PGDFM
POST GRADUATE DIPLOMA IN FINANCIAL MANAGEMENT

COST & MANAGEMENT ACCOUNTING SYSTEM

Dr. Sanjay Deshmukh
Vice Chancellor,
University of Mumbai

Dr. Ambuja Salgaonkar
Incharge Director,
Institute of Distance and
Open Learning,
University of Mumbai.

Dr. Dhaneswar Harichandan
Incharge Study Material Section,
Institute of Distance and
Open Learning,
University of Mumbai.

Programme Co-ordinator : **Dr. Madhura Kulkarni**
Lecturer-Cum. Asst. Director
IDOL, University of Mumbai

Ms. Megha Bansal
IDOL, University of Mumbai

Course Writer : **Mr. Abhiraj Shivdas**
Alkesh Dinesh Mody Institute
University of Mumbai

: **Prof. Manju Chowdhary**
Borivali (E), Mumbai

: **Mr. Subhash Dalvi**
Alkesh Dinesh Mody Institute
University of Mumbai

: **Prof. Shilpa Palande**
R.J. Thakur College of Arts & Commerce,
Thane (W)

December 2016, Post Graduate Diploma in Financial Management, Cost & Management Accounting System

Published by : Incharge Director
Institute of Distance and Open Learning ,
University of Mumbai,
Vidyanagari, Mumbai - 400 098.

DTP Composed : Ashwini Arts
Gurukripa Chawl, M.C. Chagla Marg, Bamanwada,
Vile Parle (E), Mumbai - 400 099.

Printed by :

CONTENTS

Syllabus

PGDFM - Post Graduate Diploma in Financial Management

Cost & Management Accounting System

Unit	Syllabus	Weight in Paper
I	Cost Accounting - Objective of costing system, cost concepts and cost classification. Management Accounting Nature & Scope, role of management accounting, tool and techniques of management accounting. Distinction between financial accounting, cost accounting and management accounting.	25%
II	Methods of Costing-Unit costing, job & batch cost, contract costing and process costing. Classification of costs. Element of costs-Material cost, labour cost and overheads.	25%
III	Breakeven Analysis - Cost Volume Profit Relationship - Applications of Marginal Costing. Techniques : Fixing Selling Price, Make a Buy, Accepting a foreign order, Deciding sales mix.	25%
IV	Budgetary control & Variance analysis - Preparation of various types of budgets, advantages & limitations, budgetary control report to management. Meaning and uses of standard costing; procedure of setting standards; variance analysis, one way and two way analysis of variance; overall cost variance; material variance; labour variance and overhead variance.	25%

Reference Books -

1) Homgren, Foster 7 Datar - Cost Accounting : A Managerial Emphasis (Pearson)
2) Pillai & Bhagavathi - Cost Accounting (S. Chand)
3) M. N. arora - Cost and Management Accounting Theory and Problems (HPH)

MODULE - I

1

OVERVIEW

Unit Structure

1.1 COST CONCEPT:

Cost is defined as the amount of expenses (actual or notional) incurred on or attributable to specified thing or activity.

"Cost is the measurement in monetary terms of the amount of resources used for the purpose of production of goods or rendering of services"(Institute of Cost and Work Accounts (ICWA) India).

"A cost is the value of economic resources used as a result of producing or doing the things costed." (W M Harper)

This activity of the cost will reflect in the manufacturing of the product or rendering of the services which will cover expenditures under various heads.

1.2 EVOLUTION OF COST ACCOUNTING

For examples: salary, materials, other expenses etc. In the case of service industry, they are interested in the cost of ascertaining the cost of the services it renders. The cost per unit is arrived by dividing the total expenditure incurred to the total number of production or the service rendered. This method can be used when there is only one product. If the manufacturing company manufactures more than one product, it becomes imperative to split the total cost among the number of products.

1.3 COSTING, COST ACCOUNTING AND COST ACCOUNTANCY:

- **Costing:**
  Costing is determining the costs of products/services and also planning and controlling such costs. Costing is defined as, “the techniques and processes of ascertaining costs” (The Chartered Institute of Management Accountants (CIMA). Costing means finding of cost by any process or technique. Principles and rules which are determining the costing are as follows:
  a. The cost of manufacturing a product.
  b. The cost of providing a service.

- **Cost Accounting:**
  Chartered Institute of Management Accountants, London (CIMA) defines Cost Accounting as *“the establishment of budgets, standard costs and actual costs of operations, processes, activities or products: and the analysis of variances, profitability or the social use of funds”.*

  Cost Accounting is a specialized branch of accounting, which involves classification, accumulation, assignment, and control of costs. Cost accounting deals with the collection, analysis of relevant cost data for interpretation and presentation for various problems of management.

- **Cost Accountancy:**
  CIMA defines Cost Accountancy as "*the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability as well as presentation of information for the purpose of managerial decision making*".

  Cost Accountancy is a science as it is a knowledge which a cost accountant should possess to carry out his duties and responsibilities.It is an art as it required skills by the cost accountant to apply principles of cost accountancy to various managerial problems like price, expenditures etc. Practice refers to the efforts taken by the Cost Accountant in the field of cost accountancy. Along with the Theoretical knowledge, cost accountant should possess sufficient practical training and exposure to real life costing problems.

1.4 OBJECTIVES OF COST ACCOUNTING:

The Objectives of Cost Accounting are as follows:

1. **Ascertaining the Cost:**It refers to the cost for a specific product or activity with a reasonable degree of accuracy.
2. **Determining the Selling Price:** It helps in finalizing the cost of the product after which the profit margin is added by the manufacturer and thus the selling price of the product is fixed.
3. **Cost Control and Cost Reduction:** It helps in improving profitability by controlling and reducing costs. This objective is important for current scenario due to increase in competition in the business world.
4. **Management in Decision Making:** Taking Management decision in respect of the price of the product for which the comparison of actual and standard cost is required to analysis the causes of variation and to take corrective decisions.
5. **Ascertaining the Profit:** It helps in ascertaining the profit of the business by matching the cost with the revenue of that activity. The purpose is to determine the profit or loss of any activity on an objective basis.

6. **To Provide basis of operating policies**
7. **To provide information about inefficient and carelessness**
8. **To provide information about actual situation of production activity**
9. **To inform the principles and procedures to be followed in Costing System**
10. **To prepare comparative analysis through data collection**
11. **To estimate cost**
12. **To disclose and minimize the waste**

1.5 IMPORTANCE OF COST ACCOUNTING:

Cost accounting has many importance. Specially, the following parties are benefitted from it.

1. Importance to management

Management is highly benefitted with the introduction of cost accounting. It helps to ascertain the cost and selling price of the product. Cost data help management to formulate the business policies. The introduction of budgetary control and standard cost would be an aid to analyse cost. It also helps to find out reasons for profit or loss. It provides data to submit tender as well. Thus, cost accounting is an aid to management.

2. Importance to investors

Investors can obtain benefit fro the cost accounting. Investors want to know the financial conditions and earning capacity of the business. An investor must gather information about organization before making investment decision and investor can gather such information from cost accounting.

3. Importance of consumers

The aim of costing is to reduce the cost of production to minimize the profit of business. Reduction in the cost is usually passed on the consumers in the form of lower price. Consumers get quality goods at a lower price.

4. Importance to Employees

Cost accounting helps to fix the wages of the workers. Efficient workers are rewarded for their efficiency. It helps to induce incentive wage plan in business.

5. Importance to Government

Cost accounting is one of the prime sources to provide reliable data to internal as well as external parties. It helps government agencies to determine excise duty and income tax. Government formulates tax policy, industrial policy, export and

import policy based on the information provided by the cost accounting.

1.6 SCOPE OF COST ACCOUNTING

1. **Costing:**It is ascertainment of cost of products, processes, jobs services etc.it is the most important function of cost accounting.
2. **Cost Recording:** It is a maintaining record of all the cost (expenses) incurred during the process of the production of the final products/ services. Such records are kept on the basis of double entry system.
3. **Cost Analysis:** All the costs that are recorded are analyzed and categorized separately. Example: Direct and Indirect Costs, Fixed and Variable Costs, etc.
4. **Cost Control:** Cost Accounting, compares the actual cost and standard cost, the difference between the two are analyzed and used for cost control purpose.
5. **Cost Report:** Cost accounting generates periodical reports such as weekly, monthly reports that is used by the management for taking decisions. These reports are used for planning and controlling, performance appraisal and management decision making.
6. **Cost Audit:** It is the verification of cost accounts and to check on the progress of cost accounting plan. Its main focus is on the expenditure and efficiency of performance.

1.7 CLASSIFICATION OF COST:

The process of grouping costs according to their common characteristics is known as Classification. It is systematic procedure of placing the like items together according to their common features.

The different basis of classification of cost are as follows:

a. By Time
b. By Nature, or Elements
c. By degree of traceability of product
d. Association with the product
e. By changes in activity or volume
f. By function
g. Others

- **Classification on the Basis of Time:**

  - **Historical Costs:** Costs which are ascertained after these have been incurred is known as Historical Cost. Historical Cost is Actual Cost. These costs are not available until after the completion of the manufacturing operations or after rendering the services.

  - **Pre-determined Costs:** The cost which are ascertained in advance of production on the basis of a specification of all the factors affecting cost is known as Pre- Determined Costs. These costs are used for planning and control purpose.

- **Classification by nature or element:**
  Cost is composed by three elements i.e. Material, Labour and Expenses.

  - **Material:** the substance from which the final product is made is known as material. According to CIMA, London, material cost is "the cost of commodities supplied to an undertaking".

    - **Direct Material:** The cost which can be easily identified with and allocated to cost units is known as Direct Material. Direct Materials generally become a part of the finished product. Eg. Clay in bricks, Leather in shoes, Steal in machines, Cloths in garments, timber in furniture, etc.

    - **Indirect Material:**The materials that cannot e easily identified with the individual cost units is known as Indirect Material. Eg. Lubricant Oil, Consumables, Nuts and bolts, Coal, Small Tools, Office Stationery.

  - **Labour Cost:** The efforts of the human to convert the materials into finished product is called labour. The labour cost is, "the cost of remuneration (wages, salaries, commissions, bonuses etc.) of the employees of an undertaking" (CIMA).

    - **Direct Labour:** Wages paid to workers directly engaged in converting the raw materials to finished

goods is known as Direct Labour. These wages can be identified with a particular job or process. Eg. Machine Operator Shoe maker, Carpenter, Weaver, Tailor etc.

- **Indirect Labour:** General Character and cannot be conveniently identified with a particular cost unit. Indirect Labour are not directly engaged in the production operations but will only assist or help in production/ operations. Eg. Supervisior, Inspector, Works Manager, Clerk, Peon, Watchman etc.

- **Expenses:**Cost other than material and labour is termed as expenses. It is defined as "the cost of services provided to an undertaking and the notional cost of the use of owned assets". (CIMA).

  - **Direct Expenses:** "Direct Expenses are those expenses which can be identified with and allocated to cost centers or units". (CIMA). These are the expenses that are specifically connected to the production of the final product/ services. Eg. Hire of Plant for a particular job, Travelling expenses, cost of Patent Rights, etc.

  - **Indirect Expenses:** the cost that cannot be directly identified with a particular job, process or work order and are common to cost units or cost centers are known as Indirect Expenses. Eg. Rent and rates, Depreciation, Lighting and Power, Advertising, Insurance, etc.

- **By degree of traceability of product**
  Cost can be distinguished in Direct Cost and Indirect Cost:
  - **Direct Cost:** Costs which can be easily and conveniently identified with a unit of product or other cost object. Examples of Direct Cost, cost of raw materials and wages of machine operator.

  - **Indirect Cost:**Costs than cannot be easily and conveniently identified with a unit of product or other cost object is known as Indirect Cost. Examples: Depreciation of machinery, insurance, lighting, rent, etc.

- **Association with the product**
  - **Product Cost:** The cost which are necessary for the production and which will not be incurred if there is no production is known as Product Cost. Product cost consist of Direct Materials, Direct Labour, and factory overheads.

  - **Period Cost:** Cost which are not necessary for the production and are incurred even if there is no production is known as Period Cost. Example: Showroom rent, salary of company, travel expenses etc. Administration and Selling expenses are generally treated as period cost.

- **By changes in activity or volume**
  Cost factors behave differently when the level of production rises or falls. Certain cost changes in sympathy while other cost remains the same. On the basis of behavior, costs are classified into fixed, variable and semi variable.

  - **Fixed Cost:** The cost remains constant over a specific range of activity for a specific time period i.e. it does not increase or decrease when the volume of production changes. Eg. Building rent, salaries etc.

  - **Variable Cost:** The cost tends to vary in direct proportion to the volume of output i.e. the when the volume of output increases the total variable cost also increases and when the output decreases, the total variable cost also decreases, but the total variable cost per unit remains fixed.

The Characteristics of Variable Cost:

- Variability of the total amount in direct proportion to the volume of output.
- Fixed amount per unit in the face of changing volume.
- Easy and reasonably accurate allocation and apportionment to departments
- This cost can be controlled by functional managers.

- **Semi- Variable Cost or Semi Fixed Cost:**The cost include both fixed and variable cost i.e. these are partly fixed and partly variable. A semi fixed cost will have a fixed component below which it will not fall at any level of the output. Eg. Telephone Bills, Electricity charges etc.

- **By Function:** A cost may be required to be determined functions like manufacturing, selling, research etc. and on this basis functional costs may be classified:
  - **Production Cost:** It is the cost of all the items involved in the production of a product or service. It refers to the cost incurred from the purchasing of raw materials to the packaging of the product.
  - **Administration Cost:**Expenses which are incurred for general management of an organization. These are in nature of indirect cost and are also termed as administrative overheads. Administration cost includes indirect expenses like salaries of office staff, accountants and directors, rent, rates and depreciation of building, postage and telephone.
  - **Selling and Distribution Cost:** Selling costs are related to selling of products and services an include all indirect costs in sales management for the organization. Distribution costs are the costs that has occurred due to handling of the products from the time it is completed till it reaches the final consumer. Selling and Distribution cost includes, salaries and commission of salesmen, and sales manager, expenses of advertisement, rent of showroom, etc. all the expenses related towards sales are included in the selling and distribution cost.
  - **Research and Development Cost:** It is the cost for undertaking research to improve quality of a present product or improve process of manufacturing, develop products etc.

1.8 METHODS AND TECHNIQUES OF COSTING

The methods of costing are referred to the techniques and process employed in the ascertainment of costs. The method of costing to be applied in a concern depends upon the type and nature of manufacturing activity.

- **Job Costing:**Job costing is also known as Specific Order Costing or Production order Costing or Job lot costing. This method is undertaken where the work is undertaken as per customers specific requirements. A job, big or small comprises of a specific quality of a product or service to be provided as per customers specifications. This method is used in printing repair shops, interior decorations, painting etc.

- **Contract Costing:** Contract Costing is a variation of job costing and principles of job costing is applied to this method. The cost unit here is a contract which is of a long duration and may continue over more than one year. It is used in construction of roads, dams, ships, buildings etc.

- **Batch Costing:** The cost of a batch of identical products is ascertained and each batch of products is a cost unit for which costs are ascertained. This method is used in production of cars, toys, readymade garments, shoes etc.

- **Process Costing:** Process Costing is used in mass production and in continuous processes of manufacturing, Costs are accumulated for each process or department. To arrive at a cost per unit, the total cost of a process is divided by the number of units produced. The finished product of one process is transferred to the next process until the final product is manufactured. Examples: chemical works, sugar mills, soap manufacturing, textile mills etc.

- **Operating Cost:** In this method a refinement and a more detailed application of process is involve in costing. A process consists of number of operations. This process analysis minute costs and ensure greater accuracy and better control.

Techniques of Costing

Along with different methods of costing the following techniques are used to ascertain cost:

- **Historical Costing:** The actual costs are ascertained only after they have been incurred. This is a conventional method of cost ascertainment.
- **Absorption Costing:**It is a traditional method where both the fixed and variable methods are charged to product. This is in

complete contrast to marginal costing where only variable costs are charged to products. Until recently this was the only technique used by cost accountants, now a days it has many restrictions.

- **Marginal Costing:** Marginal Cost separates fixed cost and variable cost. It regards only variable cost as the cost of products and fixed cost is treated as period cost. This technique helps and guides management in taking various policy decision under different conditions of business such as decision regarding the pricing of the product, suspension or continuance of a particular product etc.
- **Standard Costing:** The ascertainment and use of standard cists ad measurement and analysis of variances. Standard cost is pre-determined as target of performance and actual performance is measured against standards.
- **Uniform Costing:** The use of the same costing principles, methods and/or practices by several undertakings with a view to achieve uniformity in approach and system.

1.9 ROLE OF COST ACCOUNTANT IN DECISION MAKING

Cost Accountant plays an important role in an organization. It is really imperative that organizations pays attention on the job of cost analysist. Cost Accountancy deals in the preparation of various reports for the information of internal management for the smooth running of the business. All the important decision taken by the management for the future of the company's progress is prepared by the cost accountants.

Cost Accountants perform following duties:

1. To analyse material, labour and overhead expenses.
2. To reconcile daily productions with accounting transactions.
3. To co-ordinate with research and development department for the new products.
4. To assist the controller in developing the cost improvement opportunities.
5. To prepare new product costing as well as to do gross profit analysis for the marketing in order to determine the feasibility before presenting the samples and pricing to the final consumers.

1.10 MANAGEMENT ACCOUNTING, MEANING, OBJECTIVES, NATURE AND SCOPE.

INTRODUCTION:

Management accounting is the study of managerial aspect of financial accounting, "accounting in relation to management function". It shows how the accounting function can be re-oriented so as to fit it within the framework of management activity. The primary task of management accounting is, therefore, to redesign the entire accounting system so that it may serve the operational needs of the firm. If furnishes definite accounting information, past, present or future, which may be used as a basis for management action. The financial data are so devised and systematically development that they become a unique tool for management decision.

Definition:

The Institute of Chartered Accountants of England states “Any form of accounting which enables a business to be conducted more efficiently can be regarded as management accounting”.

“Management Accounting may be defined as the application of accounting techniques to the provisions of information designed to assist all levels of management in planning and controlling the activities of the firm”.

