads are all expenses other than direct expenses."

10.3 FEATURES OF OVERHEAD

On analysis of the above definitions, the features of overheads are summarised as follows :

1. Overheads are operating costs i.e. these costs help in smooth operation of business.
2. All indirect costs form part of overheads.
3. Overheads are not associated with individual jobs or products.
4. These costs are incurred jointly for more than one jobs.
5. These are apportioned to or absorbed by cost units or cost centres on suitable basis.

6. Such costs are spread over the heads of all units produced in the production centre and hence, termed as 'Overheads'.

10.4 IMPORTANCE OF OVERHEAD

Large manufacturing establishments are being set-up both in private and public sectors. It requires heavy expenses of indirect nature for mass production. Further, use of costly computers, plant automation, other advances in technology result in higher overhead cost. In many industries, overhead represents the second highest item of cost after direct materials. This necessitates careful planning and control of overhead costs—otherwise cost of production will increase appreciably.

ACCOUNTING AND CONTROL OF OVERHEAD COSTS / STEPS FOR THE DISTRIBUTION OF OVERHEAD

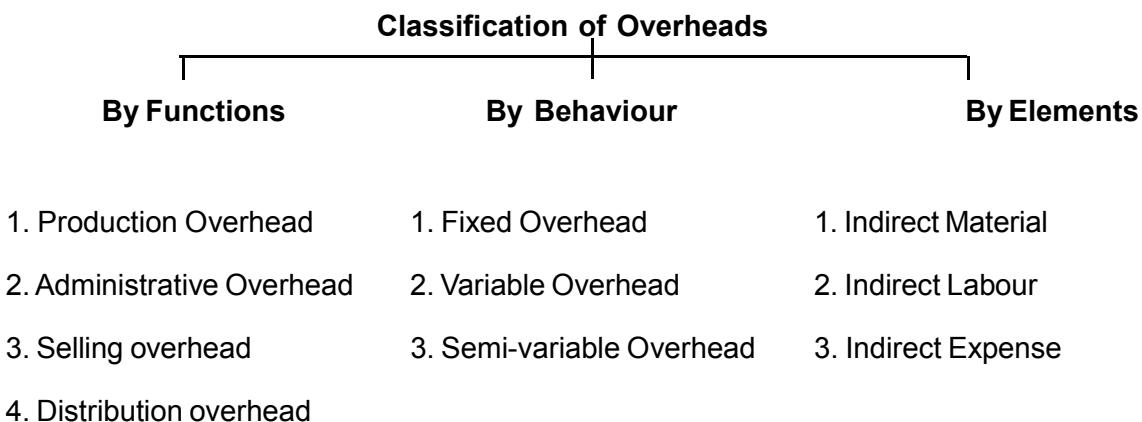
Overhead is an indirect cost. It cannot be allocated specifically to cost units like direct material and direct wage. At the same time, if overhead is not added to prime cost, we do not get the cost of production. The problem is to charge overheads to cost units on a suitable basis. Thus, for distribution of overheads following steps are followed :

1. Classification of Overhead
2. Codification of Overhead
3. Collection of Overhead
4. Allocation and apportionment of overhead
5. Reapportionment of Overhead
6. Absorption of overhead.

10.5 CLASSIFICATION OF OVERHEAD

The process of grouping the various items of overheads into distinct classes on the basis of some common characteristics, is known as classification of overhead. Generally, overheads are classified on the following basis :

- (I) Functions
- (II) Behaviour
- (III) Elements



10.5.1 CLASSIFICATION ACCORDING TO FUNCTION

In this method, classification is done according to the major functions of a concern.
It comprises of :

1. Production Overhead
2. Administrative Overhead
3. Selling Overhead
4. Distribution Overhead

1. Production Overhead : It represents all those indirect costs (material, wage, expense) incurred within the four walls of the factory proper in connection with production of product or service. These overheads may be termed as works overhead or factory overhead or manufacturing overhead.

Examples :

- (i) Indirect material : Consumable stores, lubricating oil, nails, cotton waste, thread etc.
- (ii) Indirect Labour : Salary of supervisor, foreman etc.
- (iii) Indirect Expense : Rent, rates & taxes, repair, insurance, depreciation of factory building, plant & machinery, factory telephone expenses, Lighting, heating of factory.

2. Administrative Overhead : Such expenses are incurred in managing the

undertaking which are not related directly to production or selling or distribution functions. These costs represent the aggregate of material cost, labour cost & other expenses incurred by administrative department for general management.

Examples :

- (i) Indirect material : Cost of printing, postage and stationery used in administrative dept.
- (ii) Indirect Labour : Salary of managing director, general manager, finance manager etc.
- (iii) Indirect Expenses : Rent, rates & taxes of office building; repair & insurance, depreciation of office building, plant & machinery; Lighting, heating, telephone expenses of administrative office.

3. Selling Overhead : It includes all those indirect expenses incurred in inducing customers to place orders. This is the cost of promoting sales and retaining customers.

Examples :

- (i) Indirect material : Catalogues, Price list, stationary, cost of printing of sales department etc.
- (ii) Indirect Labour : Salary, commission, bonus of salesmen etc.
- (iii) Indirect Expense : Rent, rates & taxes of showroom, advertising, Debt collection charges etc.

4. Distribution Overhead : It includes all those indirect expenes incurred in getting finished product from the factory to the customer.

Examples :

- (i) Indirect material : Cost of printing, postage & stationery used in distribution office; cost of packing; oil, grease, spare parts used in delivery vans etc.
- (ii) Indirect Labour : Salary of staff attached to delivery office, salary of driver of

delivery van.

- (iii) Indirect expense : Rent, rates & taxes of distribution office; Repairs, insurance, depreciation of distribution office building; Lighting, heating, telephone expenses of distribution office; freight & carriage outward.

10.5.2 CLASSIFICATION ACCORDING TO BEHAVIOUR/ VARIABILITY

Overhead expenses show following behaviour :

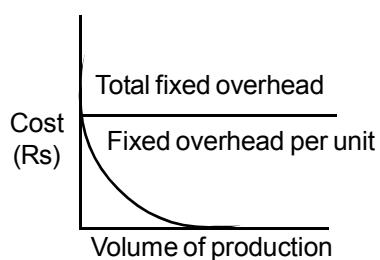
- (i) Some overheads tend to vary almost directly with the volume of production.
- (ii) Some tend to remain same whatever may be the volume of production.
- (iii) Some vary in part with volume of production and in part they are practically invariable whatever may be the volume of production.

Based on this behaviour, overhead expenses may be classified into :

1. Fixed overhead
2. Variable overhead
3. Semi-variable overhead

1. Fixed Overhead :

Meaning : Fixed overheads are those costs which do not vary with the change in the volume of production upto a given level. These overheads are also called period costs, shutdown costs or stand-by costs.



Features :

- (i) Fixed overheads do not vary with the change in the volume of production upto a given range.
- (ii) Fixed overhead per unit decreases as the production increases .

Graphic Representation.

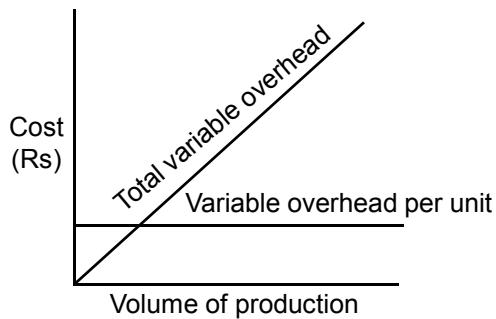
- (iii) Fixed overhead per unit increases as the

production decreases.

Examples : Rent & Insurance of Building, Salary to office Staff, Interest on capital, Legal expenses, Bank charges etc.

2. Variable Overhead :

Meaning : Variable overhead are those costs which vary in direct proportion to the volume of production. These costs are also known as product cost, marginal cost.



Graphic Representation

Features :

- (i) Total variable overhead costs vary in direct proportion to the volume of production i.e. total variable overhead decreases as the production decreases and vice versa
- (ii) Variable overhead per unit remains fixed.

Examples : Cost of indirect materials, indirect labour, salesman's commission, power, fuel.

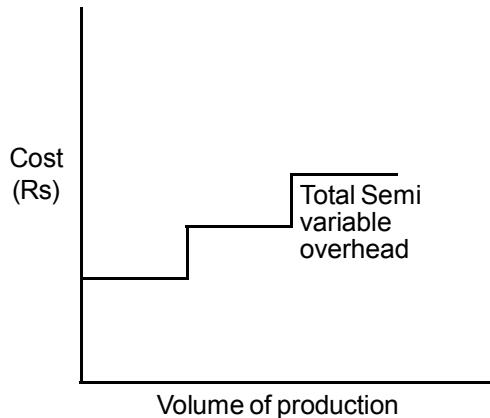
3. Semi-Variable Overhead :

Meaning : This overhead is partly fixed and partly variable. These costs vary in part with the volume of production and in part they are constant, whatever be the volume of production. So, semi-variable costs contain both fixed and variable elements, which are partly affected by fluctuations in the volume of output. It is otherwise known as semi-fixed cost.

Features :

- (i) They are partly fixed & partly variable.
- (ii) They remain fixed upto a certain level of activity and then vary with increase in

output.



Graphic Representation

Examples :

- (i) Telephone expenses include a fixed portion of annual charge plus variable charge according to call. So, total telephone expenses are semi-variable.
- (ii) A salesman is entitled to a fixed salary plus a commission beyond a certain level of output.
- (iii) In case of depreciation, a certain percentage is attributable to lapse of time and hence fixed. Another percentage is attributable to use and hence variable.

Advantages of Classification of Overhead into Fixed and Variable.

The classification of overhead costs into fixed and variable overhead is of great importance in planning, decision making and control as discussed below :

1. Preparation of Budget Estimates : The classification of overhead costs into fixed and variable helps in the preparation of flexible budget. It helps the business to estimate costs at different levels of activities.

2. Decision-Making : The classification is of special importance in making following managerial decisions :

- (i) Fixation of price during depression or recession.
- (ii) Fixation of export pricing
- (iii) Decisions to make or buy
- (iv) Decisions to shut-down or continue.

3. Cost control : According to controllability, overhead costs are classified into controllable and uncontrollable. Fixed costs are mostly uncontrollable. On the otherhand,

variable costs are controllable. For example, rent of building is a fixed cost which is not easily controllable. Cost of materials is a variable cost which may be controlled by purchasing in economic lots or in bulk or by seasonal purchasing.

4. Marginal costing : The classification helps in ascertainment of marginal cost which is a key factor for application of marginal costing technique.

5. Absorption of Overhead : The classification of overhead costs into fixed and variable helps in determining separate absorption rates for fixed & variable overheads. When there is over or under absorption in both fixed & variable overhead, different managerial actions are needed. For example, under-absorption of fixed overhead implies existence of idle capacity.

6. Preparation of Break-even charts : The study of cost-volume-Profit relationship and preparation of break-even charts requires the segregation of cost into fixed and variable.

7. Other uses : For planning capital expenditure, differential & comparative cost analysis also require the cost classification.

10.5.3 CLASSIFICATION BY ELEMENT

This method of classification follows the definition of overhead. Here, the classification is done according to the nature and source of expenditure. On this basis, expenses are classified under three main groups given below :

- (1) Indirect Material cost
- (2) Indirect Labour cost
- (3) Indirect Expenses

It is to be noted that production overhead is mainly susceptible to this classification.

1. Indirect Material cost : These material costs cannot be conveniently identified with and directly allocated to a particular cost centre or cost unit in an economically feasible way. In fact, these costs consist of cost of two types of materials. Materials like fuel, lubricant, cotton waste etc. which do not physically become part of finished products. Whereas the materials like buttons, nut & bolt, thread are actually direct materials.

However, they are considered as indirect materials due to following reasons :

- (a) Cost is very nominal when compared with the cost of the finished product.
- (b) It is of minor importance.
- (c) Process of allocation is so complex that it is convenient to treat such direct materials as indirect materials.

2. Indirect Labour Cost : Such labour costs cannot be conveniently identified with and directly allocated to a particular cost centre or cost unit in an economically feasible way. This cost is common to several units of production. Example : Salary of Supervisor, Security, Manager etc.

3. Other Indirect Expenses : Expenses other than indirect material or indirect labour are other indirect expenses. They cannot be conveniently identified with and directly allocated to a particular cost centre or cost unit in an economically feasible way. Example : Rent, repair, insurance, depreciation of building, administrative expenses like telephone, postage, lighting etc.

10.6 CODIFICATION OF OVERHEAD

Meaning : After classification of overheads, they are usually given code numbers so that each group is easily distinguished from others. Code is a short name of an overhead cost. The code number may be a number or letter or symbol or combination of these. The technique of assigning such code numbers is called codification. For items of factory overhead, code numbers are known as 'Standing Order Numbers' and for administrative and selling overhead they are known as 'Cost Account Number'.

Objectives :

- (i) It is convenient to write a code number in place of full name of overhead.
- (ii) It helps in maintaining secrecy as the name is not revealed at the time of posting & processing of cost data.
- (iii) As lengthy name is minimised, clerical labour is reduced.

(iv) It is needed in mechanised accounting.