The Institute of Cost and Works Accountants of India defines Management Accounting as “a system of collection and presentation of relevant economic information relating to an enterprise for planning, controlling and decision-making”.

Objectives of Management Accounting:

Main functions of Management Accounting are as follows:

1. **Planning** - Information and date provided by management accounting helps management to forecast and prepare short-term and long term plans for the future activities of the business and formulate corporate strategy. For this purpose management accounting techniques like budgeting, standard costing, marginal costing.

2. **Coordinating:** Management accounting techniques of planning also help in coordinating various business activities. For example, while preparing budgets for various departments like production, sales, purchases, etc., there should be full coordination so that there is no contradiction. By proper financial

reporting, management accounting helps in achieving coordination in various business activities and accomplishing the set goals.

3. **Controlling:** Controlling is a very important function of management and management accounting helps in controlling performance by control techniques such as standard costing, budgetary control, control rations, internal audit, etc.

4. **Communication:** Management accounting system prepares reports for presentation to various levels of management which show the performance of various sections of the business. Such communication in the form of reports to various levels of management helps to exercise effective control on various business activates and successfully running the business.

5. **Financial analysis and interpretation:** In order to make accounting data easily understandable, the management accounting offers various techniques of analyzing, interpreting and presenting this data in non-accounting language so that every one in organization understands it. Ratio analysis, cash flow and funds flow statements trend analysis, etc., are some of the management accounting techniques which may be used for financial analysis and interpretation.

6. **Qualitative Information:** Apart from monetary and quantitative data, management accounting provides qualitative information which helps in taking better decisions. Quality of goods, customers and employees, legal judgments, opinion polls, logic, et, are some of the expels of qualitative information supplied and used by the management accounting system for better management.

7. **Tax Policies:** Management accounting system is responsible for tax policies and procedures and supervises and coordinates the reports prepared by various authorities.

8. **Decision – Making:** Correct decision making is crucial to the success of a business. Management accounting has certain special techniques which help management in short team and long term decisions. For example, techniques like marginal costing, differential costing, discounted cash flow, et., help in decisions such as pricing of products, make or buy, discontinuance of a product line, capital expenditure, etc.

Nature of Management Accounting

The task of management accounting involves furnishing of accounting data to the management for basing its decisions on it. It also helps, in improving efficiency and achieving organizational goals. The following are the main characteristics of management accounting:

1. **Providing Accounting Information:** Management according is based on accounting information. The collection and classification of data is the primary function of accounting department. The information so collected is used by the management for taking policy decisions. Management accounting involves the presentation of information in away it suits managerial needs. The accounting data is used for reviewing various policy decisions. Management accounting is a service function and it provides necessary information to different levels of management.
2. **Cause and effect analysis:** Financial accounting is limited to the preparation of profit and loss account and finding out the ultimate result, i.e., profit or loss management accounting goes a step further. The 'cause and effect' relationship is discussed in management accounting. If there is a loss, the reasons for the loss are probed. If there is a profit, the factors different expenditures, current assets, interest payables, share capital, etc. So the study of cause and effect relationship is possible in management accounting.
3. **Use of Special Techniques and concepts:** management accounting uses special techniques and concepts to make accounting data more useful. The techniques usually used include financial planning and analysis, standard costing, budgetary control, marginal costing, project appraisal, control accounting, etc. The type of technique to be used will be determined according to the situation and necessity.
4. **Taking Important Decisions:** Management accounting helps in taking various important decisions. It supplies necessary information to the management which may base its decisions on it. The historical data is studied to see its possible impact on future decisions. The implications of various alternative decisions are also taken into account while taking important decisions.
5. **Achieving of Objectives:** In management accounting, the accounting information is used in such a way that it helps in achieving organizational objectives. Historical data is used for formulating plans and setting up objectives. The recording of actual performance and comparing it with targeted figures will give an idea to the management about the performance of

various departments. In case there are deviations between the standards set and actual performance of various departments corrective measures can be take at one. All this is possible with the help of budgetary control and standard costing.

6. **Increase in Efficiency:** The purpose of using accounting information is to increase efficiency of the concern. The efficiency can be achieved by setting up goals for each department. The performance appraisal will enable the management to pin point efficient and inefficient spots. An effort is made to take corrective measures so that efficiency is improved. The constant review of working will make the staff cost – conscious. Every one will try to control cost on one's own part.
7. **Supplies Information and not decision:** The management accountant supplies information to the management. The decisions are to be taken by the top management. The information is classified in the manner in which it is required by the management. management accountant is only to guide and not to supply decisions. 'How is the data to be utilized' will depend upon the caliber and efficiency of the management.
8. **Concerned with forecasting:** The management accounting is concerned with the future. It helps the management in planning and forecasting. The historical information is used to plan future course of action.

Scope of Management Accounting

1. **Financial Accounting:** Financial Accounting deals with the historical data. The recorded facts about an organization are useful for planning the future course of action. Though planning is always for the future but still it has to be based on past and present data. The control aspect too is based on financial data. The performance appraisal is based on recorded facts and figures. So management accounting is closely related to financial accounting.

2. **Cost Accounting:** Cost Accounting provides various techniques for determining cost of manufacturing products or cost of providing service. It uses financial data for finding out cost of various jobs, products or processes. The systems of standard costing, marginal costing, differential costing and opportunity costing are all helpful to the management for planning various business activities.

3. **Financial Management:** Financial Management is concerned with the planning and controlling of the financial resources of the firm. It deals with raising of funds and their effective utilization

so to maximize earnings. Finance has become so important for every business that all managerial activities are connected with it. Financial viability of various propositions influence decisions on them. Therefore management accounting includes and extends to the operation of financial management also.

4. **Budgeting and Forecasting:** Budgeting means expressing the plans, policies and goals of the enterprise for a definite period in future. The targets are set for different departments and responsibility is fixed for achieving these targets. The comparison of actual performance with budgeted figures will give an idea to the management about the performance of different departments. Forecasting, on the other hand, is a prediction of what will happen as a result of a given set of circumstances. Both budgeting and forecasting are useful for management accountant in planning various activities.

5. **Inventory Control:** Inventory is used to denote stock of raw materials, goods in the process of manufacture and finished products. Inventory has a special significance in accounting for determining correct income for a given period. Inventory control is significant as it involves large sums. The management should determine different levels of stocks, ie. minimum level, maximum level, re- ordering level for inventory control. The control of inventory will help in controlling costs of products. Management accountant will guide management as to when and from where to purchase and how much to purchase. So the study of inventory control will be helpful for taking managerial decisions.

6. **Reporting to Management:** One of the functions of management accountant is to keep the management informed of various activities of the concern so as to assist it in controlling the enterprise. The reports are presented in the form of graphs, diagrams, index numbers or other statistical techniques so as to make them easily understandable. The management accountant sends interim reports to the management and these reports may be monthly, quarterly, half – yearly. The reports may cover profit and loss statement, cash and found flow statements, stock reports, absentee reports and reports on orders in hand, etc. These reports are helpful in giving a constant review of working of the business.

7. **Interpretation of Data:** The management accountant interprets various financial statements to the management. These statements give an idea about the financial and earning position of the concern. These statements may be studied in comparison to statements of earlier periods or in comparison with the

statements of similar other concerns. The significance of these report is explained to the management in a simple language. If the statements are not properly interpreted then wrong conclusions may be drawn. So interpretation is also important as compiling of financial statements.

8. **Control procedures and Method:** Control procedures and methods are needed to use various factors of production in a most economical way. The studies about cost, relationship of cost and profits are useful for using economic resources efficiently and economically.

9. **Internal Audit:** Internal audit system is necessary to judge the performance of every department. The actual performance of every department and individual is compared with the pre-determined standards. Management is able to know deviations in performance. Internal audit helps management in fixing responsibility of different individuals.

10. **Tax Accounting:** In the present complex tax systems, tax planning is an important part of management accounting. Income statements are prepared and tax liabilities are calculated. The management is informed about the tax burden from central government, state government and local authorities. Various tax returns are to be filed with different departments and tax payments are to be made in time. Tax accounting comes under the purview of management accountant's duties.

11. **Office services:** Management accountant may be required to control an office. He will be expected to deal with data processing, filing, copying, duplicating, communicating etc. He will also be reporting about the utility of different office machines.

1.11 TOOLS AND TECHNIQUES OF MANAGEMENT

- **Financial Planning:**Financial planning is the act of deciding in advance about the financial activities necessary for the concern to achieve its primary objectives. It includes determining both long term and short term financial objectives of the enterprise, formulating financial policies and developing the financial procedure to achieve the objectives.

The role of financial policies cannot be emphasized to achieve the maximum return on the capital employed. Financial policies may relate to the determination of the amount of capital

required, sources of funds, govern the determination and distribution of income, act as a guide in the use of debt and equity capital and determination of the optimum level of investment in various assets.

- **Analysis of Financial Statements:**The analysis is an attempt to determine the significance and meaning of the financial statement data so that a forecast may be made of the prospects for future earnings, ability to pay interest and debt maturities and profitability of a sound dividend policy.

The techniques of such analysis are comparative financial statements, trend analysis, cash funds flow statements and ratio analysis. This analysis results in the presentation of information which will help the business executives, investors and creditors.

- **Historical Cost Accounting:**The historical cost accounting provides past data to the management relating to the cost of each job, process and department so that comparison may be made with the standard costs. Such comparison may be helpful to the management for cost control and for future planning.
- **Standard Costing:**Standard costing is the establishment of standard costs under most efficient operating conditions, comparison of actual with the standard, calculation and analysis of variance, in order to know the reasons and to pinpoint the responsibility and to take remedial action so that adverse things may not happen again. This aspect is necessary to have cost control.
- **Budgetary Control:**The management accountant uses the tool of budgetary control for planning and control of the various activities of the business. Budgetary control is an important technique of directing business operations in a desired direction, i.e., achieves a satisfactory return on investment.
- **Marginal Costing:**The management accountant uses the technique of marginal costing, differential costing and break even analysis for cost control, decision-making and profit maximisation.
- **Funds Flow Statement:**The management accountant uses the technique of funds flow statement in order to analyse the changes in the financial position of a business enterprise between two dates. It tells wherefrom the funds are coming in the business and how these are being used in the business. It helps a lot in financial analysis and control, future guidance and comparative studies.
- **Cash Flow Statement:**A funds flow statement based on increase or decrease in working capital is very useful in long-range financial planning. It is quite possible that there may be sufficient working capital as revealed by the funds flow

statement and still the company may be unable to meet its current liabilities as and when they fall due. It may be due to an accumulation of inventories and an increase in trade debtors.In such a situation, a cash flow statement is more useful because it gives detailed information of cash inflows and outflows. Cash flow statement is an important tool of cash control because it summarises sources of cash inflows and uses of cash outflows of a firm during a particular period of time, say a month or a year. It is very useful tool for liquidity analysis of the enterprise.

- **Decision Making:**Whenever there are different alternatives of doing a particular work, it becomes necessary to select the best out of all alternatives. This requires decision on the part of the management. The management accounting helps the management through the techniques of marginal costing, capital budgeting, differential costing to select the best alternative which will maximise the profits of the business.
- **Revaluation Accounting:**The management accountant, through this technique assures the maintenance and preservation of the capital of the enterprise. It brings into account the impact of changes in the prices on the preparation of the financial statements.
- **Statistical and Graphical Techniques:**The management accountant uses various statistical and graphical techniques in order to make the information more meaningful and presentation of the same in such form so that it may help the management in decision-making. The techniques used are Master Chart, Chart of Sales: and Earnings, Investment Chart, Linear Programming, Statistical Quality Control, etc.
- **Communicating:**The success or failure of the management is dependent on the fact, whether requisite information is provided to the management in right form at the right time so as to enable them to carry out the functions of planning, controlling and decision-making effectively.

The management accountant will prepare the necessary reports for providing information to the different levels of management by proper selection of data to be presented, organisation of data and selecting the appropriate method of reporting.

Relationship between Financial Accounting and Management Accounting

Financial accounting and management accounting are two major sub-systems of accounting information system. Both are concerned with revenues and expenses, assets and liabilities and

cash flows. Both therefore involve financial statements. But the major differences between the two arise because they serve different audiences. The main points of difference between the two are as follows:

Financial Accounting	**Management Accounting**
Financial accounting information is mainly intended for external users like investors, shareholder, creditors, Govt. authorities etc.	Management accounting information is mainly meant for internal user, i.e., management
Under company law and tax law, financial accounting is obligatory to satisfy various statutory provisions.	Management accounting is optional though its utility makes it highly desirable to adopt it.
Financial accounting shows the profit / loss of the business as a whole. It does not show the cost and profit for individual products, processes or departments, etc.	Management accounting provides detailed information about individual products, plants, departments or any other responsibility centre.
It is concerned with recording transactions, which have already taken place, i.e., it represents past or historical records.	It is future oriented and concentrates on what is likely to happen in future though it may use past data for future projections.
Financial reports, i.e., Profit and Loss account and Balance Sheet are prepared usually on a year to year basis.	Management accounting reports are prepared frequently, i.e, these may be monthly, weekly or even daily depending on managerial requirements
Companies are required to prepare financial accounts according to accounting standards issued by the Institute of chartered accountants of India.	Management accounting is not bound by accountings standards. It may use any practice which generates useful information to management.
Financial accounting prepares general purpose statements Profit & Loss account and Balance sheet which are used by external users.	In Management accounting special purpose reports are prepared, eg,, performance report of sales manager or any other department manager which are used by top level Management.

Financial statements, i.e., P&L A/c and Balance sheet are published for general public use and also sent to share holders. These are required to be audited by the chartered Accountants.	Management accounting statements are for internal use and thus neither published for general public use nor these are required to be audited by chartered accountants.
Financial accounting provides information in terms of money only.	Management accounting may apply monetary or non monetary units of measurements for example information may be expressed in terms of Rs. or units of quantity, machine hours, labour hours, etc.

Relationship between Cost Accounting and Management Accounting

The distinction between cost accounting and management accounting may be made on the following points:

Cost Accounting	**Management Accounting**
Scope of cost accounting is limited to providing cost information for managerial uses.	Scope of management accounting is broader than that of cost accounting as it provides all types of information, i.e., cost accounting as well as financial accounting information for managerial uses.
Main emphasis is on cost ascertainment and cost control to ensure maximum profit.	Main emphasis is on planning, controlling and decision – making to maximize profit.
Various techniques used by cost accounting include standard costing and variance analysis, marginal costing and cost volume profit analysis, budgetary control, uniform costing and inter-firm comparison, etc.	Management accounting also uses all these techniques used in cost accounting but in addition it also uses techniques like ratio analysis, funds flow statement, statistical analysis operations research and certain techniques from various branches of knowledge like mathematics, economics, etc. which so ever can help management in its tasks

Evolution of cost accounting is mainly due to the limitations of financial accounting	Evolution management accounting is due to the limitations of cost accounting. In fact, management accounting is an extension of the managerial aspects of cost accounting.
Maintenance of cost records has been made compulsory in selected industries as notified by the Govt. from time to time.	Management accounting is purely voluntary and its use depends upon its utility to management.
It is based on data derived from financial accounts	It is based on data derived from cost accounting, financial accounting and other sources.
In the organizational set up, cost accountant is placed at a lower level in hierarchy than the management accounting	Management accounting is generally placed at a higher level of hierarchy than the cost accounting
Cost accounting system can be installed without management accounting	Management accounting cannot be installed without a proper system of cost accounting.

The Management Accountant

Management accounting provides significant economic and financial data to the Management and the Management Accountant is the channel through which this information efficiently and effectively flows to the Management.

The Management Accountant has a very significant role to perform in the installation, development and functioning of an efficient and effective management accounting system. He designs the frame work of the financial and cost control reports that provide each managerial level with the most useful data at the most appropriate time. He educates executives in the need from control information and ways of using it. His position is unique with respect to information about the organization. Apart from top management no one in the organization perhaps knows more about the various functions of the organization than him. He is as the chief intelligence officer or financial advisor or financial controller of the management. He gathers information, breaks it down, sifts it out and organizes it into meaningful categories. He separates relevant and irrelevant information and then ranks relevant information

according to degree of importance to management. He reports relevant information in an intelligible form to the management and sometimes also to those who are interested in the information outside the company. He also compares the actual performance with the planned one and reports and interprets the results of operations to all levels of management and to the owners of the business.

Functions of the Management Accountant

It is the duty of the management accountant to keep all levels of management informed of their real position. He has, therefore, varied functions to perform. His important functions can be summarized as follows:

1. Planning: He has to establish, coordinate and administer as an integral part of management, an adequate plan for the control of the operations. Such a plan would include profit planning, programmes of capital investment and financing sales forecasts, expense budgets and cost standards.
2. Controlling: he has to compare actual performance with operating plans and standards and to report and interpret the results of operations to all levels of management and the owners of the business. This is done through the compilation of appropriate accounting and statistical records and reports.
3. Coordinating: He consults all segments of management responsible for policy or action. Such consultation might concern any phases of the operation of the business having to do with attainment of objectives and the effectiveness of the organization structures and policies.
4. Other Functions:
    a. He administers tax policies and procedures.
    b. He supervises and coordinates the preparation of reports to government agencies.
    c. He ensures fiscal protection for the assets of the business through adequate internal control and proper insurance coverage.
    d. He carries out continuous appraisal of economic and social forces, and the government influences, and interprets their effect on the business.

Questions

Short Answers

1) Nature of Cost Accounting
2) Scope of Cost Accounting
3) Objectives of Cost Accounting
4) Define Management Accounting
5) List few functions of Management accounting
6) State two differences between Management accounting & financial accounting
7) State two differences between Management accounting and cost accounting
8) What are the duties of a management accountant?
9) Name any 5 techniques of management accounting.
10) State any 3 objectives of management accounting

Long Answers:

1) Explain the meaning, nature and scope of Cost Accounting.
2) Explain the various ways of classification of cost.
3) Define management accounting & explain its objectives.
4) Discuss in detail the nature & scope of management accounting
5) Management accounting is nothing more than the use of financial information for management purposes. Explain this statement & clearly distinguish between management accounting and financial accounting.
6) Who is a management accountant? Explain his role & functions in an organisation.