Methods of Codification :

The following methods are usually followed for codification :

(i) Numerical Method : In this method, each item of overhead is allotted a number in serial order.

Example : 01	Fuel
02	Lubricant
03	Factory rent

(ii) Decimal Method : This is also a numerical system. The difference is that instead of full numbers, decimals are used. The whole numbers are used to indicate the main groups and decimals represent the Sub-groups.

Example :

1. Production Overhead
- 1.1 Indirect Materials
- 1.1.1 Cotton Waste
- 1.1.2 Lubricant

(iii) Mnemonic Method (Alphabetical Method)

In this method, codes are allotted on the basis of first alphabet of the name of the overhead item. Such codes are easier to remember and subject to less error.

Example : S represents sales

D represents Depreciation

DF represents Depreciation on furniture

(iv) Alpha-numeric Method : In this method, the alphabets are combined with numbers for the purpose of coding. Alphabets denote broad head of expenditure and

numbers are used to indicate sub-group of overheads.

- Example : D1 Depreciation of Plant
 D2 Depreciation of Buildings.
 D3 Depreciation of Furniture

(v) Field Method or Numerical Code : Here, codes are numeric in nature. Each code number consists of nine digits. The first two digits indicate the nature of expenses viz. Variable or fixed. The next three digits indicate head of expense. The next two digits stand for analysis of expenses i.e. they pinpoint on the expenditure. The last two digits indicate the cost centre/department, where expenses are incurred.

Example :

Code	Particulars
10/210/05/12	Fixed / wage / foreman / factory

10.7 COLLECTION OF PRODUCTION OVERHEAD

Collection of overhead means the ascertainment of total amount spent on each item of overhead during a particular period. Production overhead is collected under separate 'standing order numbers'.

Production overhead expenses are collected from the following **sources** :

1. Stores Requisition : The stores requisitions are used for issue of indirect materials from stores. It indicates the standing order number, quantity, value and the department using such materials. The total of stores issued is debited to Production Overhead Account and credited to Stores Leger Control Account.

2. Invoices or Purchase Vouchers : Invoices are the supporting documents for sundry purchases. Sundry purchases are made against purchase requisitions by a department. On scrutiny of invoices, total amount of purchases can be collected. Periodically the total purchases is debited to Production Overhead Account and credited to Cost Ledger Control Account.

3. Wages Analysis sheet or Job cards : Wages paid to indirect labour are collected from the job cards. A monthly wages analysis for a period is prepared from these job cards. The total production overhead wages are debited to Production Overhead Account and credited to Wages Ledger Control Account.

4. Cash Book : Overheads which are paid in cash but not recorded anywhere else can be collected from the Cash Book. Usually these are petty expenses which are paid in cash. The Production Overhead Account is debited and Stores Ledger/ Wages Ledger/Cost Ledger Control Account is credited for indirect materials cost, indirect labour cost and indirect expenses respectively.

5. Subsidiary Records : There are certain overheads which do not result in current cash outlay and need some adjustment or relate to accrued expenses e.g. depreciation,

accrued rent, notional rent, interest on capital etc. These items are recorded periodically in some subsidiary records.

10.8 Questions

Objective Type Questions.

1. Multiple Choice Questions.

- (a) The total of all indirect costs is called
- | | | | |
|------|--------------|-------|------------|
| (i) | Prime cost | (iii) | Overhead |
| (ii) | Factory cost | (iv) | Total cost |
- (b) Classification of overhead into fixed & variable comes under :
- | | | | |
|------|----------------------------|-------|----------------------------|
| (i) | Functional classification | (iii) | Elementwise Classification |
| (ii) | Behavioural classification | (iv) | None |
- (c) Classification of overhead into direct & indirect comes under
- | | | | |
|------|----------------------------|-------|----------------------------|
| (i) | Functional classification | (iii) | Elementwise Classification |
| (ii) | Behavioural classification | (iv) | None |
- (d) Telephone expenses come under
- | | | | |
|------|-------------------|-------|------------------------|
| (i) | Fixed overhead | (iii) | Semi variable overhead |
| (ii) | Variable overhead | (iv) | None |
- (e) Rent of the building is
- | | | | |
|------|-------------------|-------|------------------------|
| (i) | Fixed overhead | (iii) | Semi-variable overhead |
| (ii) | Variable overhead | (iv) | None |
- (f) Electricity charges of a household comes under
- | | | | |
|------|-------------------|-------|-----------------------|
| (i) | Fixed overhead | (iii) | Semivariable overhead |
| (ii) | Variable overhead | (iv) | None |
- (g) Research expenses relating to production is

- | | | | |
|------|-------------------------|-------|-------------------|
| (i) | Administration overhead | (iii) | Selling overhead |
| (ii) | Manufacturing overhead | (iv) | Research overhead |
- (h) Under which overhead, research expenses relating to market trend is identified
- | | | | |
|------|----------------|-------|--------------------------|
| (i) | Administration | (iii) | Selling and distribution |
| (ii) | Production | (iv) | Research |
- (i) Overtime is an example of
- | | | | |
|------|-----------------|-------|-----------------------|
| (i) | Fixed overhead | (iii) | Selling overhead |
| (ii) | Office overhead | (iv) | Distribution overhead |
- 2. Express in one word.**
- (a) When numbers or letters or both are used to identify an overhead is called
- (b) Aggregate of indirect material, indirect wage & indirect expenses is
- (c) The method where Alphabets or Symbols are allotted to codify
- (d) Code number given to administration overhead item
- (e) Code number given to factory overhead item
- 3. Correct the underlined portion.**
- (a) Variable overhead is known as period cost.
- (b) Depreciation is a variable expense.
- (c) Variable overhead is a committed cost.
- (d) Electricity expense is an example of variable overhead.
- (e) Alpha-numeric method of codification is known as Mnemonic Method.
- (f) In Alpha-numeric method, there is a nine-digit code number.
- 4. Fill in the blanks.**
- (a) Any expenditure over and above prime cost is _____.
- (b) Overheads are classified into fixed & variable as per _____ classification.

240 Cost Accounting =

- (c) The other name of fixed overhead is _____.
- (d) Fixed overhead per unit decreases as production _____.
- (e) Variable cost per unit always remains the _____.
- (f) In _____ method of codification, each item of overhead is allotted a number.
- (g) In _____ method of codification, codes are allotted on the basis of first alphabet of the name of the overhead.

5. Answer the following in one sentence.

- (a) Define overhead.
- (b) What is fixed overhead ?
- (c) What is variable overhead ?
- (d) What is Semi-variable overhead ?
- (e) Define numerical code ?
- (f) Write one merit of codification.
- (g) Define codification.
- (h) What is the objective of codification ?
- (i) What is decimal method of codification ?

6. Answer the following within thirty words each.

- (a) State the features of overhead.
- (b) Distinguish between fixed overhead and variable overhead.
- (c) Distinguish between factory and distribution overhead with examples.
- (d) Write a note on behaviour-wise classification.

7. Answer the following in 50 words each.

- (a) What is element-wise classification ?
- (b) Write a note on Semi-variable overhead ?

-
-
- (c) What are the objectives of codification ?
 - (d) Mention six items of overhead under office & Administration overhead.

Long Answer Type Questions.

- 1. Write in brief about classification of overhead.
- 2. Define classification. What are the advantages of classification of overhead into fixed & variable ?
- 3. Define codification. State its objectives. Discuss various methods of codification.
- 4. What is production overhead ? State the sources from which production overhead is collected.

10.9. Answers to objective type questions.

- 1. (a) iii, (b) ii, (c) iii (d) iii, (e) i, (f) iii, (g) ii, (h) iii, (i) ii
- 2. (a) codification, (b) overhead, (c) mnemonic, (d) Cost Account Number
(e) Standing order number
- 3. (a) Fixed, (b) Semi-variable, (c) Fixed, (d) Semi-variable, (e) Alphabetical
(f) Numerical code.
- 4. (a) Overhead, (b) Behaviour-wise, (c) Period cost (d) Increases (e) Same
(f) Numerical, (g) Mnemonic / Alph~~A~~abetical

CHAPTER - 11

ALLOCATION AND APPORTIONMENT OF OVERHEADS

Structure

- 11.0 Introduction
- 11.1 Departmentalisation of Overheads or Primary Distribution
 - 11.1.1 Allocation of Overheads
 - 11.1.2 Apportionment of Overheads.
- 11.2 Secondary Distribution or Reapportionment of Service Costs.
 - 11.2.1 Meaning
 - 11.2.2 Bases for Secondary distribution
 - 11.2.3 Methods of Re-apportionment
- 11.3 Questions
- 11.4 Answers.

11.0 INTRODUCTION

In a manufacturing concern, departments are classified into three categories :

- (1) Production Department
- (2) Service Department
- (3) Partly Producing Department

1. Production Department : In production department actual production takes place i.e. raw materials are converted into finished products through manual or machine operation. Example : Weaving dept, spinning dept, grinding dept, hot mill etc.

2. Service Department : It renders service to other departments. It is not engaged in direct production. For smooth running of production departments its existence is

essential. Example : Electricity, repair, maintenance, purchase, accounting, time-keeping, hospital etc.

3. Partly Producing Department : It is also known as partly servicing department. Normally it is a service department but sometimes it undertakes production activities. Example : A carpentry shop which normally looks after the maintenance job, may manufacture tables, chairs, boxes etc.

11.1 DEPARTMENTALISATION OF OVERHEADS[PRIMARY DISTRIBUTION]

After overhead costs are collected, the next step is to allocate and apportion the overhead to production and service departments. Such allocation and apportionment is known as 'Departmentalisation' or 'Primary Distribution' of overhead.

Objectives of Departmentalisation

Departmentalisation of overheads serves the following objectives.

1. Accuracy : By proper allocation and apportionment of overheads, departmentalisation helps in achieving accuracy for costing of each function or operation.

2. Control : Departmentalisation makes someone responsible for costs incurred in a department. It is called 'Responsibility Accounting'. So overhead costs can be controlled effectively.

3. Use of appropriate methods of absorption : Basis of absorption of overhead may be different for different cost centres. For example, for one machine hour rate & for other cost centre direct labour hour rate may be appropriate. It is possible when overheads are departmentalised.

4. Valuation of work-in-progress : Departmentalisation helps in ascertainment of correct cost of work-in-progress.

5. Cost of service of departments : It helps in ascertaining the cost of various services which is helpful for making estimates while submitting quotations.

6. Decision making : Due to departmentalisation, there is greater accuracy in cost ascertainment and cost control. It ensures accurate forecasting which helps in making correct decisions.

11.1.1 ALLOCATION OF OVERHEADS

Certain items of overhead costs can be identified with a particular department or cost centre. Then such overhead costs should be allotted to that department or cost centre. This is called allocation. In otherwords, allocation of overheads is the process of charging the full amount of an individual item of cost directly to department or cost centre for which this item of cost was incurred. The word 'allocate' is used when the basis is exact. For example, salary of sales managers is allocated to the sales department. The items which are allocated include indirect materials, indirect wages, overtime, idle time, depreciation of machinery, supervision etc.

11.1.2 APPORTIONMENT OF OVERHEADS

Distribution of overhead cost to various departments is known as apportionment. Certain overhead costs cannot be directly charged to a department or cost centre because such costs are common to many cost centres or departments. They are incurred benefitting more than one cost centres. Now the need arises for allotment of such costs to those cost centres on some rational basis which is called apportionment. Thus, ICMA (U.K) defines apportionment as "the allotment of proportions of items of cost to cost centres or cost units". Ex.(i) Insurance of the factory is an expense which can not be allocated to any one department. It is to be shared by all production and service departments on some equitable basis. (ii) When one electric meter is installed in a factory, the total electricity charges should be appioned to all departments.

11.1.2.1 DISTINCTION BETWEEN ALLOCATION AND APPORTIONMENT

Allocation	Appportionment
<ol style="list-style-type: none"> It deals with whole items of cost. It is a direct process. i.e. cost is allocated directly to a cost centre. It is done when the cost centre enjoys the whole of the benefit of the expenses. 	<ol style="list-style-type: none"> It deals with only proportion of cost. It is an indirect process for which suitable bases are selected for allotment. It is done when cost centre enjoys only a proportion of the benefits of the whole expenses.

11.1.2.2 Principles of Apportionment

For apportionment, the determination of a suitable basis is important. The following principles may be taken into consideration for the apportionment of overheads to department.

1. Service or use of benefit Principle : It is based on the principle that overhead costs should be apportioned according to the service or benefit received by a department. It is used when measurement of actual benefit is possible. Ex. : Cost of electricity should be distributed on the basis of its usage by different departments; Rent charges should be distributed according to floor area.

This principle is consistent and fair but it requires maintenance of detailed records.

2. Survey Principle : It may not be possible to determine exactly the extent of benefit/service received by different departments. In such case a survey is made to know the proportion of benefit received by the departments Ex.: The salary of foreman serving two departments can be apportioned after a proper survey which may reveal that 40% of such salary should be apportioned to one department and 60% to other department.

3. Ability to pay Principle : According to the theory of taxation, who earns more should bear higher tax burden. This theory adopts taxation principle. Thus, a department making more profit should bear more proportion of overhead cost and vice versa. This principle is simple to apply. But it is considered to be inequitable because it penalises efficient & profitable ventures which may promote inefficiency.

4. Efficiency or Incentive Principle : Under this principle, the production or sales of each department are pre-determined. The overheads are also budgeted to achieve production or sales target. In this principle, the apportionment of expenses is made on the basis of production target. If the target is exceeded, the cost per unit reduces indicating a more than average efficiency. If target is not achieved the unit cost goes up, disclosing inefficiency of the department.

5. Potential Benefit Principle : Potential benefit means benefit likely to be received. This principle is adopted where measurement of actual benefit is not possible at all or if possible, it is cumbersome to measure and also uneconomical. Ex.: welfare

expenses of the employees are apportioned on the basis of number of employees working in each department.

11.1.2.3 Basis of Apportionment

The following are the most usual basis of apportionment of overheads :

Overhead Costs	Basis of Apportionment
1. Rent, rates, insurance and depreciation of office building	Floor area occupied
2. Repair, maintenance, insurance and depreciation of plant & machinery	Capital value
3. Canteen, staff welfare expenses, supervision, time keeping, training, hospital, recreation	Number of employees
4. Compensation, fringe benefit to workers like Employees State Insurance, contribution to P. F.	Wages
5. Stores	Value of direct materials
6. Material handling charges	Weight of direct materials.
7. Lighting and heating	No. of light points or floor area occupied
8. Power/steam consumption	Horse power of machines or machine hours
9. Factory management & supervision expenses, Research & Development etc.	On the basis of labour hours (where labour is predominant) and machine hour rate (where machine is predominant)
10. Delivery van	Weight and volume of materials

It is to be noted that some overheads can be apportioned on more than one basis. So, proper judgement is needed before selecting an appropriate basis.

Preparation of Overhead Distribution Summary (Primary Distribution)

Primary distribution involves allocation and apportionment of overheads to production and service departments. It is otherwise known as 'Departmentalisation' of overheads. It is done by preparing an overhead distribution summary. The process of preparation involves two steps :

- (i) To allocate those overheads which can be directly identified with a particular department.
- (ii) To apportion those overheads which cannot be identified with a particular department.

The method of primary distribution can be better explained with the help of following illustration :

Illustration.1

Aman Company is divided into four departments : A,B & C are production departments and D is a service department. The expenditures for the whole concern during a period are :

	Rs.			
Rent	12000	Employer's liability insurance		1800
Repairs to plant	8400		Light	1400
Depreciation to plant	5600		Supervision	21000
Fire Insurance	6000		power	10800

The following information are available in respect of the four departments :

	Dept.A	Dept.B	Dept.C	Dept.D
Floor space (sq. ft.)	900	660	540	300
Number of employees	20	15	10	15
H.P. of Machines	1200	600	360	—
Total wages (Rs)	75000	60000	45000	30000
Value of Plant (Rs)	300000	240000	180000	120000
Value of Stock (Rs)	180000	108000	72000	—
Light Points	50	40	30	20

Prepare the statement showing apportionment of overheads.

Solution :**Primary Department Distribution Summary**

Items	Basis of Apportionment	Total (Rs.)	Production Department			Service Dept.(Rs.)
			(Rs.)	(Rs.)	(Rs.)	
1. Rent	Floor space (15:11:9:5)	12000	4500	3300	2700	1500
2. Repair to Plant	Value of plant (5 : 4 : 3 : 2)	8400	3000	2400	1800	1200
3. Depreci- ation of plant	– do –	5600	2000	1600	1200	800
4. Supervision	Wages of employees (5 : 4 : 3 : 2)	21000	7500	6000	4500	3000
5. Fire Insurance	Value of Stock (5 : 3 : 2)	6000	3000	1800	1200	–
6. Power	H.P. of Machines (10 : 5 : 3)	10800	6000	3000	1800	–
7. Light	No. of Points (5 : 4 : 3 : 2)	1400	500	400	300	200
8. Employer's Liability Insurance	No. of Employees (4 : 3 : 2 : 3)	1800	600	450	300	450
Total		67000	27100	18950	13800	7150

11.2 SECONDARY DISTRIBUTION [RE-APPORTIONMENT OF SERVICE COSTS]

11.2.1 Meaning : Service departments assist production departments in the process of production. So, it is essential to apportion the cost of service departments to production departments on a suitable basis. Such a process of apportionment is called 'Reapportionment' or 'Secondary Distribution' of overhead. The secondary distribution is

undertaken after primary distribution (i.e allocation and apportionment of overhead costs to production and service departments is complete)

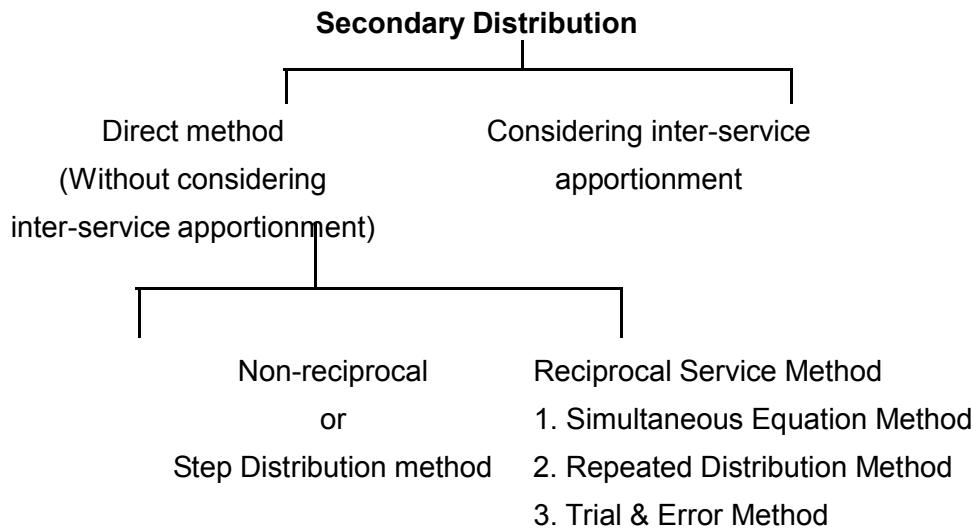
11.2.2 Basis For Secondary Distribution :

The basis for re-apportionment of service department costs is similar to apportionment of overheads as discussed earlier. The common basis of secondary distribution are as follows.

Expenses of Service Dept	Basis of Redistribution
1. Store	Value of materials issued or no. of stores requisitions,
2. Time-keeping	No. of employees; labour hours or machine hours,
3. Accounts, personnel & Training & welfare	No. of workers
4. Canteen	No. of workers; daily count of workers served
5. Power House	Metre reading or H.P. Hour for power, cubic content for lighting, heating
6. Repairs & Maintenance	Hours worked in each dept
7. Purchase	No. of purchase orders placed; value of materials purchased.
8. Factory Hospital and Dispensary	No. of cases attended; No. of employees,
9. Transport	Automobile truck hours or truck miles; tonnage hauled
10. Crane Service	Crane hours; weight of materials handled
11. Time & Motion Study	Time spent for studies
12. Tool room	Direct labour hours
13. Inspection	Value of materials inspected or inspection hours
14. Drawing office	No. of drawings made or man hours worked.

12.2.3 METHODS OF RE-APPORTIONMENT (SECONDARY DISTRIBUTION)

The re-apportionment of service department cost to production department can be done by following any one method as summarised in the chart :



1. Direct Method : Under this method, service dept. costs are apportioned directly to production departments. The services rendered by one service dept to other service dept are ignored.

Illustration-2

A company has three production departments and two service departments. The expenses for these departments as per primary distribution summary are :

	Production Dept.			Service Dept.	
	P1	P2	P3	S1 (Maintenance)	S2 (Store)
Total overhead(Rs)	6300	7400	2800	4500	2000
Direct Labour hours	3600	3200	2200		
No. of requisitions	900	600	500		

Apportion the service department overheads to production departments under direct method.

Solution :

Secondary Distribution Summary

Item	Basis of Apportionment	Total (Rs)	Production Dept.			Service Dept.	
			P1	P2	P3	S1	S2
			(Rs)	(Rs)	(Rs)		

As per Primary distribution : –

		23000	6300	7400	2800	4500	2000
S1	Labour hours	–	1800	1600	1100	(-)4500	
			(18:16:11)				
S2	No. of requisitions	–	900	600	500		(-)2000
			(9:6:5)				
	Total overhead	23000	9000	9600	4400		

NB : Here service dept overheads are apportioned straight to production dept.

2. Step Distribution Method : It comes under non-reciprocal cost apportionment method. This method partly recognises the services rendered by service departments to other service departments. So, a sequence is chosen for apportionment. The sequence starts with the department that renders service to the maximum number of other service departments. (In other words, it starts with that department which receives minimum services from other service departments). Then the cost of second service department which serves the next largest number of departments is apportioned. This process is repeated till the cost of all the service departments are transferred to production departments. In the process, the cost of last service department is apportioned only to the production departments. This method is known as the ‘step ladder system’

Illustration.3.

From the following information, apportion service dept overheads (S1, & S2) to production dept. (P1, P2, & P3) under non-reciprocal apportionment or step distribution method :

252 Cost Accounting

	Production Dept			Service Dept	
	P1	P2	P3	S1 (maintenance)	S2 (store)
Total overhead(Rs)	6300	7400	2800	4500	2000
Labour hours	3600	3200	2200	—	—
No. of requisitions	900	600	500	500	—

Solution :

From the information, it is assumed that Service Dept. S2 provides maximum service to others.

Secondary Distribution Summary

Item	Basis of Apportionment	Total (₹) Rs.	Production Dept			Service Dept	
			P1	P2	P3	S1	S2
As per Summary		23000	6300	7400	2800	4500	2000
S2 No. of Requisitions		—	720	480	400	400	(-)2000
	(9 : 6 : 5 : 5)						
S1 Labour hours			1960	1742	1198	(-)4900	—
	(18 : 16 : 11)						
Total overhead		23000	8980	9622	4398	—	—

NB : Here service dept. costs are apportioned to other service and production cost centres under step distribution method.

3. Reciprocal Service Method :

When there are two or more service departments, they may render services to each other. These inter-departmental services are to be recognised in distributing the overheads of service departments. Cost ascertainment under this method is more accurate but more clerical work is involved.

There are three methods for apportionment of overhead costs on a reciprocal basis :

- (i) Simultaneous Equation Method
- (ii) Repeated Distribution Method
- (iii) Trial & Error Method

(1) Simultaneous Equation Method : Under this method, the true costs of service departments are ascertained first with the help of simultaneous equations. Then these costs are redistributed to production depts. on the basis of given percentages. It is also called Algebraic method.

Illustration.4

From the following information, show the overhead distribution under simultaneous equation method :

Service Dept	Production Dept			Service Dept	
	P1 %	P2 %	P3 %	%	%
S1	40	30	20	-	10
S2	30	30	20	20	-
Total overhead as per					
Primary Distribution	6300	7400	2800	4500	2000

Solution :

Let x = total overhead of S1

y = total overhead of S2

$$\text{Then. } x = 4500 + 20\% y \dots \text{(i)}$$

$$y = 2000 + 10\% \text{ of } x \dots \text{(ii)}$$

$$\text{or } x = 4500 + \frac{20}{100} y \dots \text{(iii)}$$

$$y = 2000 + \frac{10}{100}x \dots \text{(iv)}$$

So, after multiplying eq (iii) & (iv) by 5

$$10x = 45000 + 2y \dots \text{(v)}$$

$$10y = 20000 + x \dots \text{(vi)}$$

Now, multiplying eq. (v) by 5 and rearranging–

$$50x - 10y = 2,25,000 \dots \text{(vii)}$$

$$-x + 10y = 20,000 \dots \text{(viii)}$$

—————
Adding, $49x = 245000$

Thus, $x = 5000$; and $y = 2500$

Now, we can apportion the total overhead thus arrived at on the basis of agreed percentages to the production dept. only as follows :

Item	Total	Production Depts.		
		P1 (₹)	P2 (₹)	P3 (₹)
As per primary distribution	16500	6300	7400	2800
S1 (90% of 5000) [4 : 3 : 2]	4500	2000	1500	1000
S2 (80% of 2500) [3 : 3 : 2]	2000	750	750	500
Total	23000	9050	9650	4300

(ii) Repeated Distribution Method : It is also known as continuous allotment or attrition method. In this method, overhead costs of service depts, are distributed to other depts. i.e. production as well as service dept, in an agreed percentages. This process is repeated until the figures of the service depts are exhausted or become too small for further apportionment.

Illustration.5

Taking the figures of illustration 4, find-out the total overhead of production depts. under Repeated Distribution Method :

Solution :

Secondary Distribution Summary					
Items	Production Dept.		Service Dept		
	P1 (₹)	P2 (₹)	P3 (₹)	S1 (₹)	S2 (₹)
As per Primary distribution	6300	7400	2800	4500	2000
S1	1800	1350	900	-4500	450
S2	735	735	490	490	-2450
S1	196	147	98	-490	49
S2	15	14	10	10	-49
S1	4	4	2	-10	
Total	9050	9650	4300		

(iii) Trial & Error Method : According to this method, cost of one service dept, is apportioned to another service dept. The cost of other service dept. plus the share received from the first service dept, is again apportioned to the first service dept. This process is repeated till the amount to be apportioned becomes negligible. This way the total cost of each service dept, is found out by trial and error. The same result of simultaneous equation method may be obtained with the help of this method.