MODULE - II

2

UNIT COSTING

Unit Structure :

2.1 INTRODUCTION

Different industries follow different methods to establish the cost of their product. This varies by the nature and specifics of each business. There are different principles and procedures for performing the costing. However, the basic principles and procedures of costing remain the same. Some of the methods are mentioned below:

- Unit costing
- Job costing
- Contract costing
- Batch costing
- Operating costing
- Process costing
- Multiple costing
- Uniform costing

In this module we shall understand Unit Costing.

2.2 DEFINITION OF UNIT OR OUTPUT COSTING

"Production cost accounting or unit cost accounting is such a method of cost ascertainment which is based on production unit. It is applicable where the production work is done continuously and the units are of same types of manufactured identical" - Herold J. Wheldon

From the above definition we can understand that Unit Costing is used in the industries with the following characteristics:

1. Production should be uniform or homogeneous and a continuous affair;
2. The units of production should be identical
3. The cost units should be physical and natural
4. Per unit cost has to be determined, for example per ton, per meter, per kg, etc.

Brick making, mining, cement manufacturing, flour mills are examples of industries using Unit Costing.

Under Unit Costing, generally no apportionment of cost is done because all the expenses are made on a similar type of production. But where production is done for a various grades or for various sizes, their expenses have to be apportioned on the basis of size or grades in detail.

2.3 OBJECTIVES OF UNIT COSTING:

- To know the total cost of production and per unit cost within specific period.
- To classify cost under related categories such as Prime Cost, works cost, cost of Production, etc. and have a detailed analysis in order to determine per unit cost.
- To determine the effect of each element of cost to have control over costs.
- To compare the cost during two or more periods.
- To make efforts for cost control on the basis of comparative analysis.
- To determine proposed setting price to earn desired profit.
- To determined tender price on the basis of cost data and future prospects.

2.4 LIMITATIONS OF UNIT COSTING:

Unit or output costing is very much important method for ascertaining the total cost and cost per unit, but it is not free from certain limitations. These are as under:

- *Limitations of historical cost:* unit or output costing, being basically of historical nature, suffers from all the defects of historical costing.
- *Useful only for homogeneous products:* this costing method can be used only for homogeneous products and not for heterogeneous products.
- *Not sufficient for cost control:* this costing system simply determines total cost and per unit cost of the products which is by itself not sufficient for cost control.
- *Arithmetical accuracy cannot be checked:* under this system, generally a statement is prepared which does not from a part of the double entry system. Therefore, arithmetical accuracy cannot be checked under this system

2.5 ELEMENTS OF COST UNDER UNIT COSTING:

In output costing in order to determine total cost and per unit cost, collection of various elements of cost is done as follows –

Materials – The quantity and value of material consumed is determined by preparing a Material Abstract. The materials which are issued from stock are valued on an appropriate basis.

Labour – As required, wages analysis sheet is prepared so that direct and indirect labour cost cab be determined.

Direct Expenses – In addition to material and labour, there are certain other expenses incurred which are termed as direct expenses.

Overheads – The overheads are debited to production for the period for which the cost us being determined. These overheads expenses' are taken from the financial records. There are certain expenses which cannot be determined before the end of the accounting period.

2.6 TENDERS OR QUOTATIONS:

Very often a producer in response to an advertisement in the press is required to submit a tender or to quote prices for the supply of the commodities he produces or for completing a job. A tender has to be prepared very carefully as the receipts of orders depend upon the acceptance of quotations or tenders supplied by the manufacturer. The preparation of tenders requires information regarding prime cost, works, administration and selling overheads and profit of the preceding period.

The manufacturer has to ascertain and find out the possible changes in prices of material, rates of wages and other costs. He has to ascertain the amount of variable, semi-variable and fixed overheads on the basis of past experience. He must also have a reasonable amount of profit by taking into consideration the market condition.

In preparation of estimates or tenders, overheads are generally estimated as percentages i.e. works overheads on wages and administration, selling and distribution overheads on works cost basis.

2.7 METHODS OF UNIT OR OUTPUT COSTING:

Unit or output costing is used to determine the cost per unit of production in a specific period of time. For this, the following methods are used:

- Cost sheet
- Manufacturing account

2.7.1 Cost sheet :

Cost sheet is "a document which provides for the assembly of the estimated detailed cost in respect of a cost center pool a cost unit". It is a period's document of cost designed to exhibit the total cost and the unit cost of products in an analytically and detailed form. In other words, a cost sheet presents cost information in such a manner that it can show cost of total production, quantity produced and cost of production per unit.

Cost sheet is an operating statement. It analyses and classifies the expenses on different items for a particular period in a tabular form. It may be prepared weekly, monthly, quantity, half yearly or yearly at any convenient interval of time. Similarly, it may be prepared on the basis of actual or estimated cost depending on the purpose to be achieved. It is online memorandum statement, not an account. It does not form a part of the double entry system.

Elements of Cost Sheet:

1. Direct Material
2. Indirect Material
3. Direct Labour
4. Indirect Labour
5. Direct Expenses
6. Indirect Expense

All the elements described above have been discussed in detail in the Cost Sheet Module. Students are advised to refer to the same.

2.7.2 Manufacturing Account

When the data related with the cost of goods manufactured of a commodity are presented is a conventional form of account i.e. in T shape from, and then it is known as Manufacturing Account. Generally, a manufacturing concern prepares this account to exhibit cost of production or cost of goods manufactured.

Pro-Forma Manufacturing Account

Direct Materials			Closing Stock:		
Opening Stock:			Raw Materials	x x	
Raw Materials	x x		Work-in-Progress	x x	x x
Work-in-Progress	x x	x x	Cost of the goods		
Purchases:			transferred to Trading		
Raw Materials	x x		Account		x x
Work-in-Progress	x x	x x			
Carriage inwards		x x			
Direct Labor					
Factory wages		x x			
Direct Expense					
Factory rent	x x				
Fuel, power, gas etc.	x x				
Factory Insurance	x x				
Depreciation on factory building					
etc. etc.	x x	x x			
Manufacturing over-heads		x x			
		x x			x x

Preparation of manufacturing account

A manufacturing account is based on the principle of national account. Therefore, it shows opening stock of work-in-progress and other direct and indirect costs of goods manufactured (i.e. factory costs) on its debit side and closing side and closing stock of work-in-progress and sale of scrap or wastage on its credit side. Generally, the balancing figure takes palace in credit side which is called "cost of goods manufactured or cost of production C/D". This account show the cost production which is transferred to the trading account.

Manufacturing account for manufacturing profit and loss

When a manufacturing account is prepared to ascertain manufacturing profit and loss, then trading value of manufacturing cost is kept in credit side instead of cost of production. In other words, all items on debit and credit side will be the same as mentioned above. But, trading price or trading value of cost of production will be shown on the credit side and balancing figure will be put on debit side of this account as "manufacturing profit" or "manufacturing loss".

Illustration

The accounts of Kool Kool Company Ltd. show for 20X6:

Materials Rs 350,000;
Labour Rs 270,000;
Factory Overheads Rs 81,000
and Administration Overheads Rs 56,080.

What price should the company quote for a refrigerator? It is estimated that Rs 1,000 in material and Rs 700 in labour will be required for one refrigerator. Absorb factory overheads on the basis of labour and administration overheads on the basis of works cost. A profit of 12½ % on selling price is required.

Solution:

Statement of Cost

Particulars	Rs.
Materials	350,000
Labour	270,000
Prime Cost	**620,000**
Factory Overheads	81,000
Works Cost	**701,000**
Administration Overheads	56,080
Total Cost of Production	**757,080**
Percentage of Factory Overheads to Labour: =(81,000/270,000)*100 = 30%	
Percentage of Administration Overheads to Works Cost: =(56,080/701,000)*100 = 8%	

Statement of Selling Price of a Refrigerator

Particulars	Rs.
Materials	1,000
Labour	700
Prime Cost	**1,700**
Factory Overheads (30% on Labour)	210
Works Cost	**1,910**
Administration Overheads (8% of Works Cost)	152.80
Total Cost of Production	**2062.80**
Add Profit (1/8 on Sales or 1/7 of Cost)	294.69
Selling Price per Refrigerator	**2,357.49**

- Determine whether unit costing would be appropriate in the following industries

a. Brick Making
b. Oil Exploration
c. Cement
d. Original Equipment Manufacturer
e. Garments
f. Jewelry making

- Write Short notes on:

1. Unit Costing
2. Advantages of Unit Costing

- When would Unit Costing be appropriate to determine costs over other methods?

2.8 JOB COSTING

A method of costing in which cost of each 'job' is determined is known as Job Costing. Here job refers to a specific work or assignment or a contract where the work is performed according to the customer's instructions and requirements. The output of each job consists of normally one or less number of units. In this method, each job is considered as a distinct entity, for which cost is ascertained. Job Costing is applied when:

- The execution of the jobs is on the basis of client's specification(s).
- All the jobs are heterogeneous in many respects, and each job requires separate treatment.
- There is a difference in WIP (Work in progress), of each period.

Job Costing is best suited for the industries where specialized products are manufactured as per customer needs and demands. Some examples of those industries are Furniture, Ship Building, Printing Press, Interior Decoration etc.

2.9 DOCUMENTS USED IN A JOB ORDER COST SYSTEM:

The following are the important documents used in a Job Order Cost System:

(I) Production Order or Manufacturing Order:

This is a works order authorizing the production department to produce a specified quantity of a product which constitutes the job.

(II) Cost Sheet:

For recording costs, very often a separate record called a cost sheet is used. The cost sheet and the works order may also be combined, when costs are recorded on the production order itself.

(III) Other Documents:

The other documents which are used as control mechanism by the dispatching function are: Material Requisitions, Tool Orders, Time Tickets, Inspection Order, etc.

2.10 ADVANTAGES OF JOB ORDER COSTING:

i) Profitability of each job can be individually determined.

ii) It provides a basis for estimating the cost of similar jobs which are to be taken in future.

iii) It provides the detailed analysis of the cost of material, labour and overheads for each job as and when required.

iv) Plant efficiency can be controlled by confining attention to costs relating to individual jobs.

v) Spoilage and defective work can be identified with a specific job and responsibility for the same may be fixed on individuals.

vi) By adopting pre-determined overhead rates in job costing, we can get all advantages of budgetary control.

vii) Job costing is essential for cost-plus contract where contract price is determined directly on the basis of cost.

2.11 LIMITATIONS OF JOB ORDER COSTING:

1) It is expensive to operate as it requires considerable detailed clerical work.

2) With the increase in the clerical work, chances of errors are increased.

3) Job order costing cannot be efficiently operated without highly developed production control system. The job costing requires intricate factory organization system.

4) The costs as ascertained are historical as they compiled after incidence and therefore does not provide control of cost unless it is used with standard costing system.

2.12 BATCH COSTING

Definition :

Batch Costing is the identification and assignment of those costs incurred in completing the manufacture of a specified batch of components. Having arrived at the batch cost, the unit cost is

simply derived by dividing it by the number of components in the batch.

When orders are received from different customers, there are common products among orders; then production orders may be issued for batches, consisting of a predetermined quantity of each type of product. Batch costing method is adopted in such cases to calculate the cost of each such batch.

Cost per unit is ascertained by dividing the total cost of a batch by number of items produced in that batch. In order to do that a Batch Cost Sheet is prepared. The preparation of Batch Cost Sheet is similar to that of Job Cost Sheet. This method is mainly applied in biscuits manufacture, garments manufacture, spare parts and component manufacture, pharmaceutical enterprises etc.

Batch costing is a form of specific order costing.

- Within each batch are a number of identical units but each batch will be different.
- Each batch is a separately identifiable cost unit which is given a batch number in the same way that each job is given a job number.
- Costs can then be identified against each batch number. For example materials requisitions will be coded to a batch number to ensure that the cost of materials used is charged to the correct batch.
- When the batch is completed the unit cost of individual items in the batch is found by dividing the total batch cost by the number of items in the batch.
- Batch costing is very common in the engineering component industry, footwear and clothing manufacturing industries.
- The selling prices of batches are calculated in the same ways as the selling prices of jobs, i.e. by adding a profit to the cost of the batch.

Economic Batch Quantity

Production is usually done in batches and each batch can have any number of units of Component in it. The optimum quantity for a batch is that quantity for which the setting up and carrying costs are minimum, such an optimum quantity is known as Economic Batch Quantity or Economic lot size.

Determination of the economic lot size is important in industries where batch costing is employed.

Need for Determining Economic Lot Size:

The need for determining economic lot size arises as:

i) Every time a component/product is to be made, setting up of the tool is involved. Because of this some loss in production time will be there. Therefore, maximum number of units is produced once the machine is set in order to reduce the cost per unit,

ii) Such large production at one run will lead to accumulation of inventory and the costs related thereto,

iii) Thus there is a quantity for which reduced cost of production is just offset by costs of carrying the quantity inventory. The determination of most economical batch quantity requires consideration of many related factors of costs and economies.

The factors that influence the decision in this respect are:

(a) Set up cost,
(b) Manufacturing cost,
(c) Interest on capital,
(d) Storage cost, and
(e) Rate of consumption.

2.13 TYPES OF COSTS IN BATCH COSTING:

There are two types of costs involved in Batch Costing:
(i) Set up costs
(ii) Carrying costs.

If the batch size is increased, set up cost per unit will come down and the carrying cost will increase. If the batch size is reduced, set up cost per unit will increase and the carrying cost will come down. Economic Batch quantity will balance both these opponent costs.

Economic Batch Quantity can be determined with the help of a table, graph or mathematical formula.

The *formula* to be used for calculation of economic lot size is $Q = \sqrt{\frac{2US}{C}}$

Where
Q = Qty. or units of products in the economic batch.
S = Set-up cost per batch
C = Carrying cost per unit of production p.a.
U = Annual units of production.

2.14 KEY DIFFERENCES BETWEEN JOB COSTING AND PROCESS COSTING

The following are the major differences between job costing and process costing:

1. The costing method which is used for the ascertainment of the cost of each job is known as Job Costing. Conversely, by process costing, we mean the costing technique used to determine the cost of each process.
2. Job Costing is performed where the products produced of a specialized nature, whereas Process Costing is used where standardized products are produced.

3. In Job Costing, the cost is calculated for each job, but in Process Costing first of all the cost of each process is calculated which is then dispersed over the number of units produced.

4. In job costing the cost center is the job itself while the process is the cost center in case of process costing.

5. In job costing each job requires special treatment. On the other hand, no such special treatment is required for each process in process costing.

6. There is no transfer of cost in job costing, from one job to another. However, the cost of the last process is transferred to the next process in the process costing.

7. The possibility of cost reduction is very less in Job Costing. In contrast to Process Costing, the scope of cost reduction is comparatively high.
8. In Job Costing, the cost is ascertained after the completion of the job, but in Process Costing, the cost of each job is determined.

In situations where a company has a mixed production system that produces in large quantities but then customizes the finished product prior to shipment, it is possible to use elements of both the job costing and process costing systems, which is known as a hybrid system.

State whether the statements are true or false. (Answers in parentheses)

- Under Batch Costing, a batch is regarded as a single cost unit (True)

- Batch costing is used when items of a identical nature are produced in a batch (True)

- Batch costing can be used only in large organizations (False)

- Economic batch quantity is nothing but economic ordering quantity of materials (False)

- Set up cost can vary depending on the size of the batch (False)
- Under job costing, the job itself is a cost unit (True)

Determination of Economic Batch Quantity

Monthly demand for a product	500 units
Setting up cost per batch	Rs. 60
Cost of manufacturing per unit	Rs. 20
Rate of Interest	10% p.a.

$EBQ = (2DS/C)^{1/2}$
$= ((2*500*12*60)/(0.1*20))^{1/2}$
= 600 units

3

CONTRACT COSTING

Unit Structure :

3.1 MEANING

Contract Costing is a special type of job costing where the unit of cost is a single contract. Contract itself is a cost centre and is executed under the customer's specifications. Contract Costing is defined by the ICMA Terminology as "that form of specific order costing which applies where work is undertaken to customer's special requirements and each order is of long duration. The work is usually of constructional nature."

Contract Costing is also termed as "Terminal Costing." The principles of job costing are also applicable to contract costing and are used by such concerns of builders, public works contractors, constructional and mechanical engineering firms and ship builders etc. who undertake work on a contract basis.

3.2 SPECIAL FEATURES OF CONTRACT COSTING

The following are the special features of Contract Costing:

(1) The cost unit is a specific contract.

(2) Each contract takes a long time to complete.

(3) The work being of a constructional nature, the same is executed at customer's site, as per his specifications.

(4) Bulk of the materials purchased and delivered direct to the contract site or obtained from the central stores through the requisition slips.

(5) Generally specific portions of the contract are given to sub-contractors.

(6) Most of costs which are normally treated as indirect can be identified specifically with a particular contract and are charged to it as direct costs.

(7) Overheads constitute only a very small proportion of the cost of the contract. However, indirect costs consist mainly of administrative cost of the central office.

(8) Scale of operations and cost control becomes difficult due to theft of materials, labour time utilization, pilferages etc.

(9) The pay roll is prepared either at the site or at a central administrative office.

3.3 TYPES OF CONTRACTS

There are three types of contract which are mentioned below:

a. Fixed price contract: The contract that is executed with the fixed price which is agreed by the contract and the contractee is called the fixed price contract. Under this contract, no modification is made in the agreed contract price irrespective of the changes in the price level of material and labour in feature. In such type of contract, the contractor is benefited when the price of material and labour decrease. In contrary to this, the contractee is benefited if the price of material and labour increase.

b. Fixed price contract with escalation and de-escalation clauses: Escalation clause is a of agreement that that aims to reduce the risks that is causes due to the changes in the price of materials, labour and other services. Under this, the contract price is adjusted in accordance, with the changes in the price of material, labour and other services. The additional cost raised due to the increase in price is born by the contracted. Similarly, the contract price is reduced if the cost decreases below a certain percentage. It is called de-escalation or reverse clause. Escalation clause safe guides the interest of both the contractor and contractor against unfavorable price change in future. Such clause may also apply where material and labour utilization exceeds a particular limit. In this case, however, contractor will have to prove that excessive utilization is not because of decrease in efficiency. The contractor allows a rebate in the bills presented by him to the extent of the decrease in price.

c. Cost plus contract: The contract in which the contract price is determined by adding a certain percentage of profit on cost is known as cost plus contract. The cost plus contract is adopted to

overcome with problem of fixing the contract price caused due to nature of contract, duration of completion of contract, uncertainly of material, change in the price level, new technology etc. this type of contract is mostly followed by the government for production of special articles not usually manufactured, urgent repairs of vehicles, roads bridge etc. under this types of contract, the contract starts the work and payment is made by the contracted gradually on the basis of the cost incurred in the work completed plus certain percentage of profit.