Illustration.6

Taking the figures of the illustration.4, apportion the cost of service depts, according to 'trial and error method'.

256 Cost Accounting =

Solution :

Items	Service Depts	
	S ₁ ₹	S ₂ ₹
As per primary distribution	4500	2000
(i) Cost of S ₁ apportioned to S ₂ [10% of ₹ 4500]	—	450
(ii) Cost of S ₂ apportioned to S ₁ [20% of ₹ 2450 (2000+450)]	490	—
(iii) Cost of S ₁ apportioned to S ₂ [10% of ₹ 490]	—	49
(iv) Cost of S ₂ apportioned to S ₁ [20% of ₹ 49]	10	—
(v) Cost of S ₂ apportioned to S ₂ [10% of ₹ 10]	—	1
Total	5000	2500

Secondary Distribution Summary

Item	Production Depts		
	P ₁ ₹	P ₂ ₹	P ₃ ₹
As per Primary distribution	6300	7400	2800
• 90% of cost of S ₁ (₹ 5000)			
apportioned to P ₁ , P ₂ , P ₃			
in the ratio of 4 : 3 : 2	2000	1500	1000
• 80% of cost of S ₂ (₹ 2500)			
apportioned to P ₁ , P ₂ , P ₃ in			
the ratio of 3 : 3 : 2	750	750	500
Total	9050	9650	4300

MESCELLANEOUS ILLUSTRATIONS

Illustration – 1

- (I) Sachin & Co is divided into four departments. M, N, O are production departments and P is a service dept. The actual costs for the period are as follows :

	Rs.
Rent	6,000
Repair	3,600
Depreciation	2700
Light	600
Supervision	9,000
Fire insurance (stock)	3,000
Employer's contribution	
to GIS	900
Power	5400

Following data are available in respect of four departments

	M	N	O	P
Area (sq. ft.)	450	330	270	150
No. of workers	72	48	36	24
Total wages (Rs.)	24000	18000	12000	6000
Horse Power of machine	1200	900	600	300
Value of plant (Rs.)	36000	27,000	18000	9000
Value of stock (Rs)	90000	54000	36000	

Apportion the cost of departments on equitable basis.

Solution**Department Overheads Distribution Summary**

Items	Basis of Apportionment	Total	Production Dept.		Service Dept.	
			M	N	O	P
		Rs.	Rs.	Rs.	Rs.	Rs.
1. Rent	Area (sq. ft)	6000	2250	1650	1350	750
2. Repair	Plant value	3600	1440	1080	720	360
3. Depreciation	Plant value	2700	1080	810	540	270
4. Light	Area (Sq.ft.)	600	225	165	135	75
5. Supervision	No. of workers	9000	3600	2400	1800	1200
6. Fire insurance	Stock value	3000	1500	900	600	—
7. Group Insurance	No. of employees	900	360	240	180	120
8. Power	H.P. of machine	5400	2160	1620	1080	540
Total		31200	12615	8865	6405	3315

Illustration -2

From the following information apportion the cost of service departments on non-reciprocal or step distribution method:

	Production Dept		Service Dept.		
	P1	P2	S ₁	S ₂	S ₃
As per			(Power)	(Store)	(Time-Keeping)
Primary	(Rs)	(Rs)	(Rs.)		(Rs.)
Distribution	8,00,000	5,00,000	80,000	45,000	69,000

Other Information

Particular	Production Dept		Service Dept		
	P1	P2	S1	S2	S3
No. of employees	100	90	25	15	10
No. of stores requisitions	50	40	10	—	—
House Powers used	600	400	—	—	—

Solution

Departments	As per Primary Distribution					
	Service Dept :					
	S3	Rs.	69000	-69000		
	S2	Rs.	45000	4500	49500	
	S1	Rs.	80,000	7500	4950	-92450
Production Dept:						
P1	(Rs.)	8,00,000	30,000	24750	55470	910220
P2	(Rs.)	5,00,000	27,000	19800	36980	583780
		1494000	—	—	—	1494000

N.B: From the other information it is clear that

- (i) Time Keeping Dept provides services to maximum number of departments , then comes stores & finally power.
- (ii) Ratio of employees = 100 : 90 : 25 : 15
- Ratio of no . of stores requisitions= 5 : 4 : 1
- Ratio of Horse Power used = 3 : 2

Illustration -3

A factory has two production department P1, P2 and two service departments S1, S2. Primary distribution summary shows the following expenses for different departments : P1 – Rs. 51837, P2 – Rs. 12163, S1 – Rs. 40,000, S2 – Rs. 16,000. The expenses of the service departments are apportioned on a percentage basis as follows :

Dept	P1	P2	S1	S2
S1	50%	40%	–	10%
S2	30%	50%	20%	–

You are required to apportion the cost of service departments by using (i) Simultaneous Equation Method (ii) Repeated Distribution Method (iii) Trial & Error Method

Solution**(i) Apportionment by using Simultaneous Equation Method**

Let x be the total expenses of S1

and

Y be the total expenses of S2

$$\text{Now, } X = 40,000 + 20\% \text{ of } Y \quad (1)$$

$$Y = 16000 + 10\% \text{ of } X \quad (2)$$

Solving simultaneous equations ,

$$X = 40,000 + .20 Y \quad (3)$$

$$Y = 16000 + .10 \times X \quad (4)$$

Putting the value of X in eq – 4

$$Y = 16000 + .10 (40,000 + 20Y)$$

$$= 16000 + 4000 + .02Y$$

$$Y - .02Y = 20,000$$

$$Y = 20,000/.98 = \text{Rs. 20408}$$

Putting the value of Y in eq -3

$$X = 40,000 + .20 \times 20408$$

$$= \text{Rs. 44082}$$

Now the amount of Rs.44082 & Rs. 20408 are to be apportioned to production departments as follows :

Secondary Distribution Summary

Particular	Total	Production Dept	
		P1	P2
	Rs.	Rs.	Rs.
As per primary distribution	64000	51837	12163
90% of cost of S1, apportioned to P1 & P2 in the ratio of 5:4	39,674	22041	17633
80% of cost of S2 apportioned to P1 & P2 in the ratio of 3:5	16326	6122	10204
Total	1,20,000	80,000	40,000

(ii) Apportionment by using Repeated Distribution Method

Overhead Distribution Summary

Item	Production Dept		Service Dept.	
	P1	P2	S1	S2
	Rs.	Rs.	Rs.	Rs.
(I) Overheads as per primary distribution	51837	12163	40,000	16,000
Cost of S1 apportioned in 5:4:1	20,000	16,000	(40,000)	4000
Cost of S2 apportioned in 3:5:2	6000	10,000	4000	(20,000)
(II) Cost of S1 apportioned in 5:4:1	2000	1600	(4000)	400
Cost of S2 apportioned in 3:5:2	120	200	80	(400)
(III) Cost of S1 apportioned in 5:4:1	40	32	(80)	8
Cost of S2 apportioned in 3:5:2	3	5	—	(8)
Total overhead		80,000		40,000

262 Cost Accounting =

(iii) Apportionment by using Trail & Error Method :

(a) Firstly, total costs of each service dept. will be calculated –

Item	Service Dept	
	S1	S2
	Rs.	Rs.
Overheads as per primary distribution	40,000	16,000
Step – 1: Cost of S1 apportioned to S2 (10% of Rs.40,000)	(40000)	4000
Step -2 : Cost of S2 apportioned to S1 [20%of Rs. 20,000 (16000+4000)]	4000	(20000)
Step -3 : Cost of S1 apportioned to S2 (10% of Rs. 4000)	(4000)	400
Step -4: Cost of S2 apportioned to S1 (20%of Rs. 400)	80	(400)
Step - 5: Cost of S1apportioned to S2 (10%of Rs. 80)	(80)	8
	<hr/>	<hr/>
	44080	20408

(b) The costs of service departments will be apportioned over production departments —

Overheads Distribution Summary

Item	Production Dept.	
	Rs.	Rs.
Over heads as per primary distribution	51837	12163
90%cost of S1 apportioned to P1 & P2 in 5:4	22040	17632
80% cost of S2 apportioned to P1 & P2 in 3:5	6122	10204
Total	79999	39999

11.3 Questions

1. Multiple Choice Questions.

- (a) Allotment of whole item of overhead to a cost centre is
(i) Re-apportionment (iii) Absorption
(ii) Allocation (iv) Apportionment
- (b) Allotment of proportion of items to cost centres on an equitable basis is
(i) Reapportionment (iii) Absorption
(ii) Allocation (iv) Apportionment
- (c) Re-apportionment of Service dept. overhead among the production dept. on appropriate basis is called.
(i) Primary distribution (iii) Suplimentary distribution
(ii) Secondry distribution (iv) Additional distribution.
- (d) Factory rent is apportioned on the basis of
(i) No. of employees (iii) Direct wages
(ii) Horse power (iv) Floor Area
- (e) Supervision expenses are apportioned on the basis of
(i) No. of employees (iii) Direct wages
(ii) No. reuisions (iv) Hose power
- 2. Express in one word**
- (a) Allocation & apportionment of overhead costs to production & service dept.
- (b) Allotment of whole item of overhead cost to cost unit
- (c) Allocation, apportionment, re-apportionment of overhead
- (d) The process of charging overheads to products or services
- (e) The process of charging a proportion of overheads to a cost centre

264 Cost Accounting =

3. Correct the underlined portion.

- (a) Depreciation is apportioned cost.
- (b) When actual overhead is less than absorbed overhead, it is under absorption.
- (c) Allocation & apportionment of overhead cost is secondary distribution.
- (d) Power is apportioned on the basis of direct wage
- (e) Steam expenses are apportioned on the basis of floor area.

4. Fill in the blanks.

- (a) Factory rent is apportioned on the basis of _____
- (b) Supervision expenses are apportioned on the basis of _____
- (c) Allocation & apportionment of overhead costs to production & service departments is called _____
- (d) Hospital expenses are apportioned on the basis of _____
- (e) The basis of apportionment of credit control is the _____

5. Answer the following is one sentence

- (a) What is allocation ?
- (b) What is apportionment ?
- (c) What is primary distribution ?
- (d) Define secondary distribution.
- (e) What is ability to pay principle of apportionment ?
- (f) Define survey principle of apportionment.
- (g) What is potential benefit principle of apportionment ?

6. Answer the following within thirty words

- (a) What is departmentalisation ?
- (b) Distinguish between allocation & apportionment of overhead.

- (c) What is service or use of benefit principle ?
- (d) What is secondary distribution ?
- (e) Explain in brief about apportionment ?

7. Answer the following in fifty words.

- (a) Write a note on efficiency principle of apportionment.
- (b) Write a note on survey principle of apportionment with examples.
- (c) What is primary distribution ?
- (d) Write a brief about basis of redistribution.
- (e) Write a note on step distribution method of re-apportionment.

Long Answer type Questions

1. What is departmentalisation ? Outline the objectives of departmentalisation.
2. Define allocation & apportionment. Distinguish between the two
3. Outline the principles of apportionment.
4. What is secondary distribution ? What are its bases ?
5. Explain various methods of secondary distribution.

11.4 Answers to objective type questions :

1. (a) ii (b) iv (c) ii (d) iv (e) i
2. (a) Primary Distribution (b) Allocation (c) Departmentalisation (d) Absorption
(e) Apportionment
3. (a) Allocated (b) over (c) Primary Distribution (d) Horse Power (e) Actual consumption
4. (a) Floor area (b) No. of employees (c) Primary distribution (d) No. of employees
(e) No. of orders.

PRACTICAL PROBLEMS

1. A factory has three production departments X, Y & Z and one service department S. The actual expenses pertaining to a period are as follows :

	Rs.		Rs.
Rent	2000	Employer's Liability	300
Repair	1200	Depreciation	900
Light	200	Supervision	3000
Power	1800	Insurance	1000

Following further details are:

	X	Y	Z	S
Area (Sq. ft)	150	110	90	50
Number of workers	24	16	12	8
Total wages (Rs.)	8000	6000	4000	2000
Value of stock (Rs.)	15000	9000	6000	—
Value of plant (Rs.)	24000	18000	12000	6000

Apportion the above costs to various departments on the most equitable basis by preparing a departmental distribution summary. (Answer : A = Rs. 4205, B = 2965, C = Rs. 2135, D= Rs. 1095)

2. Kapil Ltd. has two production dept P1, P2 and two service dept . S1, S2. For a particular period, the common expenses are as follows :

Power Rs. 28000; Depreciation of plant Rs. 24,000; Manager's salary (plant) Rs. 8000; canteen expenses Rs 8,000; Rent Rs. 5000.

Additional Information :

	P1	P2	S1	S2
Area (sq . ft.)	2000	1500	1000	5000
No. of employees	6	4	3	3
Horse power ratio	5	4	3	2
Plant value (Rs.)	60000	40000	15000	5000

Apportion common expenses to all the departments.

[Answer : $P_1 = \text{Rs. } 30000$; $P_2 = \text{Rs. } 21500$; $S_1 = \text{Rs. } 13000$; $S_2 = \text{Rs. } 8500$]

3. A company has two production departments and three service departments. The expenses for these departments as per primary distribution summary are as follows :

Production Dept		Service Dept		
X	Y	Stores	Time-keeping	Maintenance
Rs.	Rs.	Rs.	Rs.	Rs.
24000	16000	5000	4000	3000

Following information is made available from departments:

	Production Dept		Service Dept		
	X	Y	Stores	Time-keeping	Maintenance
No. of Employees	40	30	20	16	10
No. of stores					
requisitions	24	20	—	—	6
Machine Hours	2400	1600	—	—	—

Apportion the cost of service departments to production departments keeping in view that company makes secondary distribution on non-reciprocal basis

[Answer : X= Rs. 30842; Y = Rs. 21158]

268 Cost Accounting

4. X Ltd. has two production departments P1, P2 and two service departments S1, S2. Service departments give services in the following manner to various departments :

Service Dept

	P1	P2	S1	S2
S1	40%	50%	—	10%
S2	50%	30%	20%	—
Estimated Overhead (Rs.)	7000	6000	18000	8000

Calculate overhead costs for P1 & P2 using –

- (a) Direct apportionment method
(b) Step method (i) apportioning S1 Costs first (ii) apportioning S2 cost first

[Answer : (a) P1= Rs. 20,000.; P2 = Rs. 19000 (b) (i) p1 = Rs 20325; P2= Rs. 18675 (ii) P1 = Rs. 19711; P2 = Rs.19289]

5. A company has two production departments and two services departments Overheads as per primary distribution summary are :

Production Dept.		Service Dept.	
A	Rs. 5400	M	Rs. 5280
B	Rs. 4800	N	Rs. 5640

The expenses of service departments are apportioned on the following basis :

	A	B	M	N
M	55%	30%	—	15%
N	25%	35%	40%	—

Prepare overhead distribution summary under:

- (i) Repeated Distribution method
(ii) Simultaneous Equation Method

[Answer : A = Rs. 11520; B= Rs. 9600]

6. A company has three production departments A,B,&C and two service departments P & Q. Primary distribution summary shows the following figures

Dept	A	B	C	P	Q
Primary Distribution (Rs)	3150	3700	1400	2250	1000

The expenses of the service departments are apportioned on a percentage basis as follows :

Dept	A	B	C	P	Q
P(%)	40	30	20	—	10
Q(%)	30	30	20	20	—

Prepare Secondary distribution summary as per

- (i) Simultaneous equation method
- (ii) Repeated Distribution Method.

[Answer : A= Rs. 4525; B= Rs. 4825; C= Rs. 2150]



CHAPTER - 12

ABSORPTION OF OVERHEAD

STRUCTURE

- | | |
|--------|--|
| 12.1 | Introduction |
| 12.2 | Overhead Absorption Rate |
| 12.2.1 | Objectives of determination of overhead rate |
| 12.2.2 | Factors for formulating overhead rate |
| 12.3 | Methods of Absorption |
| 12.3.1 | Production Unit Method |
| 12.3.2 | Percentage Method |
| 12.3.3 | Hourly Rate Method |
| 12.4. | Methods of Absorption of office and administration Overheads |
| 12.5. | Methods of Absorption of Selling and Distribution Overheads. |
| 12.6 | Under-Absorption and over-absorption of overheads. |
| 12.7 | Questions |
| 12.8 | Answers to Objective type questions. |

12.1 INTRODUCTION

In the last chapter we learnt the process of allocation and apportionment (Primary distribution) and re-apportionment of service department costs to production departments (Secondary distribution). Now the overhead cost of a production department consists of :

- Its own expenses (indirect cost by allocation)
- Share of common expenses (by apportionment)
- Share of expenses of service departments

re-distributed to it (by re-apportionment)

Such total overhead cost of a production department is to be borne by all the cost units pertaining to the production department. It is known as 'Overhead Absorption or Recovery'. It is the last step in the distribution of overheads.

According to CIMA, London, "Absorption is the process of absorbing all overhead costs allocated or apportioned over particular cost centre or production department by the units produced. It is also defined as the charging of overhead to cost units or products."

12.2 OVERHEAD ABSORPTION RATE

It is the rate at which overheads are charged to cost units. For absorption of overhead, a suitable base is determined. The base may be production units, direct material cost, direct labour cost, prime cost, labour hours, machine hours etc. The total overhead of a job is divided by the base to arrive at the rate at which the expenses are to be applied to the production units. This is shown below.

$$\text{Overhead absorption rate} = \frac{\text{Total overheads of the job}}{\text{No. of units in the base}}$$

(Only one rate is computed for any single group of overheads)

The rate may be an actual or predetermined rate. Again, it may be a single (blanket) rate for the entire factory or separate rate for each production department or cost centre.

(a) Actual Rate : This is also known as historical overhead rate. It is computed by dividing the actual overhead by the actual quantum of base.

$$\text{Actual rate} = \frac{\text{Amount of overhead for the period}}{\text{Total number of units of base for the period}}$$

Limitations :

- (i) It can be calculated only when accounting period is over and all data are available. So, in certain situations, use of actual rate is not possible.
- (ii) Due to seasonal & cyclical causes, the actual rate may vary from period to period due to fluctuations in the amount of overheads, the volume of output & efficiency of operation. Thus, comparison becomes difficult.
- (iii) It does not provide any basis for cost control.

- (b) **Pre-determined overhead rate :** This rate is determined in advance before actual production commences. Here, budgeted figures (not actual) are taken to calculate the rate. It is computed by dividing the budgeted or estimated amount of overheads by the budgeted base.

$$\text{Predetermined overhead rate} = \frac{\text{Budgeted overhead for the period}}{\text{No. of units of base for the budgeted period}}$$

Merits :

- (i) This rate enables quick preparation of tenders and fixation of selling price. Hence, it has more practical utility.
 - (ii) Cost of production is estimated much before actual production.
 - (iii) It facilitates comparison of actual with predetermined overheads, thereby cost control becomes easier.
 - (iv) As it is decided in advance, it is not distorted by seasonal or cyclical fluctuation.
 - (v) When used, it derives the benefits of standard costing & budgetary control.
 - (vi) It is useful when cost plus contracts are undertaken.
- (c) **Single or Blanket Rate :** Here, a single rate is determined for the whole factory. It is determined as follows.

$$\text{Blanket Rate} = \frac{\text{Overhead cost for the entire factory}}{\text{Total quantum of the base}}$$

Merits :

- (i) It is easy and convenient to use for making quick estimates.
- (ii) It is suitable for small concerns, where only one product is manufactured or simple processes are followed.

Limitations :

- (i) It is an extreme average. It suffers from the disadvantages of too much averaging.
- (ii) It ignores the large differences among production departments by averaging process.

- (d) **Multiple Rate** : When different rates are computed for each producing department, service department, cost centre it is known as Multiple Rate.

$$\text{Overhead Rate} = \frac{\text{Overhead of each dept}}{\text{Base for the dept}}$$

Merits :

- (i) It helps in correct determination of cost.
- (ii) It helps in flexible budget preparation.
- (iii) It helps in determination of differential cost.

Limitations :

- (i) It involves more clerical cost.
- (ii) It consumes more time.

12.2.1. Objectives of determination of overhead rate :

The determination of overhead rate helps to –

- (i) Compute the amount of overhead to be included in unit cost.
- (ii) Compile cost immediately after production
- (iii) ascertain the value of work-in-progress
- (iv) estimate overhead to be included in unit cost in advance of production.
- (v) absorb overhead in an equitable manner.

12.2.2. Factors for Formulating Overhead Rates:

The following factors are to be considered before formulating overhead rates. In afterwards, followings are the features of an ideal overhead rate.

- (i) **Convenience** : The rate should be simple and convenient in its application. It should avoid using more clerical work.
- (ii) **Consistent and stable** : Frequent changes in the rates create unnecessary problems. So, the rate should remain stable for a period.
- (iii) **Accuracy** : The rate should ensure maximum possible accuracy.

- (iv) **Nature of Work :** The nature of work also affects the selection of the rate. For example, if works performed by various departments are different, it is better to use multiple rate instead of blanket rate.
- (v) **Other Factors :**
 - (a) Distinction between skilled & unskilled workers should be made.
 - (b) It should take into account time, skill, manual, machine work etc.
 - (c) It should be economical in application.

12.3. METHODS OF ABSORPTION OF PRODUCTION OVERHEAD

The following methods are used for absorption of production overhead.

(A) Production Unit Methods

(B) Percentage Methods

1. Percentage on Direct Material Cost
2. Percentage on Direct Labour Cost
3. Percentage on Prime Cost.

(C) Hourly Rate Methods

1. Direct Labour Hour Rate
2. Machine Hour Rate
3. Combined Hour Rate.

12.3.1 Production Unit Method :

It is the simplest of all methods. The rate is determined by dividing the total overheads of a department by the number of units produced.

$$\text{Overhead Rate} = \frac{\text{Amount of Overhead}}{\text{No. of units Produced}}$$

Example : Production overheads = Rs.30000

No. of units produced = Rs.1000

$$\text{Overhead rate} = \frac{30000}{1000} = \text{Rs. } 30 \text{ per unit}$$

So, one unit produced absorbs Rs. 30 for production overheads.

Suitability :

It is suitable where output is uniform i.e. only single product or few grades of the same product are produced.

Advantages :

- (i) It is simple to understand & easy to operate.
- (ii) It gives better results where output is uniform.

Disadvantages :

- (i) It ignores time factor.
- (ii) It does not make any distinctions between jobs done by skilled & unskilled workers.
- (iii) It also ignores the distinction between jobs done by manual labour and those done by machine.

12.3.2 Percentage Methods :

1. Percentage on Direct Material Cost :

In this method, the value of direct materials consumed is adopted as the base for calculating rate of absorption of overhead costs. This rate is determined by dividing the total overheads by the total cost of direct materials and it is expressed in percentage.

$$\text{Overhead Rate} = \frac{\text{Production Overheads}}{\text{Direct material cost}} \times 100$$

Example : Production overhead Rs.2000, Direct material cost Rs 4000

$$\text{Overhead Rate} = \frac{2000}{4000} \times 100 = 50\%$$

Thus, if direct material cost of a job is Rs.60, production overhead to be absorbed by that job will be 50% of direct material cost i.e. Rs.30.

Suitability : This method gives satisfactory results under the following circumstances :

- (i) Where output is uniform i.e. only one kind of product is produced.
- (ii) Where prices of materials do not fluctuate much.
- (iii) Where the same type of material in equal quantities is used for all the units.
- (iv) Where proportion of overheads to total cost is significant.

Advantages :

- (i) It is simple to understand & easy to adopt.
- (ii) It gives accurate results where material prices are fairly stable.
- (iii) It is useful in small business, where material cost forms major part of total cost.

Disadvantages :

- (i) This method is illogical because overhead is not even remotely related to the cost of direct materials. It is unwise to assume that a job requiring costly material will require relatively more overhead.
- (ii) It ignores time factor while most production overheads vary with time.
- (iii) It is not suitable when material prices fluctuate widely.
- (iv) It ignores the distinction between manual work or machine work and also between work done by skilled & unskilled workers.

2. Percentage on Direct Labour Cost

Under this method, direct labour cost is used as the basis for overhead absorption rate. It is computed by dividing the overhead expenses by direct labour cost.

$$\text{Overhead Rate} = \frac{\text{Production overheads}}{\text{Direct Labour cost}} \times 100$$

Example : Production overhead to be absorbed = Rs 6000

Direct labour cost incurred = Rs 10000

$$\text{Overhead Rate} = \frac{6000}{10000} \times 100 = 60\%$$

Thus, if direct labour cost of a job is Rs 40, production overhead to be absorbed by the job will be 60% of Rs 40 i.e. Rs.24.

Suitability : This method is suitable where

- (i) Labour is an important factor of production.
- (ii) Output is uniform
- (iii) Labour rates do not fluctuate widely
- (iv) Ratio of skilled & unskilled labour is constant

Advantages: :

- (i) It is simple & easy to understand
- (ii) It gives importance to the time factor, as wages are generally paid on time basis.
- (iii) Labour rates fluctuate less frequently than the rate of materials. So, it gives better results.

Disadvantages :

- (i) It does not give satisfactory results where workers are paid on piece rate because time factor is not given full consideration.
- (ii) It is not suitable when labour rates fluctuate widely.
- (iii) It does not distinguish between work done by skilled & un-skilled workers.
- (iv) There is no established proof of relationship between direct wages and the overhead costs.
- (v) It does not give satisfactory results where major work is done by machines and workers act only as attendants.
- (vi) Where same operation is performed on different jobs by workers with different rates of pay, even highly paid workers cannot increase their productivity.