3.4 RECORDING COST ON CONTRACT OR COSTING PROCEDURE

In contract costing, costs are allocated, collected and accumulated according to the contract works. Each contract is treated as a separate entity in which each contract account may be maintained separately or in general ledger itself for the purpose of costing and cost control. The following are the costing procedure for different costs relating to the important expenses:

a. Materials

The procedures of recording materials in a contract account are as follows:

Item	Treatment
Stock of Materials	The opening stock is debited and closing stock is credited
Purchase of Materials	The material purchased for the contract is debited to the contract account
Transfer of Materials	Material transferred to the contract from other contracts is debited while material transferred out is credited
Sale of Materials	The material sold from the contract is credited in the selling price
Profit/Loss on sale	The profit on sale is credited whereas loss is debited to the contract account
Loss of Material	Loss of material due to theft, fire, damage etc is credited. Claim accepted by insurance company is credited like sales

b. Plant and Machinery

The machinery used for a contract is recorded in a contract account through two ways. They are

i. The cost of machinery and equipment to be used for a longer period or purchase for the contract is shown in the debit side of a contract account. The book value of the machinery and equipment is shown in credit side. The book value is calculated by deducting the depreciation from the cost of the machinery and equipment.
ii. If the machinery and equipment is used for a short time in the contract, the amount of depreciation charged is only debited in the contract account. In such a situation, the purchase price in the debited side and the book value in the credit side are not shown. This is generally done, if the plant and equipment are not used till the end of te accounting period.

The treatments of plant and machinery in a contract account under different conditions have been presented below:

Item	Treatment
Plant at beginning	The value of plant at the beginning is debited whereas the plant at the end is credited
Purchase of Machinery	The machinery purchased for the contract is debited to the contract account
Transfer of Machinery	Machine transferred to the contract from other contracts is debited while machine transferred out is credited
Sale of Machinery	The value of machinery sold from the contract is credited in the selling price or market value
Profit/Loss on sale	The profit on sale is credited whereas loss is debited whereas loss suffered is credited
Loss of Machine	Loss of machine due to theft, fire, damage etc is credited. Claim accepted by insurance company is credited like sales

c. Labour:

In the case of contract costing, all labour engaged at site and the salaries and wages paid to the labour and workers are treated as direct labour cost is debited to Contract Account.

d. Direct Expenses:

Most of the expenses like electricity, insurance telephone, postage, sub-contracts, Architect's fees etc. can also be treated as direct cost is debited to Contract Account.

e. Overhead Cost:

In the case of contract costing overheads incurred only an insignificant part of the total cost of contract account. The nature office and administrative expenses of a particular contract may be apportioned on suitable basis.

f. Cost of extra work:

Sometimes, in case of a contract, some additional work o variations of the work originally contracted for may be required by the contractee. Since the additional work required will not be covered by the terms and condition of original contract, it will be the subject of a separate charge., if the additional work required by the contractee is quite substation, it should be treated as a separate contract and dealt with in a separate account to be opened for it. But in case the additional work is not substantial, the expenses incurred on extra work should be debited to contract account as 'cost of extra work' and the extra amount which the contractee has agreed to pay to the contractor should be added to the original contract price.

Some other terms used in Contract Costing

1. **Sub-Contracts:** Sub-Contracts refer to some portions of the specified work connected with the main contract, to be done by the sub-contractor. For example, the work of painting, special flooring, steel work etc. may be given to the sub-contractors. Usually sub-contract has been undertaken on cost-plus basis and the cost of such sub-contract should be treated as a direct charge and is debited to Contract Account.

2. **Work Certified:** In the case of the small contracts which are completed within the shorter period, the contractor pays the contract price on the completion of the contract. In the case of contracts of long duration, the contract agreement provides interim payment to the contractor. It is done on the basis of certificates issued by the contractee's Surveyor, Architect or Engineer. At the same time Contractee usually does not pay to the full value of the work certified. A portion of amount say 20% or 30% thereof shall be retained by the Contractee. The money so retained is called as **"Retention Money."** This retention money is intented to ensure that the contractor to complete the work as scheduled and according to specifications. Money retained could also be used for imposing penalties for faulty or

delayed work. This amount will be settled on completion of the contract.

3. **Work Uncertified:** If the progress of a work is unsatisfactory or the work has not reached the stipulated stage, though certain work is completed, such work does not qualify for a certificate by the Contractee's Architect or Surveyor is termed as "Work Uncertified." It is valued at cost and credited to Contract Account and debited to Work in Progress Account.

4. **Work in Progress:** Work in progress includes the amount of work .certified and the amount of work uncertified. The work in progress account will appear on the asset side of the balance sheet. The amount of cash received from the contractee and reserve for contingencies will be deducted out of this amount.

3.5 TREATMENT OF PROFIT OR LOSS ON CONTRACT ALC.

The accounting treatment of profits or loss of contracts in the following stages :
(A) Profit or Loss on incomplete contracts
(B) Profits or Loss on completed contracts

(A) Profit or Loss on Incomplete Contracts

To determine the profits to be taken to Profit and Loss Account in the case of incomplete contracts, the following situations may arise :

(i) Completion of Contract is Less than 25%: In this case no profit should be taken to Profit and Loss Account.

(ii) Completion *of Contract is up to 25% or more but Less than 50%:* In this case one-third of the notional profit, reduced in the ratio of cash received to work certified, should be transferred to Profit and Loss Account. It can be expressed as:

1/3 x Notional Profit x Cash Received/ Work Certified

(iii) Completion of Contract is up to 50% or more but Less than 90%: In this case two-third of the notional profit reduced by proportion of cash received to work certified is transferred to Profit and Loss Account. The equation is

2/3 x Notional Profit x Cash Received/ Work Certified

(iv) Completion of Contract is up to 90% or more than 90%, i.e., it is nearing completion: In this case the profit to be taken to Profit and Loss Account is determined by determining the estimated profit and using anyone of the following formula :

a. Estimated profit x Work Certified/Contract price

b. Estimated profit x Work Certified/Contract price x Cash received/Work Certified
   OR
   Estimated profit x Cash Received/Contract Price
c. Estimated Profit x Cost of work done to date/Estimated Total Cost
d. Estimated Profit = Cost of work done to date/Estimated Total Cost x Cash received/Work Certified
e. Normal Profit = Work Certified/Contract Price

(B) Profits or Loss on Completed Contracts

When a contract is completed, the overall profit or loss on the contract is transferred to the Profit and Loss Account.

Illustration

The following are the expenses on a contract which commences on 1st Jan. 2013

Particulars	Amt Rs.
Materials Purchased	1,00,000
Materials on hand	5,000
Direct Wages	1,50,000
Plant issued	50,000
Direct Expenses	80,000

The contract price was Rs. 15,00,000 and the same was duly received when the contract was completed in August 2013. Charge indirect expenses at 15% on wages. Provide Rs. 10,000 for depreciation on plant and prepare the contract account and the contractee's account.

Solution:

Contract Account

Particulars	Amt Rs.	Particulars	Amt Rs.
To Material Purchased	1,00,000	By Materials on Hand	5,000
To Direct Wages	1,50,000	By Plant on Hand (50,000-10,000)	40,000
To Direct Expenses	80,000	By Contractor’s A/c (Contract Price)	15,00,000
To Indirect	22,500		

Expenses (15% on wages)			
To Depreciation on plant	10,000		
To Profit & Loss A/c	11,82,500		
Total	**15,45,000**	**Total**	**15,45,000**

Contract Account

Particulars	Amt Rs.	Particulars	Amt Rs.
To Contract A/c	15,00,000	By Bank	15,00,000
Total	**15,00,000**	**Total**	**15,00,000**

Illustration

The following information is available from the books of a contractor relating to a contract for Rs 75 lakhs. The Contractee pays 90% of the value of the work done as certified by the architect.

Particulars	2006	2007	2008
Materials	9,00,000	11,00,000	6,30,000
Wages	8,50,000	11,50,000	8,50,000
Direct Expenses	35,000	1,25,000	45,000
Indirect Expenses	15,000	20,000	-
Work Certified	17,50,000	56,50,000	75,00,000
Work Uncertified	-	1,00,000	-
Plant Issued	1,00,000	-	-

The value of plant at the end of 2006, 2007 & 2008 was Rs. 80,000, Rs. 50,000 and Rs. 20,000 respectively.

Prepare Contract Account, Work in Progress Account, and Contractee's Account

Show the relevant figures in the Balance Sheet

Solution

Contract Account for the year 2006

Particulars	Amt Rs.	Particulars	Amt Rs.
To Materials	9,00,000	By WIP A/c:	
To Wages	8,50,000	- Work Certified	17,50,000
To Direct Expenses	35,000	- Plant at Site	80,000
To Plant	1,00,000		
To Indirect Expenses	15,000	By P&L A/c	70,000
Total	**19,00,000**	**Total**	**19,00,000**

Contract Account for the year 2007

Particulars	Amt Rs.	Particulars	Amt Rs.
To WIP A/c:		By WIP A/c:	
- Work Certified	17,50,000	- Work Certified	56,50,000
- Plant at Site	80,000	- Work uncertified	1,00,000
To Materials	11,00,000	- Plant at Site	50,000
To Wages	11,50,000		
To Direct Expense	1,25,000		
To Indirect Expenses	20,000		
To P&L A/c	9,45,000		
To WIP A/c (Reserve)	6,30,000		
Total	**58,00,000**	**Total**	**58,00,000**

Contract Account for the year 2008

Particulars	Amt Rs.	Particulars	Amt Rs.
To WIP A/c:		By Contractee's A/c	75,00,000
- Work Certified	56,50,000	By Plant	20,000
- Work Uncertified	1,00,000		
- Plant at Site	50,000		
(Less): Reserve	(6,30,00)		
To Materials	6,30,000		
To Wages	8,50,000		
To Direct Expense	45,000		
To P&L A/c (Profit)	8,25,000		
Total	**75,20,000**	**Total**	**75,20,000**

WIP Account

Year	Particulars	Amt Rs.	Year	Particulars	Amt Rs.
2006	To Contract A/c	18,30,000	2006	By Balance c/d	18,30,000
2007	To balance b/d	18,30,000	2007	By Contract A/c	18,30,000
	To Contract A/c	58,00,000		By Contract A/c	6,30,000
				By balance c/d	51,70,000
	Total	**76,30,000**		**Total**	**76,30,000**
2008	To balance b/d	51,70,000	2008	By Contract A/c	51,70,000

Contractee's Account

Year	Particulars	Amt Rs.	Year	Particulars	Amt Rs.
2006	To Balance c/d	15,75,000	2006	By cash	15,75,000
2007	To balance c/d	50,85,000	2007	By balance b/d	15,75,000
				By Cash	35,10,000
	Total	**50,85,000**		**Total**	**50,85,000**
2008	To Contract A/c	75,00,000	2008	By balance b/d	50,85,000
				By Cash	24,15,000
	Total	**75,00,000**		**Total**	**75,00,000**

Balance Sheet as on 31st December 2006

Particulars	Amt Rs.	Amt Rs.
Work In Progress		
- Work Certified	17,50,000	
- Work uncertified	-	
- Plant at Site	80,000	
Less: Reserve	-	
	18,30,000	
Less: Cash Received	15,75,000	**2,55,000**

Balance Sheet as on 31st December 2007

Particulars	Amt Rs.	Amt Rs.
Work In Progress		
- Work Certified	56,50,000	
- Work uncertified	1,00,000	
-	57,50,000	
Less: Reserve	6,30,000	
	51,20,000	
Less: Cash Received	50,85,000	**35,000**
Plant at Site		**50,000**

Illustration

The following particulars relate to the houses which a firm of builders had in course of construction under contract:

Particulars	House A	House B
WIP on 1.1.2008 (excluding Rs. 800 estimated profit which was taken to P&L A/c in 2007)	14,000	-
Materials purchased	23,000	16,600
Wages	20,000	14,000
Electrical Services and Fittings	1,400	300
Road Making Charges	8,000	-
Contract Price (including road making)	60,000	40,000
Cash received up to 31.12.2008	60,000	24,000
Percentage of cash received to work certified	100%	66.67%
Value of materials in hand on 31.12.2008	400	540
Completed work not certified	-	2,500
Value of plants used on sites	12,000	6,000
Period of plants remained on site during the year	10 months	8 months

Total Establishment expenses incurred during the year – Rs. 12,240. These are to be charged to the two contracts in proportion of wages.

Deprecation on plant to be charged @ 10% p.a.

Prepare two contract accounts (in columnar form) showing profit/loss for each contract and sums which you consider appropriately transferable to P&L A/c

Contract Account for year ended 31.12.2008

Particulars	House A	House B	Particulars	House A	House B
To Balance b/d	14,800	-	By Balance b/d		
To Materials	23,000	16,600	Work certified	60,000	36,000
To Wages	20,000	14,000	Work uncertified	-	2,500
To Electrical services and	1,400	300	By Materials in	400	540

Fittings			hand		
To road making charges	8,000		By P&L A/c (Loss)	15,000	
To Establishment expenses	7,200	5,040			
To Depreciation on Plant	1,000	400			
To Notional Profit c/d	-	2,700			
Total	**75,400**	**39,040**	**Total**	**75,400**	**39,040**
To P&L A/c		1,200	By Notional Profit b/d		**2,700**
To Balance c/d (Reserve)		1,500			
Total		**2,700**	**Total**		**2,700**

Working:

As work done on House B > 50%, profit taken to P&L A/c is

Rs. 2,700* 2/3*66.67%
= Rs. 1,200

Illustration

Paramount Engineers are engaged in construction and erection of a bridge under a long-term contract. The cost incurred up to 31. 03. 2003 was as under:

Fabrication	**Rs. in lakhs**
Direct Materials	280
Direct Labour	100
Overhead	60
	440
Erection cost to date	110
	550

The contract price is Rs. 11 crores and the cash received on account till 31.03.2003 was Rs. 6 crores.

A technical estimate of the contract indicates the following degree of completion of work:

Fabrication - Direct Materials - 70%, Direct labour and overheads 60%; Erection - 40%.

You are required to estimate the profit that could be taken to profit and loss account against this partly completed contract as at 31.03.2003.

Solution

Estimated Cost and Profit on Completion of Contract

Particulars	Cost incurred up to 31.3.03 Rs Lakhs	Completion %	Estimated cost on completion of 100% Rs. Lakhs
Direct Materials	280	70%	400.00
Direct Labour	100	60%	166.67
Overhead	60	60%	100.00
Erection	110	40%	275.00
Total	550		941.67
Contract price			1100.00
Profit on Completion			158.33

Profit on cost of Rs.9.41.67 lakhs is Rs.158.33 lakhs. Therefore, profit on cost to date of Rs.550 lakhs.

Work Certified = 550 x 158.33 / 941.67 = Rs. 92.48 lakhs
= Cost + Profit
= Rs. 550 + Rs. 92.48 = Rs. 642.48 lakhs

Degree of completion of contract is:

= 642.48 x 100 / 1,100 = 58.41 %

The contract is more than· half complete.

Profit to be taken to Profit and Loss Account of the year is:

2 / 3 x Notional Profit x Cash Received / Work Certified

$$= \frac{2 \times 92.48 \times 600}{3 \times 642.48}$$

= Rs. 57.58 lakhs

Illustration:

Kapoor Engineering Company undertakes long term contracts which involves fabrication of pre-stressed concrete blocks and erection of the same on consumer's side.

The following information is supplied regarding contract 666 which is incomplete on 31. 3. 2016

Fabrication	**Rs.**
Direct Materials	2,80,000
Direct Labour	90,000
Overhead	75,000
	4,45,000
Erection cost to date	15,000
Total	4,60,000
Contract price	8,19,000
Cash received on account	6,00,000

A technical estimate of completion of work:
Fabrication - Direct Materials - 80%, Direct labour and overheads - 75%; Erection - 25%.

You are required to prepare
1. Estimated profit on completion of contract
2. Estimated profit to date on contract

Solution:

Estimated Profit to date and Profit on Completion of Contract no. 666

Particulars	**Cost incurred up to 31.3.03 Rs Lakhs**	**Completion %**	**Estimated cost on completion of 100% Rs. Lakhs**
Direct Materials	2,80,000	80%	3,50,000
Direct Labour	90,000	75%	1,20,000
Overhead	75,000	75%	1,00,000
Erection	15,000	25%	60,000
Total	550		6,30,000

Estimated Profit on Completion			1,89,000
Contract price			8,19,000

Estimated profit to date
= Profit on whole contract x Costs incurred/Total contract cost
=1,89,000 x 4,60,000/6,30,000
= Rs. 1,38,000

Alternatively, Profit to date can also be calculated as:

Estimated profit on whole contract x Cash received/contract price
= 1,89,000 x 6,00,000/8,19,000
= Rs. 1,38,462

Choose the correct answer (Answer highlighted in **BOLD**)

1. Contract costing is a basic method of
(a) Historical costing **(b) Specific order costing**
(c) Standard costing (d) Process costing

2. Contract costing is usually applicable in
(a) Constructional Works (b) Textile Mills
(c) Cement Industries (d) Chemical Industries

3. In contract costing, determination of work in progress include:
(a) Work Certified (b) Work Uncertified
(c) Retention Money **(d) Both a and b**

4. Work Certified is valued at
(a) Cost price (b) Market price
(c) Cost or market price whichever is less (d) Estimate price

5. The degree of completion of work is determined by comparing the work certified with
(a) Contract price (b) Work in progress
(c) Cash received on contract (d) Retention money

6. In contract costing credit is taken only for a part of the profit on
(a) Completed contract **(b) In complete contract**
(c) Cost-plus contract (d) Work Certified

7. Escalation Clause in a contract to prefect the interest of
(a) Contractor **(b) Contractee**
(c) Surveyor (d) Contractee's Architect

8. In contract costing payment of cash to the contractor is made on the basis of

(a) Uncertified work **(b) Certified work**
(c) Work in progress (d) Estimated value

9. Materials returned under material return note credited to
(a) Contract account (b) Work in progress account
(c) Plant and machinery account (d) Profit and loss account

10. Cash received on contract is credited to
(a) Contract Account (b) Plant Account
(c) Work in Progress Account **(d) Contractee's Account**

True or False:

1. Contract costing is a form of job costing – True
2. Cost – plus contract and fixed – price contract are one and same – False
3. The contractor is compensated for increase in costs by escalation cause – True
4. The actual cost of the contract includes abnormal costs – False
5. Profit is generally recognized only after the entire work is completed – False
6. If a contract is 40% complete, 40% of the notional profit is credited to P&L Account – False
7. Work certified is valued at cost – False

Fill in the blanks

1. _____ is the person f whom the contract job is undertaken
2. Cost of closing stock appears on the ____ side of the Contract A/c
3. Value of work certified but not paid is known as ____ money
4. Cash received Rs. 4,80,000 being 80% of work certified: value of work certified is _____

Answers
1. Contractee
2. Credit
3. Retention
4. Rs. 6,00,000

3.6 PROCESS COSTING

Meaning

Process Costing is a method of costing. It is employed where each similar units of production involved in different series of process from conversion of raw materials into finished output. Thus, .unit cost is determined on the basis of accumulated costs of each operation or at each stage of manufacturing a product.