3. Percentage of Prime Cost :

Under this method, prime cost is used as basis for overhead absorption rate. In a way, this is a combination of the material cost and labour cost methods. It is computed by dividing the production overhead by prime cost.

$$\text{Overhead Rate} = \frac{\text{Production overhead}}{\text{Prime cost}} \times 100$$

Example : Production overhead to be absorbed = Rs. 10,000

$$\begin{aligned}\text{Prime cost of Products} &= \text{Rs. } 20,000 \\ \text{Overhead Rate} &= \frac{10,000}{20,000} \times 100 = 50\%\end{aligned}$$

Thus, if prime cost is Rs. 100, production overhead to be absorbed by that job will be 50% of Rs. 100 i.e. Rs. 50

Suitability : It is suitable in following cases :

- (i) Where equal importance is given to both materials & labour.
- (ii) Where standard article is to be produced requiring a constant quantity of materials and number of hours engaged upon its production.
- (iii) Where output is uniform

Advantages :

- (i) It is simple to understand & easy to operate
- (ii) Data required for calculating prime cost is readily available.
- (iii) As both material & wages give rise to prime cost, it is extensively used due to custom of trade.

Disadvantages :

- (i) It has the same disadvantages as the first two methods.
- (ii) It ignores the time factor
- (iii) No legal relationship between items of overhead & prime cost.

- (iv) It can be used only when the type of labour and value of material used are constant.

12.3.3 Hourly Rate Methods :

1. Direct Labour Hour Rate

In this method, direct labour hours are used for determination of overhead absorption rate. The rate is computed by dividing the total production overheads by the total direct labour hours for a given period.

$$\text{Overhead Rate} = \frac{\text{Production overhead}}{\text{Direct Labour Hours}}$$

N.B.: Direct Labour Hours means total labour hours minus idle capacity. Only effective net working hours are considered.

Example : Production Overhead to be absorbed = Rs. 1500

Labour hours required for production = 3000

$$\text{Overhead rate} = \frac{1500}{3000} = \text{Re } 0.50 \text{ per hour.}$$

If 30 labour hours are spent on a job, production overhead to be absorbed by that job will be, $\text{Re } 0.50 \times 30 = \text{Rs. } 15$

Suitability : The method is suitable where

- (i) Most of the work is done manually.
- (ii) There is no uniformity in production
- (iii) Percentage method fails to give accurate result.
- (iv) It is desired to take into account the time factor.
- (v) Method of wage payment is uniform.

Advantages :

- (i) It is simple to understand.
- (ii) It is easy to operate because labour hours are readily available from time sheets, job cards etc.

- (iii) It gives full recognition to time factor.
- (iv) It is not affected by output related remuneration scheme.
- (v) It is not affected by the method of wage payment or rate of pay of workers.
- (vi) It is a good method to exercise cost control.

Disadvantages :

- (i) It ignores the distinction between the jobs done by skilled & unskilled workers.
- (ii) It ignores other factors of production like machines.
- (iii) It involves additional clerical labour as a number of records are required to be maintained for recording time spent by worker.

2. Machine-Hour Rate :

In this method, the idea is to determine the amount of money spent when a machine runs for one hour. Thus, machine hour rate is the cost of running a machine for one hour. It is obtained by dividing the amount of factory overhead apportioned to a machine by the number of hours run by the machine during a period.

$$\text{Machine-Hour Rate} = \frac{\text{Production Overhead apportioned to a machine}}{\text{No. of Machine hours}}$$

Example : Overhead to be absorbed = Rs 12,000

No. of machine hours = 4000

Machine- hour rate = = Rs. 3 per hour.

Thus, if a job requires 10 machine hours, the production overhead to be absorbed will be $\text{Rs } 3 \times 10 = \text{Rs. } 30$

Suitability : This method is suitable in those cases where the process of manufacture is carried out by machines and there is very little or particularly no manual labours.

Basis for Apportionment of Various Expenses.

Machine hour rate is calculated for each machine or a group of machines performing similar jobs. So, while computing the rate, the machine is treated as a small department or cost centre. Then apportionment is made as is done among bigger departments.

The basis of apportionment of different expenses are as follows :

Expenses	Basis
Standing Charges or Fixed Charges	
1. Rent & Rates :	Floor Area occupied by each machine
2. Lighting & Heating :	No. of light points/No. of operators/Floor Area occupied by each machine
3. Supervision :	No. of hours devoted by the supervisors to each machine
4. Insurance :	Insured value of each machine
5. Lubricating Oil & Consumable Stores	Capital values of machine/ machine hours/Past experience
6. Cleaning materials	No. of machines/past experience
7. Miscellaneous Expenses	Equitable basis depending upon facts
Machine or Variable Expenses :	
1. Depreciation :	Original Cost-Scrap Life in terms of machine hours
2. Repairs and maintenance :	Capital Values/Machine hours
3. Power :	Horse power of machine/machine hours or both / Actual meter readings
4. Miscellaneous Expenses :	Equitable basis depending on facts

Steps for Computation of Machine Hour Rate

1. The total overheads of the department (both allocated & apportioned) are apportioned to different machines used in the department on some suitable basis.
2. Specific overheads like power, depreciation etc are directly allocated to the machine.
3. Overheads relating to the machine are divided between

- (i) Fixed or standing charges.
- (ii) Variable or machine expenses.

Fixed charges are those which remain fixed irrespective of the use of the machine (e.g. supervision salary, rent, insurance etc). Variable charges (machine expenses) (e.g. power, depreciation, repairs & maintenance etc.) vary with the use of machine.

4. The effective working hours of the machine are estimated in advance.
5. Overheads pertaining to the machine are divided by effective machine hours to arrive at Machine Hour Rate.

Comprehensive Machine Hour Rate

Usually, the wages paid to the machine operators are not included in the machine hour rate since the wages will be treated as direct wages. Some firms include this amount also so that they may know the total amount which will be spent if the machine is used on a job for one hour. If the wages are included, the machine hour rate is termed as 'Comprehensive Machine Hour Rate'.

Format or Statement showing Computation of Machine Hour Rate

	Total per machine (Rs)	Per hour (Rs)
--	---------------------------	------------------

A. Fixed/Standing Charges :

Rent & Rates	x x
Lighting & Heating	x x
Supervision	x x
Insurance	x x
Lubricating Oil & Consumable store	x x
Total Standing Charges	<u> </u> <u> </u>

Standing charges per hour :

$$\frac{\text{Total standing charges}}{\text{Normal working Hours of machine}} \quad x x$$

B. Variable Charges or Machine Expenses :

Depreciation (per hour)	x x
Repair & maintenance (per hour)	x x
Power (per hour)	x x
Machine Hour Rate	x x x

Add : Machine Operator's salary (per hour) x x

Comprehensive Machine Hour Rate x x x

Advantages :

- (i) It gives weightage to time factor.
- (ii) It is an ideal method, where machines are predominantly used for production.
- (iii) It helps to compare the relative efficiencies of operating different machines.

- (iv) Under absorption of overheads would indicate the idle capacity of machines.
- (v) Cost report prepared with this rate helps in decision-making.
- (vi) It provides useful data for estimating cost of production, setting standards and for fixing selling prices for quotations.
- (vii) It is scientific, practical and accurate method of recovery of overhead.

Dis-advantages :

- (i) Where hand labour is equally important, it gives inaccurate results.
- (ii) It is difficult to estimate machine hours. A wrong estimate gives misleading results.
- (iii) Maintenance of records for running hours of each & every machine is difficult, time consuming, involves more clerical work and costly as well.

3. Combined Hour Rate Method :

Where work is done partly by machines and partly by manual labour, a combination of machine hour and direct labour hour method is used to absorb production overheads. Expenses, inseparable from running of the machine, are allocated on the basis of machine hour rate. Other expenses which are not directly attached to the machines are allocated on the basis of direct labour hour rate. The use of this dual rate gives better results and hence, otherwise called 'Dual Hour Rate Method'.

Illustration 1

Calculate the machine hour rate from the following data :

Cost of machine Rs.19200; scrap value Rs 1200; Repair per month Rs.150; standing charges per month Rs.50; Effective working life 10000 hrs; Running time per month 200 hrs; Power used 5 units per hour @ 18 paise

Solution :

Computation of Machine Hour Rate

Particulars	Per Hour (Rs)
(a) Standing Charges : $\frac{50}{200}$	0.25
(b) Variable Charges :	
Depreciation $\frac{19200 - 1200}{10000}$	1.80
Repairs $\frac{150}{200}$	0.75
Power : 5 Units per hour @ 18 paise	0.90
Machine Hour Rate	3.70

Illustration 2

From the following data, calculate machine hour rate :

	Per Annum (Rs)
Rent of the dept (machine occupies 1/5th space of the dept)	780
Lighting (out of 12 men in the dept, 2 men are engaged in the machine)	288
Insurance	36
Cotton Waste	60
Salary of foreman (1/4th of time devoted to this machine by foreman)	6000
Cost of machine is Rs 9200 and its estimated scrap value is Rs. 200	

Other information

- (a) Machine will work for 1800 hrs. Per annum
- (b) Expenditure for repairs will be Rs 1125
- (c) It will consume 5 units of power per hour at the cost of 6 paise per unit
- (d) Working life of the machine will be 18000 hrs.

Solution**Computation of Machine Hour Rate**

(a) Standing Charges	(Rs)
Rent (1/5th of the dept) Rs $780 \times \frac{1}{5}$	156
Lighting (2 out 12 persons are engaged) Rs $288 \times \frac{1}{6}$	48
Foreman's Salary (Devotes 1/4th of his time) Rs $6000 \times \frac{1}{4}$	1500
Insurance	36
Cotton Waste	60
<hr/>	<hr/>
	1800
Standing charges per hour (Rs 1800 \div 1800 hrs)	1.00

(b) Machine Expenses

Depreciation	$\frac{9200 - 200}{18000 \text{hrs}}$	0.50
Repairs	$\frac{1125}{18000 \text{hrs}}$	0.06
Power 5 units @ 6 paise per unit		0.30
Machine Hour Rate		1.86

12.4 METHODS OF ABSORPTION OF OFFICE AND ADMINISTRATION OVERHEADS

Following are the main methods of absorption of office and administration overheads :

- (1) As a percentage of Factory Cost :

$$\text{Overhead Rate} = \frac{\text{Total office & administration overhead}}{\text{Total factory cost}} \times 100$$

- (2) As a percentage of factory overheads :

$$\text{Overhead Rate} = \frac{\text{Total office & administration overhead}}{\text{Total factory overhead}} \times 100$$

- (3) As a percentage to sales :

$$\text{Overhead Rate} = \frac{\text{Total office & administration overheads}}{\text{Sales}} \times 100$$

12.5 METHODS OF ABSORPTION OF SELLING AND DISTRIBUTION OVERHEADS :

Selling and distribution overheads can be absorbed by the following methods :

- (1) **Rate per Article** : It is computed by dividing the total of selling & distribution overheads by no. of units sold.
- (2) **As a percentage of Sales** :

$$\text{Overhead Rate} = \frac{\text{Total selling & distribution overheads}}{\text{Sales}} \times 100$$

- (3) **As a percentage of Factory Cost** :

$$\text{Overhead Rate} = \frac{\text{Total selling & distribution overheads}}{\text{Factory cost}} \times 100$$

- (4) According to the number of orders.
- (5) According to the number of invoices issued.

12.6 UNDER-ABSORPTION AND OVER-ABSORPTION OF OVERHEADS

Meaning : Overheads may be absorbed on the basis of actual rate or predetermined rate. When actual rate is used, overheads absorbed is equal to the overheads incurred. There is no problem of under or over absorption of overhead. However, for calculating the actual rate, one may have to wait for the production to complete. But it is not possible. Thus, most of the concerns absorb overheads by computing the predetermined rate. The application of predetermined rates necessitates estimation of overhead cost in advance. Hence, overhead absorbed may not be equal to overhead actually incurred. Such a deviation is known as under or over-absorption of overhead.

Under-absorption of overheads : When overhead absorbed is less than the overheads incurred, it is called 'under-absorption or under recovery.' For example; Overheads absorbed – Rs 50,000 and actual overheads incurred- Rs 60000. Hence, there is under-absorption to the extent of Rs 10,000 (i.e. Rs. 60,000 – Rs 50,000)

Over-absorption of overheads : When overheads absorbed is higher than the overheads incurred, it is called 'over-absorption or over-recovery'. For example : Overheads absorbed is Rs. 80,000 and actual overheads incurred is Rs 50,000. Hence, there is over-absorption to the extent of Rs30,000 (i.e. Rs 80,000 – Rs.50,000)

Causes of Under/over-absorption : Under or over-absorption of overhead may be due to any one or more of the following causes :

- (i) **Wrong Estimation of overhead costs :** Actual overheads may be more or less than the estimated amount.
- (ii) **Wrong estimation of quantity of output :** Actual output may differ from anticipated output.
- (iii) **Seasonal Fluctuation :** Due to seasonal nature of work, overhead may fluctuate from one period to another period.

- (iv) **Improper Utilisation of Capacity :** Production capacity of an industry may be under/over utilised.
- (v) **Unexpected changes in the method of production :** Unexpected changes in methods of production and application of unsuitable method of absorption may be the causes.
- (vi) **Unexpected expenses of losses :** If it occurs, it results in under/over-absorption of overhead.