Charles T. Horngren defines process costing as "a method of costing deals with the mass production of the like units that usually pass the continuous fashion through a number of operations called process costing." Textiles, chemical works, cement industries, food processing industries etc. are the few examples of industries where process costing is applied.

3.7 CHARACTERISTICS OF PROCESS COSTING

1. Continuous or mass production where products pass through distinct processes or operations.
2. Each process is deemed as a separate operations or production centres.
3. Products produced are completely homogenous and standardized.
4. Output and cost of one process are transferred to the next process till the finished product completed.
5. Cost of raw materials, labour and overheads are collected for each process.
6. The cost of a finished unit is determined by accumulated of all costs incurred in all the process divided by the number of units produced.
7. The cost of normal and abnormal losses usually incurred at different stages of production is added to finished goods.
8. The interconnected processes make the final output of by-product or joint products possible.

3.8 ADVANTAGES & DISADVANTAGES

Advantages :

The main advantages of process costing are:

(1) Determination of the cost of process and unit cost is possible at short intervals.
(2) Effective cost control is possible.
(3) Computation of average cost is easier because the products produced are homogenous.
(4) It ensures correct valuation of opening and closing stock of work in progress in each process.
(5) It is simple to operate and involve less expenditure.

Disadvantages :

(1) Computation of average cost does not give the true picture because costs are obtained on historical basis.

(2) Operational weakness and inefficiencies on processes can be concealed.
(3) It becomes more difficult to apportionment of joint costs, when more than one type of products manufactured.
(4) Valuation of work in progress is done on estimated basis, it leads to inaccuracies in total costs.
(5) It is difficult to measure the performance of individual workers and supervisors.

Illustration-

Following figures show the cost of A product passes through three processes. In March 1000 units were produced. Prepare the process accounts and find out per unit of each process.

(All Figures in Rs.)

	Process I	Process II	Process III
Raw Materials	50,000	30,000	20,000
Wages	30,000	25,000	25,000
Direct Expenses	7,000	3,000	5,000

Overhead expenses were Rs 12,000 and it should be apportioned on the basis of wages.

Solution

Process I Account

Particulars	**Units**	**Amount Rs.**	**Particulars**	**Units**	**Amount Rs.**
To Raw Materials	1,000	50,000	By Process II A/c (Output transferred at Rs 91.50 per Unit)	1,000	91,500
To Wages		30,000			
To Direct Expenses		7,000			
To Overheads (6/16*12000)		4,500			
Total	**1,000**	**91,500**	**Total**	**1,000**	**91,500**

Process II Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Process II A/c (Transferred from Process I)	1,000	91,500	By Process II A/c (Output transferred at Rs 153.25 per Unit)	1,000	1,53,250
To Raw Materials		30,000			
To Wages		25,000			
To Direct Expenses		3,000			
To Overheads (5/16*12000)		3,750			
Total	**1,000**	**1,53,250**	**Total**	**1,000**	**1,53,250**

Process III Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Process III A/c (Transferred from Process II)	1,000	1,53,250	By Finished Stock (Output transferred @ Rs 207 per unit)	1,000	2,07,000
To Raw Materials		20,000			
To Wages		25,000			
To Direct Expenses		5,000			
To Overheads (5/16*12000)		3,750			
Total	**1,000**	**2,07,000**	**Total**	**1,000**	**2,07,000**

3.9 PROCESS LOSSES:

Process Losses may be defined as the loss of material occur at different stages of manufacturing process. The following are the types of losses unavoidable during the course of processing operations such as:

(1) Normal Process Loss
(2) Abnormal Process Loss
(3) Abnormal Process Gain
(4) Spoilage
(5) Defectives

(1) **Normal Process Loss:** The cost of normal process loss in practice is absorbed by good units produced under the process. This is known as Normal Process Loss or Normal Wastage. For example, evaporation, scrap, stamping process etc. The amount realized by the sale of normal process loss units should be credited to process account.

(2) **Abnormal Process Loss:** The cost of an abnormal process loss unit is equal to the cost of good unit. . The total cost of abnormal process loss is credited to process account from which it arises. This is known as Abnormal Process Loss. Such loss may be caused by breakdown of machinery, false production planning, lack of effective supervision, substandard materials etc., Cost of abnormal process loss is not treated as cost of the product. In fact, the total cost of abnormal process loss is debited to Costing Profit and Loss Account.

Computation of Abnormal Loss:

$$\text{Value of Abnormal Loss} = \frac{\text{Normal Cost of Normal Output}}{\text{Normal Output}} * \text{Units of Abnormal Loss}$$

Where:
Quantity of Abnormal Loss = Normal Output - Actual Output
Normal Output = Input - Normal Loss
If actual output is less than normal output to balance represents Units of Abnormal Loss.

(3) **Abnormal Process Gain:** Abnormal Process Gain may be defined as unexpected gain in production under normal conditions. The process account under which abnormal gain arises is debited with abnormal gain. The cost of abnormal gain is computed on the basis of normal production.

(4) **Spoilage:** Normal Spoilage (i.e., which is inherent in the operation) costs are included in costs either by charging the loss

due to spoilage to the production order or by charging it to production overhead so that it is spread over all the products. Any value realized from the sale of spoilage is credited to production order or production overhead account as the case may be. The cost of abnormal spoilage is charged to Costing Profit and Loss Account. When spoiled work is the result of rigid specification, the cost of spoiled work is absorbed by good production while the cost of disposal is charged to production overhead.

(5) **Defectives:** Defectives that are considered inherent in the process and are identified as normal can be recovered by using the following method.

- Charged to goods products
- Charged to general overheads
- Charged to departmental overheads
- If defectives are abnormal, they are to be debited to Costing Profit and Loss Account.

Equivalent Production

Equivalent Production represents the production of a process in terms of completed units. In other words, it means converting the uncompleted production into its equivalent of completed units. The term equivalent unit means a notional quantity of completed units substituted for an actual quantity of incomplete physical units in progress, when the aggregate work content of the incomplete units is deemed to be equivalent to that of the substituted quantity, (e.g. 100 units of 70% completed = 70 completed units).

The principle applies when operation costs are being apportioned between work- in-progress and completed output. Thus in each process an estimate is made of the percentage completion of any work-in-progress. A production schedule and a cost schedule will then be prepared.

The work-in- progress is inspected and an estimate is made of the degree of completion, usually on a percentage basis. It is most important that this estimate is as accurate as possible because a mistake at this stage would affect the stock valuation used in the preparation of final accounts. The formula of equivalent production is:

Equivalent units of work-in-progress = Actual no. of units in progress of manufacture X Percentage of work completed

For example, if 70% work has been done on the average on 200 units still in process, then 200 such units will be equal to 140

completed units. The cost of work-in-progress will be equal to 140 completed units.

Calculation of Equivalent Production:

Following steps are worth noting in its calculation under different methods:

Method I:

Under this method opening work-in-progress is stated in equivalent completed units by applying the percentage of work needed to complete the unfinished work of the previous period. Then number of units started and completed (i.e. units started less closing stock) are added. Further equivalent completed units of closing work-in-progress are also added to get the equivalent production.

Method II:

Under this method units completed during the period (i.e. units started + opening stock units—closing stock units) are added to the units of closing stock completed during the period and out of the total units, opening stock units completed in previous year are deducted to get the units of equivalent production.

Method III:

Under this method units of uncompleted input are added to the units of incomplete work in opening stock and out of the total units, incomplete work in closing stock are deducted to have units of equitant production.

Often in a continuous process there will be opening as well as closing work-in-progress which are to be converted into equivalent of completed units for apportionment of process costs. The procedure of conversion of opening work-in-progress will vary depending upon which method of valuation of work-in-progress is used.

valuation of work-in-progress can be made in the following ways depending upon the assumptions made regarding the flow of costs:

(a) Average Cost Method,
(b) FIFO,
(c) LIFO and
(d) Weighted Average Method.

These are discussed one by one:

(a) Average Cost Method:

According to this method opening inventory of work-in-progress and its costs are merged with production and cost of the current period respectively. An average cost per unit is determined by dividing the total cost by the total equivalent units, to ascertain the value of the units completed and units in process.

This method is useful when prices fluctuate from period to period. The closing valuation of work-in-progress in the old period is added to the cost of the new period and an average rate obtained which tends to even out price fluctuations. In calculating the equivalent production opening units will not be shown separately as units of opening work-in-progress are taken to be included in the units completed and transferred.

(B) FIFO Method:

According to this method, the units first entering the process are completed first after taking into consideration the percentage of work to be done and shown separately in the statement of equivalent production. Thus the units completed during a period would consist partly of units which were incomplete at the beginning of the period and partly of the units introduced during the period.

The cost of completed units is affected by the value of opening inventory which is based on the cost of previous period. This method is satisfactory when prices of raw materials and rates of direct labour and overheads are relatively stable.

Work-in-progress at the end of the period becomes the opening work-in-progress for the next period; the closing work- in-progress will be valued at costs ruling during the new period, while the opening work-in- progress will be valued at costs ruling during the old period. Thus, where costs are more or less the same in each period, this system is adequate.

(C) Last in First-out (LIFO) Method:

According to this method, units lastly entering in the process are first to be completed. This assumption will definitely have a different impact on the cost of completed units and closing inventory of work in progress. The completed units will be shown at their current cost and the closing inventory of work-in-progress will continue to appear at the cost of opening inventory of work-in-progress along with current cost of work in progress, if any.

(D) Weighted Average Method:

When two or more dissimilar products are manufactured in the same process, a simple average process cost may give misleading results. In such a case, a close study of production and costs of each type of product is required to be made and the relative importance of one as compared to others should be indicated in terms of points to be used as a common denominator.

In order to find out the cost of production under weighted average method, statements of weighted average production in terms of points and cost for each type of product should be prepared. The computation of weighted average process cost sheet will be easy, if due consideration to weights or points are given.

Illustration:

From the following details prepare statement of equivalent production, statement of cost, statement of evaluation and Process Account by following average cost method:

Opening WIP (2000 Units)
Materials (100% Complete) Rs. 7,500
Labour (60% Complete) Rs. 3,000
Overhead (60% Complete) Rs. 1,500
Units introduced into the process – 8,000

There are 2,000 units in the process. The stage of completion is estimated to be:
Materials 100% Complete
Labour 50% Complete
Overhead 50% Complete
8,000 units are transferred to the next process
The Process costs for the period are:

Materials: Rs. 1,00,000
Labour: Rs. 78,000
Overheads: Rs. 39,000

Statement of Equivalent Production

Production	*Units*	*Materials*		*Labour & Overheads*	
		% Completion	*Equiv. Units*	*% Completion*	*Equiv. Units*
Finished & Transferred	8,000	100	8,000	100	8,000
Closing WIP	2,000	100	2,000	50	1,000
Total	**10,000**		**10,000**		**9,000**

Statement of Cost

	Material (Rs.)	Labour (Rs.)	Overheads (Rs.)
Cost of Opening WIP	7,500	3,000	1,500
Cost incurred during the process	1,00,000	78,000	39,000
1. Total Cost	1,07,500	81,000	40,500
2. Equivalent Units	10,000	9,000	9,000
3. Cost per unit (1/2)	10.75	9.00	4.50
4. Total Cost per unit	24.25		

Statement of Evaluation

a) Value of output transferred		
8,000 units at Rs. 24.25		1,94,000
b) Value of Closing WIP		
Materials 2,000 @ 10.75	21,500	
Labour 1,000 @ 9.00	9,000	
Overheads 1,000@ 4.50	4,500	35,000
Total		**2,29,000**

Process Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Opening WIP	2,000	12,000	By Finished Stock transferred to next process	8,000	1,94,000
To Materials	8,000	1,00,000	By WIP A/c	2,000	35,000
To Labour		78,000			
To Overheads		39,000			
Total	**10,000**	**2,29,000**	**Total**	**10,000**	**2,29,000**

From the following details prepare statement of equivalent production, statement of cost, statement of evaluation and Process Account by following FIFO method:

Opening WIP (2000 Units)

Materials (100% Complete) Rs. 5,000
Labour (60% Complete) Rs. 3,000
Overhead (60% Complete) Rs. 1,500
Units introduced into the process – 8,000

There are 2,000 units in the process. The stage of completion is estimated to be:

Materials 100% Complete
Labour 50% Complete
Overhead 50% Complete
8,000 units are transferred to the next process

The Process costs for the period are:

Materials: Rs. 96,000
Labour: Rs. 54,600
Overheads: Rs. 31,200

Statement of Equivalent Production

Production	*Units*	*Materials*		*Labour & Overheads*	
		% Completion	*Equiv. Units*	*% Completion*	*Equiv. Units*
Opening WIP	2,000	-	-	40	800
Completely processed during the period (8,000 – 2,000)	6,000	100	6,000	100	6,000
Closing WIP	2,000	100	2,000	50	1,000
Total	**10,000**		**8,000**		**7,800**

65

Statement of Cost

	Cost incurred during the period Rs.	**Equivalent Production (Units)**	**Cost Per Unit (Rs.)**
Materials	96,000	8,000	12
Labour	54,600	7,800	7
Overheads	31,200	7,800	4
Total	**1,81,800**		**23**

Statement of Evaluation

Opening WIP (Current Cost)	Rs.	Rs.
Materials	-	
Labour ---- 800 units @ Rs. 7	5,600	
Overheads ---- 800 units @ Rs. 4	3,200	8,800
Closing WIP		
Materials ---- 2,000 Units @ Rs. 12	24,000	
Labour ---- 1,000 units @ Rs. 7	7,000	
Overheads ---- 1,000 units @ Rs. 4	4,000	35,000
Units completely processed during the period ---- 6,000 units @ Rs. 23		1,38,000
Total		**1,81,800**

Process Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Opening WIP	2,000	9,500	By Finished Stock transferred to next process (9,500+8,800+ 1,38,000)	8,000	1,56,300
To Materials	8,000	96,000	By WIP A/c	2,000	35,000
To Labour		54,600			
To Overheads		31,200			
Total	**10,000**	**1,91,300**	**Total**	**10,000**	**1,91,300**

From the following information for the month of May 2016, prepare process cost accounts for Process II by using FIFO method to value equivalent production

Direct Materials added in Process II (Opening WIP)	2000 units @ Rs. 25,750
Transfer from Process I	53,000 units @ Rs. 4,11,500
Transfer to Process III	48,000 units
Closing stock of Process II	5,000 units
Units scrapped	2,000
Directs material added in Process II	Rs. 1,97,600
Direct Wages	Rs. 97,600
Direct overheads	Rs. 48,800

Degree of completion:

	Opening Stock	Closing Stock	Scrap
Materials	80%	70%	100%
Labour	60%	50%	70%
Overheads	60%	50%	70%

Solution

Statement of Equivalent Production

Production	*Units*	*Material A*		*Material B*		*Labour & Overheads*	
		% Completion	*Equiv. Units*	*% Completion*	*Equiv. Units*	*% Completion*	*Equiv. Units*
Opening WIP	2,000	-	-	20	400	40	800
Completely processed during the period (48,000 – 2,000)	46,000	100	46,000	100	46,000	100	46,000
Normal Loss (2,000+53,000-5,000)*5%	2,500						
Closing WIP	5,000	100	5,000	70	3,500	50	2,500
	55,500		**51,000**		**49,900**		**49,300**
Abnormal Gain	**500**	**100**	**500**	**100**	**500**	**100**	**500**
	55,000		**50,500**		**49,400**		**48,800**

Statement of Cost

	Cost incurred during the period Rs.	**Equivalent Production (Units)**	**Cost Per Unit (Rs.)**
Material – A Transfer from Process I	4,11,500		
Less: Scrap Value of Normal Loss (2,500*3)	(7,500)		
	4,04,000	50,500	8
Material – B	1,97,600	49,400	4
Labour	97,600	48,800	2
Overheads	48,800	48,800	1
Total	**7,48,000**		**15**

Statement of Evaluation

Opening WIP (for completion)	Rs.	Rs.
Material – B 400 units @ Rs. 4	1,600	
Wages ---- 800 units @ Rs. 2	1,600	
Overheads ---- 800 units @ Rs. 1	800	4,000
Closing WIP		
Material A ---- 5,000 Units @ Rs. 8	40,000	
Material B ---- 3,500 Units @ Rs. 4	14,000	
Wages ---- 2,500 units @ Rs. 2	5,000	
Overheads ---- 2,500 units @ Rs. 1	2,500	61,500
Units completely processed during the period ---- 46,000 units @ Rs. 15		6,90,000
Abnormal Gain 500 Units @ Rs. 15		**7,500**

Process II Account

Particulars	**Units**	**Amount Rs.**	**Particulars**	**Units**	**Amount Rs.**
To Balance b/d	2,000	25,750	By Normal Loss	2,500	7,500
To Process I A/c	53,000	4,11,500	By Process III A/c (6,90,000 + 4,000 + 25,750)	48,000	7,19,750
To D. Materials		1,97,600	By balance c/d	5,000	61,500
To D. Wages		97,600			
To Overheads		48,800			
To Abnormal Gain	500	7,500			
Total	**55,500**	**7,88,750**	**Total**	**55,500**	**7,88,750**

69

Following information is available regarding process X for the month of May 2016

Production Record:

Units in Process as on 01.05.2016 (All materials used; 25% complete for labour and overhead)	4,000
New units introduced	16,000
Units completed	14,000
Units in process as on 31.5.2016 (All materials used; 33.33% complete for labour and overhead)	6,000

Cost Record:

Work in Process as on 01.05.2016	Amount Rs.
Materials	6,000
Labour	1,000
Overhead	1,000

Cost during the month	Amount Rs.
Materials	25,600
Labour	15,000
Overhead	15,000

Presuming that ***Average Cost method*** of inventory is used, prepare:

1. Statement of Equivalent Production
2. Statement showing cost for each element
3. Statement of Apportionment of Cost
4. Process cost account for Process A

Statement of Equivalent Production

Production	*Units*	*Materials*		*Labour & Overheads*	
		% Completion	*Equiv. Units*	*% Completion*	*Equiv. Units*
Completed	14,000	100	14,000	100	14,000
WIP	6,000	100	6,000	33.33	2,000
Total	**10,000**		**20,000**		**15,000**

Statement showing cost for each element

(All figures in Rs.)

Particulars	Materials	Labour	Overhead	Total
Cost of Opening WIP	6,000	1,000	1,000	8,000
Cost incurred during the month	25,600	15,000	15,000	55,600
Total Cost (A)	31,600	16,000	16,000	63,600
Equivalent Units (B)	20,000	16,000	16,000	
Cost per equivalent unit ('C)= (A/B)	**1.58**	**1.00**	**1.00**	**3.58**

Statement of Apportionment of Cost

Particulars	Rs.	Rs.
Value of output transferred (A) (14,000 units @ Rs. 3.58)		50,120
Value of Closing WIP		
Material – 6,000 units @ Rs. 1.58	9,480	
Labour – 2,000 units @ Rs. 1	2,000	
Overheads - 2,000 units @ Rs. 1	2,000	13,480
Total Cost		**63,600**

Process X Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Opening WIP	4,000	8,000	By Completed units	14,000	50,120
To Materials	16,000	25,600	By Closing WIP	6,000	13,480
To Labour		15,000			
To Overheads		15,000			
Total	**20,000**	**63,600**	**Total**	**20,000**	**63,600**

Exercise

Choose the correct option(s) for the following questions:
(Answers are highlighted in bold)

1. Total costs incur in a production process is divided by total number of output units for calculating the

- cost of indirect labor
- cost of direct labor
- cost of direct material
- **unit costs**

2. Costs that are incurred in last department where product has been processed and will be carried to next department where further processing will be done are called

- partial work costs
- transferred-in costs
- **transferred-out costs**
- weighted average costs

3. Costing method which calculates per equivalent unit cost of all production related work done till calculate date is classified as

- **weighted average method**
- net present value method
- gross production method
- average value method

4. If beginning work in process equivalent units are 2500 units, work done in current period equivalent units are 3800 units and ending work in process equivalent units are 5000 then complete equivalent units in current period are

- 1800 units
- 1500 units
- **1300 units**
- 1500 units

5. Equivalent units of production are equal to the

- units completed by a production department in the period.
- number of units worked on during the period by a production department.

- **number of whole units that could have been completed if all work of the period had been used to produce whole units.**
- identifiable units existing at the end of the period in a production department.

True or False:

i. Process costing is most appropriate when manufacturing large batches of homogenous products. (True)

ii. Equivalent units are computed to assign costs to partially completed units (True)

iii. The FIFO method combines beginning inventory and current production to compute cost per unit of production. (False)

iv. The weighted average costing method assumes that units in beginning inventory are the first units transferred. (False)

4

VALUATION OF MATERIALS ISSUES

Unit Structure :

4.1 INTRODUCTION

All receipts and issues of materials are the important aspects to continuous flow of production. A systematic procedure should be adopted for movement of materials from one place to another place. Materials received and stored are issued on the basis of stores requisition, bills of materials, stock in balance, proper authorization and pricing material issues etc. It is clear that ascertainment of accurate material cost, fixing of material issue and effective cost control are the primary objective in order to fulfill the needs of management. For this reasons the following aspects considered to be the subject matter of valuation of materials issues.

1. Valuation of total cost of materials purchased.
2. Material Issue Procedure.
3. Important methods of pricing of materials issued.

4.2 VALUATION OF TOTAL COST OF MATERIALS PURCHASED

Material costing is very important in terms of the valuation of the cost of materials consumed by the production department as well as in terms of the estimation of the value of materials in stock. For costing purposes, the material cost is worked out by the actual cost incurred by taking price quoted by supplier as the basis subtracting the discounts and adding any other expenses not covered. In practice discounts may be allowed by the supplier in the following ways such as : (a) Trade Discount. (b) Quantity Discount and (c) Cash Discount.

a. Trade Discount: Trade Discount is allowed by the seller to the buyer who has to resell the goods. This allowance is to

compensate the buyer for the cost of storage, breaking bulk, selling repacking the goods etc.

b. Quantity Discount: This discount refers to the allowance which is allowed by the supplier to the buyer to encourage large orders. Placing the large orders from the buyers gives savings in costs which arise from large-scale production to the supplier. Part of the savings allowed by supplier to the buyer by means of a quantity discount.

c. Cash Discount: Cash Discount is allowed by the supplier to a buyer to encourage prompt payment of cash within the stipulated period.

2. MATERIALS ISSUE PROCEDURE

Issues of materials are based on production program. Based on this and the bill of materials work orders are printed, listing for each material quantity to be issued against each component requiring that material. The storekeeper is very much concerned with the material control, as he is responsible for the issue of materials based on the proper authorization of material requisition and bills of materials.

Materials Requisition:

Purchase or Material Requisition is also known as Intent for Materials. This is a document prepared by the production department for requisition of materials is known as Materials Requisition. The storekeeper is authorized to issue the materials based on the proper authority to avoid the misappropriation of material. The store keeper is responsible to maintained a record of serial number on requisition, issues and stock balances are up to date are must be posted in stores ledger.

Bill of Materials:

Bill of materials is a document which shows a complete listing for each material, quantity to be issued against each component requiring that materials for a particular job order or process. Bill of Materials is prepared by the production department before the quantity of the components to be manufactured. This is helpful for the purpose of initiate material requisition and estimation of cost materials to collect quotations.

3. METHOD OF PRICING OF MATERIALS ISSUES

In the relation to the estimation of the cost of the product for pricing decisions, material issues assumes a key role. Material

price usually refers to the price quoted and accepted in the purchase orders. Materials are issued from the stores to work orders based on the material requisition. But stock of materials consists of different consignment received at different dates and prices. There are different methods used for pricing the materials issues may be summarized in the following categories:

(A) Actual Price Method (or) Cost Price Method

(1) First In First Out (FIFO).

(2) Last In First Out (LIFO).

(3) Specific Price Method.

(4) Base Stock Method.

(5) Highest In First Out (HIFO).

(B) Average Cost Method

(1) Simple Average Method.

(2) Weighted Average Method.

(3) Periodic Simple Average Method.

(4) Periodic Weighted Average Method.

(C) Standard Price Method.

(D) Inflated Price Method.

(E) Market Price Method (or) Replacement Price Method.

A. Actual Price Method

In this method, the materials issued are priced at their actual cost and this involves identification of each lot purchased. This method is suitable only in the case of materials purchased for a specific job. There are several methods frequently used under actual cost price method which will be discussed in details:

(1) First In First Out (FIFO): First In First Out is also known as FIFO. Under this method, the pricing of issue is based on an assumption made that the oldest stock is issued first. Therefore at the time of issue, the rate pertaining to that will be applied until the whole lots is exhausted.

Advantages

(1) It is simple and easy to adaptability.

(2) It is beneficial when the prices are falling.

(3) As actual prices are issued, it reflects on profit no loss in the pricing.

(4) This method is very useful for slow moving materials.

Disadvantages

(1) Calculation becomes complicated due to fluctuation of material prices.

(2) More chances of clerical errors due to complicated calculations.

(3) Under fluctuating prices, one requisition involves more than one price.

(4) In times of raising prices this method tends to show the production at low cost since the cost of replacing the material will be higher.

Illustration: 1

From the following particulars, prepare the Stores Ledger Account showing how the value of the issues would be recorded under FIFO methods.

01.12.2003 Opening Stock 1,000 Units at Rs. 26 each
05.12.2003 Purchased 500 Units at Rs. 24.50 each
07.12.2003 Issued 750 Units
10.12.2003 Purchased 1,500 Units at Rs. 24 each
12.12.2003 Issued 1,100 Units
15.12.2003 Purchased 1,000 Units at Rs. 25 each
17.12.2003 Issued 500 Units
18.12.2003 Issued 300 Units
25.12.2003 Purchased 1,500 Units at Rs. 26 each
29.12.2003 Issued 1,500 Units

Solution:

Stores Ledger Account (FIFO)

Date	*Receipts*			*Issues*			*Balance*		
	Qty.	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*
01.12.2003	-	-	-	-	-	-	1,000	26	26,000
05.12.2003	500	24.50	12,250				1,000	26	26,000
							500	24.50	12,250
07.12.2003				750	26	19,500	250	26	6,500
							500	24.50	12,250
10.12.2003	1,500	24	36,000				250	26	6,500
							500	24.50	12,250
							1,500	24	36,000
				500	24.50	6,500			
12.12.2003				250	26	12,250			

				350	24	8,400	1,150	24	27,600
				1,100					
15.12.2003	1,000	25	25,000				1,150	24	27,600
							1,000	25	25,000
17.12.2003				500	24	12,000	650	24	15,600
							1,000	25	25,000
18.12.2003				300	24	7,200	350	24	8.400
							1,000	25	25,000
25.12.2003	1,500	26	39,000				350	24	
									8,400
							1,000	25	25,000
							1,500	26	39,000
29.12.2003				350	24	8.400			
				1,000	25	25,000			
				150	26	3,900	1,350	26	35,100
				1,500					

(2) Last In First Out (LIFO): This method is just opposite to First In First Out method. The basic assumption here is that the most recent receipts are issued first. The price of the materials to be issued would be the cost price of the last lots of materials purchased.

Advantages

(1) It is beneficial when the period of raising prices.

(2) Under this method, latest prices are issued thereby leading to lower reported profits hence savings in taxes.

(3) When there are wide fluctuations in price levels this methods tends to minimize unrealized gains or losses in inventory.

Disadvantages

(1) This method involves more clerical work which leads to complicated calculations.

(2) Under this method more than one price is to be adopted for the same issue lot of material.

(3) Due to wide fluctuation of prices, comparison of cost of similar jobs is very difficult.

Illustration: 2

Solve the illustration No.1, under LIFO method.

Solution:

Stores Ledger Account (LIFO)

Date	Receipts			Issues			Balance		
	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.
01.12.2002	-	-	-	-	-	-	1,000	26	26,000
05.12.2002	500	24.50	12,250				1,000	26	26,000
							500	24.50	12,250
07.12.2002				500	24.50	12,250			
				250	26	6,500	750	26	19,500
				750					
10.12.2002	1,500	24	36,000				750	26	19,500
							1,500	24	36,000
12.12.2002				1100	24	26,400	750	26	19,500
							400	24	9,600
15.12.2002	1,000	25	25,000				750	26	19,500
							400	24	9,600
							1,000	25	25,000
17.12.2002				500	25	12,500	750	26	19,500
							400	24	9,600
							500	25	25,000
18.12.2002				300	25	7,500	750	26	19,500
							400	24	9,600
							200	25	5,000
25.12.2002	1,500	26	39,000				750	26	39,000
							400	24	9,600
							200	25	5,000
							1,500	26	39,000
29.12.2002				1500	26	39,000	750	26	19,500
							400	24	9,600
							200	25	5,000

(3) Specific Price Method: Specific Price Method is one of the methods of actual price method. In this method adopted where the materials are purchased for particular job or operation and the issue is charged with the actual cost price. This method is suitable only in the case of special purpose materials are purchased for a particular job. This method has been widely used in job order

industries which carry out individual jobs or contract against specific orders.

Advantages -

(1) This method is simple and easy to operate.

(2) This method is useful where the job costing is in operation.

(3) Under this method, the actual material cost can be easily identified.

(4) This method is desirable because actual cost of materials is charged to production and therefore no profit no loss.

Disadvantages

(1) This method involves considerable amount of clerical work.

(2) If the purchases and issues are numerous, it is difficult to identification of issues for a particular job.

(3) **Base Stock Method:** Under this method pricing is determined on the basis of assumption made here is that a certain minimum quantity of materials maintained in stock. This minimum quantity is known as Base Stock or Safety Stock. This quantity cannot be used unless an emergency arises. The minimum stock is in the nature of fixed assets because it is created out of the first lot of the material purchased. Therefore it always valued at the actual cost price of the first lot and is carried forward as fixed assets. This method is usually applied with FIFO or LIFO.

Illustration: 3

From the following details of stores receipts and issues of materials in a manufacturing unit, prepare the stores ledger using Base Stock Method of valuing the issues; assume base stock 200 tons.

1.1.2003	Purchased 500 tons at Rs. 2 per ton
10.1.2003	Purchased 300 tons at Rs. 2.10 per ton
15.1.2003	Issued 600 tons
20.1.2003	Purchased 400 tons at Rs. 2.20 per ton
25.1.2003	Issued 300 tons
27.1.2003	Purchased 500 tons at Rs. 2.10 per ton
31.1.2003	Issued 200 tons

Solution:

Stores Ledger Account (Base Stock - FIFO)

		Receipts			Issues			Balance	
Date	Qty	Rate	Amt.	Qty.	Rate	Amt.	Qty.	Rate	Aml.
		Rs.	Rs.		Rs.	Rs.		Rs.	Rs.
01.01.2003	500	2	1,000				500	2	1000
10.01.2003	300	2.10	630				500	2	1000
							300	2.10	630
15.01.2003				300	2	600			
				300	2.10	630	200	2	400
20.01.2003	400	2.20	880				200	2	400
							400	2.20	880
25.01.2003				300	2.20	660	200	2	400
							100	2.20	220
27.01.2003	500	2.10	1,050				200	2	
							100	2.20	220
									400
							500	2.10	1,050
31.01.2003				100	2.20	220	200	2	400
				100	2.10	210	400	2.10	840

Closing Stock = 600 tons (200 x Rs. 2 + 400 x Rs. 2.10) = Rs. 1,240

Illustration:

Solve illustration 3 Under Base Stock - LIFO method

Solution:

Stores Ledger Account (Base Stock-LIFO)

Date	Receipts			Issues			Balance		
	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.
01.01.2003	500	2	1,000				500	2	1,000

10.01.2003	300	2.10	630				500	2	1,000
							300	2.10	630
15.01.2003				300	2	600			
				300	2.10	630	200	2	400
20.01.2003	400	2.20	880				200	2	400
							400	2.20	880
25.01.2003				300	2.20	660	200	2	400
							100	2.20	220
27.01.2003	500	2.10	1,050				200	2	
									400
							100	2.20	220
							500	2.10	1,050
31.01.2003				200	2.10	420	200	2	
									400
							100	2.20	220
							300	2.10	330

Closing stock =600 tons (200 x Rs. 2 + 100 x Rs. 2.20 + 300 x Rs. 2.10) =Rs. 1,250.

(5) **Highest In First Out (HIFO):** This method is based on the assumption that the stock of materials should always be valued at the lowest possible price. Accordingly materials purchased at the highest price should be used for making the issue. This method is useful because issues are based on actual cost. It aims at recovering the highest cost of materials when the market is constantly fluctuating. But at the same time this method involves too many complicated calculations. And also this method has not been adopted widely.

Illustration: 4

From the following details of stores receipts and issues of material "XYZ" in a manufacturing unit, prepare the Stores Ledger using Highest In First Out Method (HIFO):

2003 January 1 Opening stock 4,000 units at Rs. 5
4 Purchased 1,000 units at Rs. 7 per unit
8 Purchased 1,200 units at Rs. 8 per unit
12 Issued 1,000 units
15 Purchased 700 units at Rs. 10 per units
19 Purchased 300 units at Rs. 8 per unit
23 Issued 800 units
25 Purchased 509 units at Rs. 10 per unit
31 Issued 400 units.