Methods of Treatment of Under or Over-absorption of Overheads in Cost Accounts

The treatment of under and over-absorption of overheads depends on the extent of under & over-absorption and the circumstances leading to it. Whatever may be the reason, it obviously vitiates the cost of production. There are three methods which are used for disposing of under and over-absorption of overheads. They are :

- (i) Writing off to Costing Profit & loss account
 - (ii) Carry forward to the subsequent years
 - (iii) Use of supplementary rate.
- (i) **Writing off to Costing Profit and Loss Account :** Where the amount of over and under absorbed overheads is not much or it was caused due to abnormal circumstances, the difference should be transferred to costing profit & loss account at the end of the accounting period.
 - (ii) **Carry forward to the subsequent years :** The under or over-absorbed amount of overheads may be carried forward to subsequent years in the following cases :
 - (a) Where factory overheads account are closed at frequent intervals, the under or over absorbed amount may be transferred to 'overhead reserve account' or 'overhead suspense account' with the assumption that its balance would be wiped off in course of time. It presupposes that the over & under absorption is mainly due to seasonal factor.
 - (b) Where production is affected by business cycle and business cycle extends

over more than a year, the balance amount of a year may be transferred to subsequent years.

- (c) In case of new products, in the beginning years the balance of under or over absorbed overheads may be transferred to the next on the presumption that in the next year there will be more production which will absorb more overheads.
- (iii) **Use of Supplementary rate :** If the amount of under or over absorption is significant, the same is adjusted in the cost of work-in-progress, finished stock & cost of sales by computing the supplementary overhead rates. Under-absorption is adjusted by a plus-rate since the amount is to be added, whereas over-absorption is adjusted by a minus rate since the amount is to be deducted. The supplementary rate is calculated by dividing under/over-absorbed overhead with the actual base.

Example :

	Predetermined	Actual
Overhead (Rs)	60,000	75,000
Machine hour	15,000	15,000
Now, predetermined rate =	$\frac{60,000}{15,000}$	Rs 4 per machine hour

$$\text{Overhead absorbed} = 15000 \times 4 = \text{Rs } 60,000$$

$$\text{Overhead under absorbed} = 75,000 - 60,000 = \text{Rs } 15,000$$

$$\begin{aligned} \text{Suplementray rate} &= \frac{(\text{Actual} - \text{Absorbed}) \text{ overhead}}{\text{Actual Hours}} \\ &= \frac{75000 - 60000}{15000} = \frac{15000}{15000} = +1 \end{aligned}$$

Since it is a plus rate, add the supplementary rate to the predetermined rate to find the

correct rate.

So, correct rate = Rs 4 + Rs 1 = Rs 5

MISCELLANEOUS ILLUSTRATIONS

Illustration-3 :

From the following monthly budget of a department, find out the overhead recovery rates under different methods.

Direct material Rs. 90,000; Direct wages Rs. 120,000; Overheads Rs. 180,000;
Direct labour hours 30,000; machine hours 60,000.

Solution :

(i) Direct Material cost method :

$$\text{Overhead rate} = \frac{\text{Total overheads}}{\text{Cost of direct material}} \times 100 = \frac{180000}{90000} \times 100 = 200\% \text{ of direct material}$$

(ii) Direct Labour Cost Method :

$$\text{Overhead rate} = \frac{\text{Total overheads}}{\text{Cost of direct labour}} \times 100 = \frac{180000}{120000} \times 100 = 150\% \text{ of cost of direct labour.}$$

(iii) Prime cost method :

$$\text{Overhead rate} = \frac{\text{Total overheads}}{\text{Prime cost}} \times 100 = \frac{180000}{210000} \times 100 = 85.71\% \text{ of prime cost.}$$

(iv) Direct labour hour rate method :

$$\text{Overhead rate} = \frac{\text{Total overheads}}{\text{Direct labour hours}} = \frac{180000}{30000} = \text{Rs 6 per labour hour}$$

(v) Machine hour rate method :

$$\text{Overhead rate} = \frac{\text{Total overheads}}{\text{Machine hours}} = \frac{180000}{60000} = \text{Rs 3 per machine hour}$$

Illustration-4

The manufacturing dept. of a company furnishes the following information for a period :

Material Rs 72000; wages Rs 60000; machine hours 20000; Labour hours 24000;
Total overheads charged to the dept Rs 48000.

While executing an order, the relevant data were : materials used Rs 13000; Wages
Rs 7000; Labour hours 2500 hrs; machine hours 2200 hrs.

Prepare a comparative statement of cost of the order by using the following methods :

- (i) Percentage on direct labour cost
- (ii) Direct labour hour rate
- (iii) Machine hour rate

Solution :

(i) Percentage on direct labour cost :

$$\frac{\text{Total overheads}}{\text{Wages}} \times 100 = \frac{\text{Rs. } 48000}{\text{Rs. } 60000} \times 100 = 80\%$$

(ii) Direct labour hour rate :

$$\frac{\text{Total overheads}}{\text{Direct labour hours}} = \frac{\text{Rs. } 48000}{24000} = \text{Rs. } 2$$

(iii) Machine hour rate :

$$\frac{\text{Total overheads}}{\text{Machine hours}} = \frac{\text{Rs. } 48000}{20000} = \text{Rs. } 2.40$$

Comparative Statement

Particulars	% on direct labour	Direct labour hour	M a c h i n e
	hour	Cost method	rate method
	(Rs)	(Rs)	(Rs)
Materials	13000	13000	13000
Wages	7000	7000	7000
Prime Cost	20000	20000	20000
Factory Overhead			
80% of wage	5600		
Rs. 2 per labour hour (2500 hrs)		5000	
Rs. 2.40 per machine hour (2200 hrs)			5280
Work Cost	25600	25000	45280

Illustration - 5

From the data given below calculate the machine hour rate.

	Per Annum
	Rs.
Rent of the department (Space occupied by the machine is 1/5th of the dept)	780
Insurance	84
Cotton, oil etc.	60
Salary of foreman (1/4th for the machine)	6000
Cost of machine	9200

Estimated scrap value	200
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It is assumed that the machine will work for 1800 hours per annum and that it will incur Rs. 1125 for repairs & maintenance for its life. It is further assumed that 5 units of power would be used per hour @ 8 paise per unit. The working life of machine will be 10 years. [CHSE, 1992(A)]

Solution :

Computation of Machine Hour Rate

Particulars	Per Annum	Per Hour
	(Rs)	(Rs)
Standing Charges :		
Rent $\left(\frac{\text{Rs. } 780}{5} \right)$		
	156	
Insurance	84	
Cotton waste, oil etc.	60	
Salary of foreman $\left(\frac{\text{Rs. } 6000}{4} \right)$	1500	
Total	1800	
Standing charges per hour $\left(\frac{\text{Rs. } 1800}{1800} \right)$		1.00
Machine Expenses :		
Depreciation $\left(\frac{\text{Rs. } 9200 - \text{Rs. } 200}{1800 \text{ hrs.} \times 10 \text{ yrs.}} \right)$	0.50	
Repairs $\left(\frac{\text{Rs. } 1125}{1800 \times 10} \right)$		0.06
Power (5×8 paise)		0.40
MACHINE HOUR RATE		1.96

Illustration - 6

Production dept. of a factory furnishes the following information as available for the month of October : Materials used Rs. 54000; Direct wages Rs 45000; Labour hour worked 36000 hrs; machine hours 30000 hrs.; overhead chargeable to the dept. Rs 36000.

For an order executed by the department during the period, the relevant information was as under : Materials used Rs 6000; Direct wages paid Rs 3200; Labour hours worked 3200 hrs; Hours of machine operation 2400 hrs.

Calculate the overhead charges chargeable to the job by the following methods :
 (i) Direct material cost percentage rate (ii) Labour hour rate (iii) Machine hour rate.

[CHSE 1995 (A); 1997 (A)]

Solution :**Statement of cost of the Production Dept. for October.**

	(Rs)
Material used	54000
Direct Wages	45000
Prime Cost	99000
Factory Overheads Charged	36000
Works Cost	135000

Calculation of Overhead Absorption Rate**(i) Direct Material Cost Percentage Rate :**

$$\frac{\text{Factory Overheads}}{\text{Direct Materials}} \times 100 = \frac{\text{Rs. } 36000}{\text{Rs. } 54000} \times 100 = 66.67\%$$

(ii) Labour Hour Rate :

$$\frac{\text{Factory Overheads}}{\text{Direct Labour Hours}} = \frac{\text{Rs. } 36000}{36000} = \text{Re. } 1.00 \text{ per labour hour}$$

(iii) Machine Hour Rate :

$$\frac{\text{Factory Overheads}}{\text{Machine Hours}} = \frac{\text{Rs.} 36000}{30000} = \text{Rs.} 1.20 \text{ per machine hour}$$

Calculation of Overhead Chargeable to the Job

	(Rs)
Material used	6000
Direct wages	3200

(i) Under Direct Material Cost Percentage Rate :

$$80\% \text{ of direct material} = \text{Rs } 6000 \times 80\% = \text{Rs } 4800$$

(ii) Under Labour Hour method :

$$\text{Re. } 1 \text{ per hr} = \text{Re. } 1 \times 3200 = \text{Rs. } 3200$$

(iii) Under Machine Hour Rate :

$$\text{Re } 1.20 \text{ per hr.} = \text{Re. } 1.20 \times 2400 = \text{Rs. } 2880$$

Illustration -7

Calculate Machine Hour Rate from the given particulars :

	Per annum (Rs)
• Rent of the department (Space occupied by the machine 1/5th)	23400
• Lighting (No.of men in the dept. is 12 and 2 work in the machine)	8640
• Insurance	1080
• Cotton waste, Oil etc.	1800
• Salary of foreman (1/4th of time devoted to machine)	180000

Cost of the machine is Rs 276000, Estimated scrap value Rs 6000; Its working life

is estimated to be 10 years & it will run 1800 hrs. per annum; Repairs & maintenance expenditure on machine per annum is estimated at Rs.33750; It consumes 5 units of power per hour at a cost of Rs.2.40 per unit. [CHSE 2008(A), 2012(A)]

Solution :

Computation of Machine Hour Rate

Particulars	Per annum	Per hour
Standing Charges :	(Rs)	(Rs)
Rent ($\text{Rs } 23400 \times 1/5$)	4680	
Lighting ($\text{Rs } 8640 \times 2/12$)	1440	
Insurance	1080	
Cotton waste, oil etc.	1800	
Salary to foreman ($\text{Rs } 180000 \times 1/4$)	45000	
	54,000	
Standing charges per hour ($\text{Rs } 54000/1800$)		30.00

Machine Expenses

Depreciation ($\text{Rs } 276000 - 6000/18000$)	15.00
Repairs ($\text{Rs } 33750/1800$)	18.75
Powers (5 units @ $\text{Rs}.2.40$ per unit)	12.00

Machine Hour Rate	75.75
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Illustration -8

Compute Machine hour rate from the following information given below :

	Per hour	Per annum
Electric power	80p	
Steam	25p	
Water	8p	

Repairs	Rs. 680
Rent	Rs. 350

Other Information available were :

Original cost of machine	Rs. 15000
Present book value	Rs. 5000
Replacement value	Rs. 20000
Rate of depreciation 10%	per annum
Running hours of the machine 2000	

[CHSE]

Solution**Computation of Machine Hour Rate**

Per year	Per hour
(Rs)	(Rs)

Standing Charges :

Rent	350	
Standing charges per hour =	$\frac{Rs.350}{2000}$	0.175

Machine Charges :

Depreciation (10% of Rs. 15000) =	$\frac{Rs1500}{2000}$	0.750
Repairs =	$\frac{Rs680}{2000}$	0.340
Electric Power		0.800
Steam		0.250
Water		0.080
Machine Hour Rate		2.395

Illustration -9

Compute machine hour rate from the following data : Monthly rent & rates for the workshop Rs.600; General lighting for the workshop per month Rs.400; Insurance Premium for the machine per month Rs. 1000; Repair & maintenance expenses of the machine per month Rs.1000; Power consumption 10 units per hour; Rate of power-50 paise per unit; Estimated working hours per annum 2000 hours; workshop's supervisor's monthly salary Rs.1000.

The above machine occupies 1/4th area of workshop. Supervisor is expected to devote 1/2 of his time for supervising this machine. [CHSE 1998 (A) 2009]

Solution

Computation of Machine Hour Rate

	Per year (Rs)	Per hour (Rs)
Standing Charges :		
Rents rates ($\text{Rs } 600 \times 12 \times \frac{1}{4}$)	1800	
General lighting ($\text{Rs } 400 \times 12 \times \frac{1}{4}$)	1200	
Insurance Premium ($\text{Rs } 1000 \times 12$)	12000	
Repair & maintenance ($\text{Rs } 1000 \times 12$)	12000	
Supervisor's Salary ($\text{Rs } 1000 \times 12 \times \frac{1}{4}$)	6000	
	33000	
Standing Charges per hour = $\frac{\text{Rs. } 33000}{2000}$		16.50

Machine Expenses :

Power ($10 \times .50$)	5.00
---------------------------	------

Machine Hour Rate	21.50
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Illustration : 10

From the following particulars, compute machine hour rate :

	Rs
Cost of machine	114800
Installation charge	5400
Anticipated life of machine	10 years
Residual value at the end of 10 yrs	5000
Rent & rates per annum	12000
Insurance of the machine per annum	3000
Repairs & maintenance per annum	8640
Consumable Stores per annum	1200
Total production services per annum	1080

Power cost is 5 units per working hour @ 40 paise per unit

Setting up time

(Non-productive) 400 hours p.a.