Solution:

Stores Ledger Account

(Highest In First Out (HIFO) Method)

Date	Receipts			Issues			Balance		
	Qty.	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*
2003									
Jan.1							4,000	5	20,000
"4	1,000	7	7,000				4,000	5	20,000
							1,000	7	7,000
"8	1,200	8	9,600				4,000	5	20,000
							1,000	7	7,000
							1,200	8	96,000
" 12				1,000	8	8,000	4,000	5	20,000
							1,000	7	7,000
							200	8	1,600
" 15	700	10	7,000				4,000	5	20,000
							1,000	7	7,000
							200	8	1,600
							700	10	7,000
" 19	300	9	2,700				4,000	5	
									20,000
							1,000	7	7,000
							200	8	1,600
							700	10	7,000
							300	9	2,700
				700	10	7,000	4,000	5	20,000
.. 23				100	9	900	1,000	7	7,000
				--					
				800			200	8	1,600
							200	9	1,800
"25	500	10	5,000				4,000	5	
									20,000
							1,000	7	7,000
							200	8	1,600
							200	9	1,800
							500	10	5,000
"31				400	10	4,000	4,000	5	
									20,000
							1,000	7	7,000
							200	8	1,600
							200	9	1,800
							100	10	1,000

B. Average Cost Method

In this method, the issues to the production department are split into equal batches from each shipment at stock. It is a realistic method reflecting the price levels and stabilizing the cost price. The following various methods of averaging issue prices may be used:

(1) Simple Average Method

(2) Weighted Average Method

(3) Periodic Simple Average Method

(4) Periodic Weighted Average Method

(1) Simple Average Method: Under this method, price of issue materials is determined by dividing the total of the prices of the materials in stock, i.e., adding of different prices by the number of different prices. Then, this average price is applied to the issues to production. This method is simple and easy to operate. The value of closing stock becomes unrealistic. The following formula is applied for calculation of material issue price under simple average method :

$$\text{Issue Price} = \frac{\text{Total of Unit Prices of Materials in Stock}}{\text{Number of Prices}}$$

Illustration: 5

From the following prepare stores ledger account using Simple Average Method for the month of January 2003:

January	1	Opening balance 500 units at Rs. 2 per unit
	3	Issued 100 units
	4	Issued 100 units
	8	Issued 100 units
	13	Purchased 400 units at Rs. 3 per unit
	14	Purchased 200 units at Re. 1 per unit
	16	Issued 150 units
	20	Purchased 400 units at Rs. 4 Per unit
	24	Issued 250 units
	25	Purchased 500 units at Rs. 5 per unit
	26	Issued 300 units
	28	Purchased 200 units at Rs. 2 per unit
	31	Purchased 200 units at Rs. 4 per unit

Solution:

Stores Ledger Account (Simple Average Method)

Date	Receipts			Issues			Balance		
	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.
01.01.2003	500	2	1,000				500	2	1,000
03.01.2003				100	2	200	400	2	800
04.01.2003				100	2	200	300	2	600
08.01.2003				100	2	200	200	2	400
13.01.2003	400	3	1,200				200	2	400
							400	3	1,200
14.1.2003	200	1	200				200	2	
									400
							400	3	1,200
							200	1	200
16.01.2003				150	2	300	650		1,500
20.01.2003	400	4	1,600				1,050		3,100
24.01.2003				250	2.5	625	800		2,475
25.01.2003	500	5	2,500				1,300		4,975
26.01.2003				300	3.25	975	1,000		4,000
28.01.2003	200	4	400				1,200		4,400
31.01.2003	200	4	800				1,400		5,200

Working Notes

1. Issue rate on 3rd, 4th and 8th at Rs. 2 per unit
2. Issue rate on 16^{th} = (2+ 3 + 1)/3 = Rs. 2
3. Issue rate on 24^{th} = (2+ 3 + 1 + 4)/4 = Rs. 2.5
4. Issue rate on 26^{th} = (3 + 1 + 4 + 5)/4 = Rs. 3.25

(2) Weighted Average Method: Under this method, the price of materials issue is determined by dividing the total cost of materials in stock by the total quantity of material in stock. Here weighted average rate is calculated based on both quantity and price of the materials in stock. As more issues are made, a new average rate is computed and this average rate is applied to the subsequent issues. The material issue price is calculated by the formula given below:

$$\text{Weighted Average Price} = \frac{\text{Value of Materials in Stock}}{\text{Quantity in Stock}}$$

Illustration: 6

From the following particulars, prepare stores Ledger Account on weight Average basis:

2003
March I Opening balance 200 units at Rs. 2 per unit
10 Purchased 300 units at Rs. 2.40 per unit
15 Issued 250 units
18 Purchased 250 units at Rs. 2.60 per unit
20 Issued 200 units
25 Purchased 300 units at Rs. 2.50 per unit
31 Purchased 100 units at Rs. 2 per unit

Solution:

Stores Ledger Account (Weighted Average Method

Date	*Receipts*			*Issues*			*Balance*		
	Qty.	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*
01.03.2003	200	2	400				200	2	400
10.03.2003	300	2.40	720				200	2	400
							300	2.40	720
15.03.2003				250	2.24	560	250		560
18.03.2003	250	2.60	650				500		1,210
20.03.2003				200	2.42	484	300		726
25.03.2003	300	2.50	750				600		1,476
31.03.2003	100	2	200				700		1,676

Working Notes

Issue Price = Value of materials in stock / quantity in stock

1. Issue rate on 15^{th} = (400 + 720)/(200 + 300) = Rs. 2.24
2. Issue rate on 20^{th} = (560 + 650)/(250 + 250)= Rs. 2.42

(3) **Periodic Simple Average Method:** Under this method, the simple average rate is calculated for a particular period ignoring the rate of opening stock. The issue price is calculated by totaling the

unit price of all materials purchased during a particular period by the total number of prices during that period. Thus this rate is applied to the issue to production for a particular period say a month and not at the occasion of each issue of materials.

Illustration: 7

From the following detail of stores receipts and issues of material "EXE" in a manufacturing unit, prepare the Stores Ledger using Periodic Simple Average Method.

2003 Jan.1 Opening Stock 200 units at Rs. 2 per unit
Jan. 5 Purchased 400 units at Rs. 3 per unit
Jan. 10 Issued 250 units
Jan. 16 Purchased 500 units at Rs. 3 per unit
Jan. 20 Issued 300 units
Jan. 31 Purchased 200 units at Rs. 4 per unit
Feb. 10 Issued 500 units
Feb. 15 Purchased 400 units at Rs. 4.50 per unit
Feb. 20 Issued 300 units
Feb. 25 Purchased 200 units at Rs. 6 per unit

Stores Ledger Account (Periodic Simple Average Method)

	Receipts			*Issues*			*Balance*		
Date	*Qty.*	*Rate* *Rs.*	*Amt.* *Rs.*	*Qty.*	*Rate* *Rs.*	*Amt.* *Rs.*	*Qty.*	*Rate* *Rs.*	*Amt.* *Rs.*
01.01.2003	200	2	400				200	2	400
05.01.2003	400	3	1,200				400		
10.01.2003				250			350		
16.01.2003	500	3	1,500				850		
20.01.2003				300			550		
31.01.2003	200	4	800				750		
	1,300		3,900	550	4.66	2,563	750	4.66	3,495
Feb.l Balance	750	4.66	3,495				750	4.66	3,495
10.02.2003				500			250		
15.02.2003	400	4.50	1,800				650		
20.02.2003				300			350		
25.02.2003	200	6	1,200				550		
	1,350		6,495	800	5.25	4,200	550	5.25	2,888

Working Notes

1. Issue rate in Jan = (3 + 3 + 4)/3 = Rs. 4.66
2. Issue rate in Feb = (4.50 + 6)/2 = Rs. 5.25

(4) **Periodic Weighted Average Method:** This method is similar to the periodic simple average method. In this method issue rate is calculated by total cost of materials purchased during a period by the total quantity of materials purchased during that period. Here both quantity and prices of materials in stock during a particular period are taken into account for calculation of periodic weighted average rate. Under this method the issue rate is determined for a particular period ignoring the rate and quantity of opening stock. A new average rate is computed at the end of each period say a month and this average rate is applied to subsequent issues.

Illustration: 8

Solve the illustration No.6, under Periodic Weighted Average Method.

Solution:

Stores Ledger Account (Periodic Simple Average Method)

Date	*Receipts*			*Issues*			*Balance*		
	Qty.	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*	*Qty.*	*Rate Rs.*	*Amt. Rs.*
01.01.2003	200	2	400				200		-
05.01.2003	400	3	1,200				400		
10.01.2003				250			350		
16.01.2003	500	3	1,500				850		
20.01.2003				300			550		
31.01.2003	200	4	800				750		
	1,300		3,900	550	3.18	1,749	750	3.18	2,385
Feb'! Balance	750	3.18	2,385				750		
10.02.2003				500			250		
15.02.2003	400	4.50	1,800				650		
20.02.2003				300			350		
25.02.2003	200	6	1,200				550		
	1,350		5,385	800	5	4,000	550	5	2,750

Working Notes

1. Issue rate in Jan = (1200 + 1500 + 800)/(400 + 500 + 200) = Rs. 3.18
2. Issue rate in Feb = (1800 + 1200)/(400 + 200) = Rs. 5

Ignoring Opening Stock of Jan. & Feb.

C. Standard Price Method

Under this method, standard price of material issues are calculated on the basis of detailed analysis of market prices and trends. The standard price also referred to as predetermined price is fixed for a definite period of six months or more. Accordingly the material issue is done on the basis of standard price irrespective of actual rate. The difference between actual price and standard price is treated as material variance. At the end of the period, new standard price is fixed for a further period.

Illustration: 9

From the following particulars, prepare a stores Ledger Account by Standard Price Method of issue of materials. The standard price of a material is fixed at Rs. IO per unit.

2003
Mar. 1 Opening stock of materials 1,000 units
at Rs. 15 per unit
3 Purchased 500 units at Rs.10 per unit
7 Issued 500 units
12 Purchased 1,000 units at RS.15
15 Purchased 800 units at Rs.10
19 Issued 700 units
22 Issued 500 units
27 Purchased 600 units at Rs.12
29 Issued 300 units
30 Purchased 100 units at Rs.14
31 Issued 400 units

Solution:

STORES LEDGER ACCOUNT

(Standard Price Method)

Date	Receipts			Issues			Balance		
	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.	Qty.	Rate Rs.	Amt. Rs.
2003							1,000	15	15,000
Mar. I									
3	500	10	5,000				1,500		20,000
7				500	10	5,000	1,000		15,000
12	1,000	15	15,000				2,000		30,000
15	800	10	8,000				2,800		38,000
19				700	10	7,000	2,100		31,000
22				500	10	5,000	1,600		26,000
27	600	12	7,200				2,200		33,200
29				300	10	3,000	1,900		30,200
30	100	14	1,400				2,000		31,600
31				400	10	4,000	1,600		27,600

D. Inflated Price Method

This method is used to cover material losses on account of obsolescence, deterioration, and materials handling expenses. Under this method cost of materials issue, such losses and expenses are directly charged to material cost. Therefore, when the issue of materials is made, the price is to inflated to cover all the losses and expenses.

E. Market Price Method

This method is also known as Replacement Rate Method. Under this method issue materials that are valued at the market rate prevailing at the time issue. It therefore follows that when prices increase the stock on hand is continuously under estimated because receipts are cost at actual and issued at higher rates. This method is most suitable when quotations or tenders have to be made because they are to be quoted at competitive prices. Besides this system requires continuous monitoring of market price for all materials and hence it is very unwieldy.

4.3 MATERIALS: INVENTORY CONTROL

4.3.1 Store and Storekeeping

Stores play a vital role in the operation of a company. Generally un-worked material is stored and the place where it is stored is called Store Room. It is in direct touch with the user departments in its day-to-day activities. The chief aim of the stores is to ensure the smooth flow of production without any interruption. Stores generally include raw materials, work in progress and finished goods.

Effective storekeeping and inventory control are indispensable to the control of material cost. Further, stores often equated directly with money, as capital is blocked in inventories.

4.3.2 Purpose of Storekeeping

4. Storekeeping helps to examine carefully all goods and materials on receipts.
5. It is essential to arrange for a systematic and efficient storing of materials.
6. Storekeeping ensure accurate and prompt distribution of materials to user departments as per issue requisition note.
7. It is essential because stores often equated directly with money, as capital is blocked in inventories.

4.3.3 Functions of the Storekeeper

The store is a service department headed by the storekeeper who holds the responsible position in the organisation of the stores department. He is as much responsible for the articles incharge as a cashier for the cash. Important functions of the storekeeper are given below:

(1) He must receive raw materials, components, tools, equipment and other items and account for them properly.

(2) He must provide adequate and proper storage and preservation to the various items.

(3) He must check, and provide proper classification and codification of materials.

(F) Issue the materials as per material issue requisition duly signed by an authorized person.

(G) He has to take steps to prevent leakage, theft, wastage and deterioration.

(6) He must ensure good storekeeping.

(5) He should not permit any person without authorization.

(6) He should maintain proper records in order to know desired quantities available.

(7) He must provide adequate information to the top executives for verifications and effective decision making.

4.3.4 Stores Layout

In order to achieve the objectives of effective inventory control, well planned layout of stores should be required. A planned stores layout will facilitate easy movement of materials, good housekeeping, sufficient space for materials handling. It ensures effective utilization of storage space and judicious use of storage equipments. The stores department should be equipped with shelves, racks, pallets and proper preservation from rain, light and other such elements. An ideal location of stores should facilitate the volume and variety of goods to be handled. In order to bring down the transport cost it should be close to roads or railway stations. And also as far as possible, the stores department should be near to the receiving department. In the case of large organizations usually stores attached to each consuming department, whereas receiving is done centrally.

4.3.5 Types of Stores

The types of stores depend on the size, types and policy of the organization. Organization of stores varies from concern to concern. As per the requirement of the firm the stores organization may be classified into:

Centralized Stores.
Decentralized Stores.
Combination of both, i.e., Centralized Stores with Sub Stores.

a. Centralized Stores: This system is suitable to small-scale industries where it is desirable to centralize the materials in one department. Under this system, the store room will be most conveniently situated where it is near to all the departments.
Advantages of Centralized Stores

(4) Well planned layout of stores.
(5) Effective utilization of floor space.
(6) Better supervision of stores is possible.
(7) Effective material handling is possible.
(8) Lot of manual work may be eliminated.
(9) Better control is possible.
(10) Less investment is required.

(11) Ensures minimum wastages.
(12) Facilitates prompt flow of materials.
(13) Better forecasting is possible.

Disadvantages

(5) Increases transportation costs.
(6) Delay and inconvenience because of over-crowding of materials.
(7) Greater risk of loss in case of fire.
(8) Break down in transport will affect continuous flow of production.
(9) Increases cost of materials handling.

b. Decentralized Stores: Under this system each department has its own stores. It is suitable to large concern where there are several departments each using a different type of material from its own stores. In this system all the disadvantages of centralized stores can be eliminated.

c. Combination of both: This system is also termed as imprest System or stores control. Centralized Stores with Sub Stores is usually adopted in large factories where departments are situated at a distance from the central stores. In order to minimize the cost of transportation and materials handling, this type of organization would be located nearer to the receiving department. Under this system material receipts are stored in the central stores and issues are made to the sub-stores. Under imprest system of stores control sub stores which are located nearer to the central stores for the purpose of draw supplies from central stores and issue the required quantity to production. To maintain the stocks at the predetermined level, the sub-stores make requisition from the central stores.

Fixation of Stock Level

Material control involves physical control of materials, preservation of stores, minimization of obsolescence and damages through timely disposal and efficient handling. Effective stock control system should ensure the minimization of inventory carrying cost and materials holding cost. Level of stock is the important aspect of inventory control. Stock level may be overstocking or under-stocking. Overstocking requires large capital with high cost of holding. In the case of under-stocking, production and overall performance of the concern as a whole will affect. Thus, fixation of stock level is essential to maintain sufficient stock for the smooth flow of production and sales. The following are the important techniques usually adopted in different industries:

Maximum Stock Level.

Minimum Stock Level.
Danger Level.
Re-Order Level.
Economic Ordering Quantity (EOQ).
Average of Stack Level.

a. Maximum Stock Level: The maximum stock level indicates the maximum quantity of an item should not be allowed to increase. The maximum quantity of an item can be held in stack at any time. The following factors can be considered while fixing the maximum stock levels :

(5) Availability of capital.
(6) Availability of floor space.
(7) Cost of storage.
(8) Possibility of fluctuation of prices in raw materials.
(9) Cost of insurance.
(10) Economic order of quantity.
5 Average rate of consumption.
6 Re-order level and lead time.
7 Seasonal nature of supply.
8 Risk of obsolescence, depletion, evaporation etc.

The maximum stock level can be calculated by the following formula:

Maximum Stock Level = Re-Order Level + Re-Ordering Quantity (Minimum Consumption x Minimum Re-Ordering Period)

b. Minimum Stock Level: Minimum stock level indicates the minimum quantity of material to be maintained in stock. Accordingly, the minimum quantity of an item should not be allowed to fall. The minimum stock is also known as Safety Stock or Buffer Stock. The following formula is adopted for calculation of minimum stock level :

Minimum Stock Level = Re-Order Level - (Normal Consumption x Normal Re-Order Period)

c. Danger Level: It is the stock level below the Minimum Level. This level indicates the danger point to affect the normal production. When materials reach danger level, necessary steps should be taken to restock the materials. If there is any emergency, special arrangements should be made for fresh issue. Generally this level is fixed above the minimum level but below the reordering level. The formula for determination of danger level is :

Danger Level = Average Rate of Consumption x Emergency Supply Time

d. Re-order Level: Re-order level is also termed as Ordering Level. It indicates when to order, i.e., orders for its fresh supplies. This is the stock level between maximum and the minimum stock levels. The re-order stock level is fixed on the basis of economic order quantity, lead time and average rate of consumption. Calculation of re-order level is adopted by the following formula :

Re-order Level =Minimum Level + Consumption during the time to get fresh delivery

(Or)

Re-order Level = Maximum Consumption x Maximum Re-ordering Period

e. Economic Order Quantity (EOQ): Economic Order Quantity is one of the important techniques used to determine the optimum quantity or number of orders to be placed from the suppliers. The main objectives of economic order quantity is to minimize the cost of ordering, cost of carrying materials and total cost of production. Ordering costs include cost of stationery, salaries of those engaged in receiving and inspecting, general office and administrative expenses of purchase departments Carrying costs are incurred on stationery, salaries, rent, materials handling cost, interest on capital, insurance cost, risk of obsolescence, deterioration and wastage of materials and evaporation. Economic Order Quantity can be calculated by the following formula :

$EOQ = (2AB/CS)^{1/2}$

Where EOQ = Economic Order Quantity;
A = Annual Consumption
B = Buying cost per order
C = Cost per Unit
S = Storage and Carrying cost per annum

f. Average Stock Level: Average stock level is determined on the basis of minimum stock level and re-order quantity. This is calculated with the help of the following formula:
Average Stock Level = Minimum Stock Level + 1/2 of Re-order Quantity

(or)

(Minimum Level + Maximum Level)/2

Illustration: 1

From the following particulars calculate the
Maximum Stock Level.
Minimum Stock Level.
Re-ordering Level.
Average Stock Level.

17 Normal consumption = 600 units per week.
18 Maximum consumption = 840 units per week.
19 Minimum consumption = 480 unit per week.
20 Re-order quantity = 7200 units.
21 Re-order period = 10 to 15 weeks.
22 Normal reorder period = 12 weeks.

Solution:

Re-order Level = Maximum Consumption x Maximum Re-order Period
21 840 x 15 = 12600 units

Minimum Stock Level
27 Re-order Level - (Normal Consumption x Normal Re-order Period)
28 12600 - (600 x 12)
29 12600 - 7200 = 5400 units

Maximum Stock Level = Re-order Level + Re-order Quantity - (Minimum Consumption x Minimum Re-order Period)
= 12600 + 7200 - (480 x 10)
= 19800 - 4800 = 15000 units.