There are 300 working days of 8 hrs in a year.

[Delhi, B.Com., 1994]

Solution :

Computation of Machine Hour Rate

Particulars	Per annum (Rs)	Per hour (Rs)
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Standing Charges :

Rent & rates	12000
Insurance	3000
Consumable Stores	1200
Production Services	1080
	17280

$$\text{Standing charges per hour. } \frac{\text{Rs}17280}{2000} \quad 8.64$$

Variable Charges :

Depreciation	$\left[\frac{114800 + 5400 - 5000}{10} \right]$	
	$\frac{11520}{2000}$	5.76
Power (300 × 8 × 5 × 0.40)	$\frac{4800}{2000}$	2.40
Repairs & Maintenance	$\frac{8640}{2000}$	4.32
Machine Hour Rate		21.12

Illustration -11

Cost of machine Rs.100000; Installation charge Rs.10,000; scrap value after its life (15 yrs) Rs.5000; Rent & rates for the shop per month Rs. 200; General lighting for the shop per month Rs. 300; Insurance of shop per annum Rs. 960; Repairs & maintenance per annum Rs. 1000; Power consumption-10 units per hour, rate of power for 100 units

Rs. 20; Estimated working hours per annum 2200 (it includes setting up time of 200 hrs); shop supervisor's salary per month Rs. 600; machine occupies 1/4th of total area of the shop; supervisor is expected to devote 1/5th of his time for supervising the machine.

Solution

Computation of Machine Hour Rate

	Per annum (Rs)	Per hour (Rs)
Standing Charges :		
Rent & rates of shop ($200 \times 1/4 \times 12$)	600	
General Lighting ($300 \times 1/4 \times 12$)	900	
Insurance	960	
Supervisor's salary ($600 \times 1/5 \times 12$)	1440	
	3900	
Standing charges per hour	$\frac{3900}{2000}$	1.95

[Machine hours = $2200 - 200 = 2000$; presumed that the machine does not take current during setting up time]

Variable Charges :

Depreciation	$\left[\frac{100000 + 10000 - 5000}{15 \times 2000} \right]$	3.50
Repairs & maintenance	$\frac{1000}{2000}$	0.50
Power consumtion : 10 units per hr. @ Rs. 20 per 100 units		2.00
Machine Hour Rate		7.95

12.7 QUESTIONS :**(A) Objective Type Questions**

- 1.(a) Supervisor's remuneration is apportioned to the machinery on the basis of
(i) Floor area (iii) Direct method
(ii) Time spent (iv) Capital value of machine
- (b) When material cost is substantial in prime cost, the suitable method of absorption is :
(i) % on material cost (iii) % on prime cost
(ii) % on labour cost (iv) Machine hour rate
- (c) When direct labour cost is a major part of prime cost, the suitable method is :
(i) % on material cost (iii) % on prime cost
(ii) % on labour cost (iv) Machine hour rate
- (d) In a labour intensive industry where production is not uniform, the preferred method of absorption is
(i) Labour hour rate (iii) % on labour cost
(ii) Machine hour rate (iv) % on Prime cost
- (e) Direct material is Rs 2000, direct labour is Rs 3000, factory overhead is Rs 10,000. If prime cost is the basis of absorption, the rate of absorption of factory overhead is :
(i) 50% (iii) 200%
(ii) 100% (iv) 300%
- (f) Which of the following is not a standing charge :
(i) Power (iii) Rent
(ii) Insurance (iv) Rates

- (g) Which is a machine expense :
- | | |
|-----------|------------------------|
| (i) Rent | (iii) Insurance |
| (ii) Rate | (iv) Wage of attendant |
- (h) Administrative overhead is a % of :
- | | |
|----------------------|--------------------|
| (i) Works cost | (iii) Prime cost |
| (ii) Direct material | (iv) Direct labour |
- (i) Factory overhead control account shows a credit balance. So, factory overhead is :
- | | |
|---------------------|------------------|
| (i) Over-absorbed | (iii) Allocated |
| (ii) Under-absorbed | (iv) Apportioned |
- (j) If under/over absorption is negligible, it is charged to :
- | | |
|------------------------------|-----------------------|
| (i) Cost of work-in-progress | (iii) Costing P/L a/c |
| (ii) Cost of goods sold | (iv) C/F to next year |

2. Fill in the blanks

- (a) Allotment of overheads to cost unit is _____
- (b) Total overhead divided by cost unit is called _____
- (c) In _____ intensive industry, the suitable method of absorption is direct labour hour.
- (d) When majority of production is done by machines, the preferred method of absorption is _____
- (e) If under/ over-absorbed amount is _____, the amount is transferred to _____
- (f) When single overhead rate is accepted for the industry as a whole, it is called _____
- (g) Productive labour hours mean total labour hours minus _____

3. Correct the under-lined portion.

- (a) Absorption is the 1st step in overhead distribution.
- (b) Allotment of overheads to cost unit is apportionment
- (c) When products are identical, % on material cost method is most suitable.
- (d) When actual overhead is more than estimated overhead, it is under-absorption.
- (e) When material cost is used as a basis of absorption, time factor is considered.

4. Write in one word

- (a) Last step in distribution of overhead
- (b) Allotment of overhead to cost unit
- (c) Overhead absorbed < overhead incurred
- (d) Overhead absorbed > overhead incurred
- (e) Preferred rate for labour intensive industry
- (f) Cost of running a machine for one hour

5. Answer in one sentence each

- (a) What is machine hour rate ?
- (b) Define absorption.
- (c) What is blanket rate ?
- (d) Define labour hour rate.
- (e) What is under-absorption ?
- (f) What is over-absorption ?
- (g) What is supplementary overhead rate ?
- (h) When under or over-absorbed amount is transferred to costing P/L a/c ?
- (i) When under or over-absorbed amount is carried forward to the next year ?

6. Answer in six sentences each

- (a) What is machine hour rate ? How is it different from labour hour rate ?
- (b) What are the causes of under or over-absorption of overhead ?
- (c) State the advantages of machine hour rate.
- (d) Explain direct labour cost method of factory overhead absorption.
- (e) What are the items of expenses which are taken under standing charges and machine expenses.
- (f) Distinguish between actual rate & pre-determined rate.
- (g) Distinguish between blanket rate and multiple rate.
- (h) Distinguish between under and over-absorption of overhead.

B. LONG TYPE QUESTIONS

- 1. Discuss various methods of absorption of factory overheads.
- 2. What is machine hour rate? What are the steps involved in its computation ?
- 3. What is machine hour rate ? State its advantages and dis-advantages.
- 4. Write a detail note on direct labour cost of absorption of overhead.
- 5. Describle briefly the various bases used for distribution of works overhead to product.
- 6. What do you mean by under and over-absorption of overhead ? What are its causes ? Explain its accounting treatment.
- 7. How would you dispose of under and over-absorbed cost ?

12.8 Answers to objective type questions :

- 1. (a) ii (b) i (c) ii (d) i (e) iii (f) i (g) iv (h) i (i) i (j) iii
- 2. (a). Absorption b. Absorption rate (c) Labour (d) Machine hour rate (e) Costing P/L a/c (f) Blanket rate (g) Idle hours
- 3. a. Last step. b. Absorption. c. Production unit. d. over-absorption. e. Ignored.
- 4. a. Absorption b. Absorption. c. Under-absorption. d. over-absorption e. Direct labour rate. f. Machine hour rate.

PRACTICAL PROBLEMS

1. From the following budget of a Company, prepare the overhead application rates using the following methods.

(i) Direct Labour Hour (ii) Direct Labour Cost (iii) Machine Hour Rate

Factory overhead Rs 62000; Direct labour cost Rs 98000; Direct labour hours 155000; Machine hour 50000.

Ans: (i) Re. 0.40 (ii) 63.26% (iii) Rs. 1.24

2. Overheads of an industry amount to Rs.90000. During the period 100 workers worked for 25 days at 8 hrs per day. Five machines were put to use in 3 shifts, each shift of 8 hrs, on all the 25 days. Calculate (i) labour hour rate (ii) Machine hour rate.

Ans: Hints – Labour hrs 20000; machine hrs. 3000; (i) Rs. 4.50 (ii) Rs.30

3. From the following figures (a) Prepare normal overhead application rates using :
 (i) Direct labour hour method
 (ii) Direct labour cost method
 (iii) Machine hour rate method.

Budgeted Figures	Rs
Factory overhead for the year	58000
Direct labour hour for the year	134600 hrs
Direct labour cost for the year	97800
Estimated machine hours	50500 hrs.

- (b) Prepare a comparative statement of cost showing the result of application of each of the above rates to a job from the following data : Rs.

Cost of material consumed	420
Direct labour cost	450
Direct labour hours	300
Machine hours	200

[Ans: (i) Rs. 999 (ii) Rs. 1140 (iii) Rs. 1098]

4. Compute machine hour rate so as to cover the overhead expenses given below :

	Per hour(Rs)	Per annum (Rs)
Electric power	80 paise	
Steam	25 paise	
Water	8 paise	
Repairs		689
Rent		350

Other information :

Original cost of machine	25000
Present book value	5000
Replacement value	20000
Rate of depreciation	10% p.a

Running hrs of machine, 2000hrs

[Ans : Rs 2.40] [CHSE 1989 A]

5. Calculate machine hour rate for machine M1 from the following data :

Cost of machine Rs 20000

Estimated scrap value Rs 2000

Effective working life 10000 hrs

Running time for four-weekly period 200 hrs

Average cost of repairs per four-weekly period Rs.120

Standing charges allocated to the machine M1 per four- weekly period Rs.40

Power used by the machine : 4 units/per hour at the cost of 5 paise per unit.

[Ans: Rs. 2.80] [CHSE 1999 A]

6. Following annual charges are incurred in respect of the machine in a shop having 5 machines of exactly same type :

	<u>Rs</u>
• Rent & rate (proportional to the floor area occupied) of the shop	4800
• Depreciation on each machine	500
• Repairs & maintenance of 5 machines	1000
• Electric charges for lighting the shop	540
• Power consumed (as per meter) 5p per unit for the shop	3000
• There are 2 attendants for 5 machines, each being paid Rs 60 pm	
• For 5 machines in the shop, there is one supervisor whose emoluments are Rs 250 pm	
• Sundry supplies such as lubricants, jute, cotton waste etc for the shop	450
• Hire-purchase instalment payment for the machine (including Rs 300 interest)	1200
• The machine uses 10 units of power per hour. Calculate machine hour rate.	

[Ans: Rs. 2.79]

[CHSE 2000 A]

7. From the following particulars calculate machine hour rate:

- (a) Cost price of machine is Rs. 10,000, its estimated working life is 10 years and scrap value at the end of its life is Rs. 1000. Estimated working time per year is 2000 hrs. (50 weeks of 40 hrs. each.)
- (b) Electricity used by the machine is 16 units per hour at the cost of Re. 1 per unit.
- (c) Machine requiring a chemical solution which is replaced at the end of each week at a cost of Rs.20 each time.
- (d) Estimated cost of maintenance of the machine per year is Rs 1200
- (e) Department & general works overheads allocated to this machine for the year were Rs.2000.

- (f) Two attendants look after the machine together with five other identical machines. Their combined weekly wages amount to Rs 120. [CHSE 2003 A]
[Ans: Rs. 19.05]
8. Calculate comprehensive machine hour rate from the following information of a saw mill.
- (a) Purchase price of the saw mill is Rs. 40,000
(b) Railways freight, other incidental charges and installation charges Rs. 10,000.
(c) Life of a saw mill is 10 years @ 2000 working hrs. per year.
(d) Consumption of electric power, 20 units per hour @ 10 paise per unit.
(e) Repair, 40% of depreciation.
(f) Lubricating oil @ Rs. 2 per day of 8 hrs.
(g) Consumable stores @ Rs. 10 per day of 8 hrs.
(h) Wages of machine operator @ Rs. 4 per day of 8 hrs.
(i) Scrap value of saw mill is NIL. [CHSE. 2005 A]

9. Calculate machine hour rate of machine A :

	<u>Rs</u>
Consumable stores for machine A	600
Consumable stores for machine B	1000
Repair for machine A	800
Repair for machine B	1200
Heat & light	360
Rent	1200
Insurance of Buildings	4800
Insurance of machines	800
Depreciation of machines	700
Room service	60
General charges	90

Additional Information :

Machine	Working Hrs	Area (Sq. ft)	Book Value (Rs)
A	10,000	100	12000
B	25000	500	20,000

[Ans: Re. 0.306]

10. From the following data of a textile machine room, calculate machine hour rate, assuming that the machine room will work on 90% capacity throughout the year and that a break-down allowance of 10% is reasonable.

There are 3 holidays at Dewali, 2 holidays at Holi, 2 holidays at X-mass, exclusive of Sundays. Factory works 8 hrs a day on 5 days and 4 hrs. on Saturdays. There are 40 machines in the room.

	Per Annum (Rs)
Power	3120
Lighting	640
Salaries of foreman	1200
Lubricating Oil	66
Repairs of machines	1446
Depreciation	785
Total	7257

[Ans : Re. 0.100; working hours of

[B.com, Kerala, 1990]

the machine is 1814 hrs]