Average Stock Level = (Minimum Stock Level + Maximum Stock Level)/2
= (5400 + 15000)/2
= 20400/2
= 10200 units

Illustration 2:

The following information available in respect of a material X:
Re-order quantity = 1800 units
Maximum Consumption = 450 units per week
Minimum Consumption = 150 units per week
Normal Consumption = 300 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

Solution:

(a) Re-order Level :

= Maximum Consumption x Maximum Re-order Period

= 450 x 5 = 2250 units

(b) Minimum Stock Level:

= Re-order Level - (Normal Consumption x Normal Re-order Period)

= 2250 - (300 x 4)

= 2250 - 1200 = 1050 units.

(c) Maximum Stock Level:

= Re-order Level + Re-order Quantity - (Minimum Consumption x Minimum Re-order Period)

2250 + 1800 - (150 x 3)

= 4050 - 450 = 3600 units.

(d) Normal Re-order Period:

= (Minimum re-order period + Maximum re-order period)/2

= 3 weeks + 5 weeks /2

= 4 weeks

Illustration 3:

A company uses a particular material in a factory which is 20000 units per year. The cost per unit of material is Rs. 10. The cost of placing one order is Rs. 100 and the inventory carrying cost 20% on average inventory. From the above information calculate Economic Order Quantity.

Solution:

$EOQ = (2AB/CS)^{1/2}$

$= (2 \times 200000 \times 100/10 \times 20\%)^{1/2}$

= 1,414 units

Illustration 4:

A Ltd. Co. is committed to supply 24000 bearings per annum to B Ltd. on a steady basis. It is estimated that it costs 10 paise as inventory holding cost per bearing per month and that the set up cost per run of bearing manufacture is Rs. 324.

(1) What should be the optimum run size for bearing manufacture?
(2) What would be the interval between two consecutive optimum runs?
(3) Find out the minimum inventory cost per annum.

Solution:

(1) EOQ = $(2AB/CS)^{1/2}$
= $(2 \times 24000 \times 324/10)^{1/2}$
= 3,600 units

(2) Number of set up per annum = Annual Production/Economic run size
= 24,000/3,600
= 6.67 times
Interval between two consecutive optimum runs = 12 x 3/20
= 1.8 months

(3) Minimum Inventory cost per year = ((24,000/3,600) x 324)) + ((3,600/2) X 1.2)
= Rs. 2,160 + Rs. 2,160 = Rs. 4320

4.3.6 The ABC Analysis

ABC Analysis is one of the important techniques which is based on grading the items according to the importance of materials. This method is popularly known as Always Better Control. This is also termed as Proportional Value Analysis - In inventory control, this technique helps to analyze the distribution of any characteristic by money value of importance in order to determine its importance. Accordingly, materials are grouped into three categories on the basis of the money value of importance of materials.

(1) High Value Materials - A
(2) Medium Value Materials - B
(3) Low Value Materials - C

The items, which are of high value and less than 10 per cent of the total consumption or inventory, can be called as 'A' grouped materials. It is required to exercise selective control and focus more attention because of high value items. Similarly, 70 per cent of materials in total consumption or inventory which lies 10 per cent of the inventory value can be grouped under 'C' categories. The materials which have moderate value that lies between the high value materials and low value materials are grouped under 'B' category. The following table shows more explanation about ABC Analysis:

Category	*Percentage to total inventory*	*Percentage to total inventory cost*
A	Less than 10	70 to 80
B	10 to 20	15 to 25
C	70 to 80	Less than 10

Advantages of ABC Analysis

(1) Exercise selective control is possible.
(2) Focus high attention on high value items is possible.
(3) It helps to reduce the clerical efforts and costs.
(4) It facilitates better planning and improved inventory turnover.
(5) It facilitates goods storekeeping and effective materials handling.

4.3.7 Classification and Codification

In order to ensure the effective inventory control, it should be carried out with the classification and codification of materials. Codification is the process of representing each item by a number, the digits of which indicate the group, the sub group, the type and the size and shape of the items. The codification process could be obtained by the nature of materials in grouping all items of the same metal content say ferrous and non-ferrous etc. The system of codification could be built by the end use of items, that is, items grouped according to maintenance, spinning, weaving, packing, foundry, machine shop etc.

Advantages of Codification

(1) Codes ensure the secrecy of materials.
(2) It is essential for mechanical accounting.
(3) Easy identification of material is possible.
(4) It ensures effective material control.
(5) It minimizes length in description of materials.
(6) Effective materials handling is possible.
(7) It helps in avoiding duplication of materials.
(8) Codification facilitates less clerical work.
(9) Cost reduction is possible.

Methods of Coding

The following are the three important Methods of Codification :

(1) Numerical Method.
(2) Alphabetical Method.
(3) Numerical Cum Alphabetical Method.

1. **Numerical Method:** Under this method, each number or numerical digit is allotted to each item or material. Accordingly, each code should uniquely indicate one item. For example, in printing press following codes may be assigned :

   Paper 145
   Ink 155
   Gum 165

There are various universal decimal classification of codification used in libraries may be indicated for identification of items.

2. **Alphabetical Method:** In this method alphabets or letters are used for codification of each category of materials. Accordingly each letter or alphabet is allotted for each item or material. For example, 'C' for copper, 'S' for steel and so on.

3. **Numerical cum Alphabetical Method:** This method is done by a combination of numerical and alphabetical method. Under this method both numerical along with alphabet is allotted for each item. For example, IR 5 may indicate Ink Red of Grade 5, Steel wire 6 may be denoted by SW 6 etc.

4.3.8 Inventory System

The chief aims of inventory control is as follows :
(1) To maintain a balanced inventory.
(2) To ensure the smooth flow of production.
(3) To keep the investment in inventory as low as possible.

Accordingly stock verification is an important aspect to ensure and maintain a balanced inventory. The following are the two systems of stock verification adopted in different industries:

(1) Periodic Inventory System.
(2) Perpetual Inventory System.
(3) Continuous Stock Verification.

1. **Periodic Inventory System:** Under this system, quantity and value of materials are checked and verified at the end of the accounting period after having a physical verification of the units in hand.

2. **Perpetual Inventory System:** The Perpetual Inventory System is also known as Automatic Inventory System. This is one of the important methods adopted for verification inventories to know the physical balances. According to ICMA London defines Perpetual Inventory System as a method of recording stores balances after every receipt and issue to facilitate regular checking and to obviate closing down for stock taking.

Advantages of Perpetual Inventory System

(1) It facilitates rigid control over stock of materials.
(2) It gives up to date details about materials in stock.
(3) Not necessary to stop production for stock taking.
(4) It assists to minimize pilferage and fraudulent practices.

(5) It enables to reconcile the stock records and document for accuracy.
(6) It helps to take the important decisions for corrective actions.

Perpetual Inventory Records

Perpetual Inventory represents a system of records maintained by the organization. The records are of two types, viz.:

(a) Bin Cards
(b) Stores Ledger

A constant comparison of the quantity balances of these two set of records is made and the balances are reconciled.

a. Bin Cards: Bin Card is only quantitative record of stores receipt, issue and balance and is kept by the Storekeeper for each item of stores.

b. Stores Ledger: Stores ledger is both quantitative and monetary value record of stores receipt, issue and balance and is prepared by the Cost Accounting Department.

3. Continuous Stock Verification: Since Verification of physical inventory is an essential feature of a sound system of material control, a system of continuous stock taking is introduced. Continuous stock taking ensures that the balances of all items of stocks are checked at least three to four times in a year by physical verification. It avoids long and costly procedure of closing down the stores for stock taking on periodical basis. Stock discrepancies are detected on timely basis and preventive measures can be taken. The correctness of the physical stocks as reflected in the books is ensured and thus the monthly accounts represent a true and fair view of the business. Continuous Stock Verification not only serves as an essential tool of material control but also will help in proper presentation of accounting information to the management.

Material Storage Losses

The investment in materials constitutes a major portion of current assets, so it is essential to exercise effective stores control. Stores control helps to avoid losses from misappropriation, damage, deterioration etc. Generally material storage losses arising during storage may be classified as:

(1) Normal Loss
(1) Abnormal Loss

1. **Normal Loss:** Normal Losses arise during the storage of materials due to the avoidable reasons of pilferage, theft, careless of materials handling, clerical errors, improper storage, wrong entries etc.

2. **Abnormal Loss:** Abnormal Losses arise during the storage of materials due to unavoidable causes of evaporation, shrinkage, bulk losses due to accident, fire, etc.

Accounting Treatment of Normal Loss and Abnormal Loss

The following are the accounting treatment of normal and abnormal loss of materials arising during storage:

1. Normal Loss: (a) Inflate the issue price. (b) Charge to stores overheads. (c) Treat it as a separate item of overheads to be recovered as a percentage of materials consumed.

2. Abnormal Loss: Abnormal losses are directly charged to Costing Profit and Loss Account.

3. If the loss is due to error in documentation it should be corrected through adjustment entries.

Inventory Turnover Ratio

Inventory Turnover Ratio may be defined as "a ratio which measures the number of times a firm's average inventory is sold during a year." It is a ratio which is useful to measure the firm's inventory performance. High rate of inventory turnover ratio denotes that materials are fast moving stock. A low turnover rate indicates the locking up of working capital in undesirable items. The Inventory turnover ratio is calculated by the following formula:

Material Turnover Ratio = Cost of material used / Average value of material in stock

Material Turnover in days = Days during the period / Inventory Turnover Ratio

4.4 LABOR COST ACCOUNTING

Introduction

Labour cost is one of the important elements of production. Wage, salaries and other incentives of employee remuneration constitute a very large component of operating costs. Remuneration of employees is a vital factor not only affecting the cost of production but also industrial relations of the organization.

No organization can expect to attract and attain qualified and motivated employees unless it pays them fair remuneration. Employee remuneration therefore influences vitally the growth and profitability of the company. For employees remuneration is more than a means of satisfying their physical needs. Wages and salaries have significant influence on our distribution of income, consumption, savings, employment and prices. Thus employee remuneration is a very significant issue from the viewpoint of employers, employees and the nation as whole.

Objectives of an Ideal Wage System

An ideal wage system is required to achieve the following objectives:

1. The wage system should establish a fair and equitable remuneration.
2. A sound wage system helps to attract qualified and efficient worker by ensuring an adequate payment.
3. It assists to improve the motivation and moral of employees which in turn lead to higher productivity.
4. It enables effective control of labour cost.
5. An Ideal wage system helps to improve union-management relations. It should reduce grievances arising out of wage inequities.
6. It should facilitate job sequences and lines of promotion wherever applicable.
7. An ideal system seeks to project the image of a progressive employer and to comply with legal requirements relating to wages and salaries.

Principles of an Ideal Wage System

The following principles should be adopted for an ideal wage system

1. Differences in pay should be based on differences in job requirements.
2. Follow the principle of equal pay for equal work.
3. The scheme should be based on work study, and the work contents of various jobs should be stabilized.
4. Recognize individual differences in ability and contributions.
5. The scheme should not be very costly in operation.
6. The scheme should be flexible.
7. The scheme should encourage productivity.

8) The scheme should not undermine co-operation amongst the workers.

(H) The scheme should be sufficient to ensure for the worker and his family reasonable standard of living.

Method of Remuneration

There are two basic methods of wage payment: (1) Time Wage System and (2) Piece Wage System. Under time wage system, wages are paid on the basis of time spent on the job irrespective of the amount of work done. This is known as Time Rate or Day Wage System. The unit of time may be a day, a week, a fortnight or a month. Under piece wage system, remuneration is based on the amount of work done or output of a worker. This is known as "Piece Rate System" or "Payment by Result." Thus, a workman is paid in direct proportion to his output. A variety of bonus and premium plans have been designed to overcome the drawbacks of two basic methods of wage payments. A system of incentive plans also takes into consideration the primary principles of these two basic plans known as Incentive or Bonus or Premium Plan.

The following are the important methods of remuneration which may be grouped into:

(1) Time Rate Systems

(2) Piece Rate Systems

(3) Bonus System (or) Incentives Schemes.

(4) Indirect Monetary Incentives.

These may be further classified as under:

Time Rate Systems:

At Ordinary Levels

At High Wage Levels

Guaranteed Time Rates.

Piece Rate Systems:

Straight Piece Rate

Piece Rates with Guaranteed Time Rate

Differential Piece Rates:

Taylor's Differential Piece Rate System

Merrick Differential Piece Rate System

Gantt Task and Bonus Plan.

Bonus System or Incentive Schemes:

Halsey Premium Plan

Halsey-Weir Premium Plan

Rowan Plan

Barth Variable Sharing Plan

Emerson Efficiency Plan

Bedaux Point Premium System

Accelerating Premium Plan

Group or Collective Bonus Plans.

Indirect Monetary Incentives:

Non-Monetary Incentives:

Comparison between Time Rate and Piece Rate System

Time Rate System	Piece Rate System
Under this system earnings of a worker are calculated on the basis of time spent on the job	In this system earnings of a worker are calculated on the basis of number of units Produced.
In this system, minimum guaranteed time rate is paid to every worker.	Under this system, no guarantee of minimum payment to every worker.
Under time rate system, remunerations are not directly linked with productivity.	Remuneration of workers directly linked with productivity.
Under this system emphasis is on high quality of work.	Under piece rate system there is no consideration for the quality of work.
Under time rate system, strict supervision is essential.	In this system, close supervision is not required.
This method may lead to trade unions to support it.	Under this method the attitude of trade unions is not to co-operate with the schemes.
More idle time arises in time rate systems.	Compared with time rate system there is no change of idle time in piece rate schemes.

Time Wage System

a. *Time Rate at Ordinary Levels:* This is also termed as "Day Wage System" or "Flat Rate System." Under this system, wages are paid to the workers on the basis of time spent on the job irrespective of the quantity of work produced by the workers. Payment can be made at a rate per day or a week, a fortnight or a month. The formula for calculation of payment of time rate of ordinary levels is as follows:

Remuneration or Earnings = Hours Worked X Rate per Hour

Time wage system is suitable under the following conditions:

(4) Where the units of output are difficult to measurable, e.g., watchman.

(5) Where the quality of work is more important, e.g., artistic furniture, fine jewellery, carving etc.

(6) Where machinery and materials used are very sophisticated and expensive.

(7) Where supervision is effective and close supervision is possible.

(8) Where the workers are new and learning the job.

(9) Where the work is of a highly varied nature and standard of performance cannot be established.

Advantages

(4) It is simple and easy to calculate.

(5) Earning of workers are regular and fixed.

(6) Time rate system is accepted by trade unions.

(7) Quality of the work is not affected.

(8) This method also avoids inefficient handling of materials and tools.

Disadvantages

No distinction between efficient and inefficient worker is made and hence they get the same remuneration.

Cost of supervision is high due to strict supervision used for high productivity of labour.

Labour cost is difficult to control due to more payment may be made for the lesser amount of work.

No incentive is given to efficient workers. It will depress the efficient workers.

There are no specific standards for evaluating the merit of different employees for promotions.

b. *Time Rate at High Levels:* Under this system, efficient workers are paid higher wages in order to increase production. The main object of this method designed to remove the drawbacks of time rate at ordinary levels. This system is simple and easily understandable. When higher rate of wages are paid, it not only reduces labour turnover but also increases production and efficiency.

c. *Guaranteed Time Rates:* Under this method, the wage rate is calculated by considering to changes in cost of living index. Accordingly, the wage rate is varied for each worker according to the change in cost of living index. This system is suitable during the period of raising prices.

9 Piece Rate System

This is also known as "Piece Wage System" or "Payment by Result." Under this system, wages of a worker are calculated on the basis of amount of work done or output of a worker. Accordingly, a worker is paid in direct proportion to his output.

Advantages

(1) It facilitates direct relation between efforts and reward.

(2) This system encourages the efficient workers to increase production.

(3) Under this system efficient workers are recognized and rewarded.

(4) It helps to reduce the cost of supervision and idle time.

(5) Tenders or quotations can be prepared confidently and accurately.

Disadvantages

(1) Where a concern is producing large quantities, it is difficult to fix a piece rate.

(2) In order to maximize their earnings, workers working with high speed may affect their health.

(3) The quality of output cannot be maintained.

(4) This system is not encouraging to the inefficient workers.

(5) Temporary delays or difficulties may affect the earnings of the workers.

Piece Rate System is Suitable Where

Quality and workmanship are not important.

(1) Work can be measured accurately.

(2) Quantity of output directly depends upon the efforts of the worker.

(3) Production of standardized goods in a factory.

(4) Job is of a repetitive nature.

There are three important methods of paying labour remuneration falling under this type: (a) Straight Piece Rate (2) Piece Rates with Guaranteed Time Rates and (c) Differential Piece Rates.

(a) *Straight Piece Rate:* Under this system, workers are paid according to the number of units produced at a given rate per unit. Thus, total earning of each worker is calculated on the basis of his output irrespective of the time taken by him. The following formula is used for measuring piece work earning:

Straight Piece Work Earnings =Units Produced x Rate per Hour

= *Piece Rates with Guaranteed Time Rates:* Under this method, the worker earning from piece work less than the guaranteed minimum wage, will get the fixed amount of guaranteed time rate. A guaranteed rate would be paid per hour rate or day rate or week rate.

= *Differential Piece Rates:* This system is designed to provide for variation of piece rates at different levels of output. Accordingly increase in wages is proportionate to increase in output. Under this system, efficient workers get ample reward and at the same time inefficient workers are motivated to earn more. The following are the three important types of differential piece rates :

Taylor's Differential Piece Rates System.

Merrick's Differential Piece Rates System.

Gantt Task Bonus Plan.

(a) Taylor's Differential Piece Rates System

E W Taylor, who is the father of scientific management, introduced this plan. Under this system, two piece rates are applicable on the basis of standard of performance established. Accordingly one is high rate and the other one is lower rate. Thus high piece rate is applicable for standard and above the standard performance and lower piece rate for those workers with below the standard performance.

Illustration: 1

Calculate the earnings of workers A and B under Straight Piece Rate System and Taylor's Differential Piece Rate System from the following particulars:

Standard time allowed 50 units per hour. Normal time rate per hour Rs. 100. Differentials to be applied.
80% of Piece rate below standard.
120% of Piece rate at or above standard.
In a day of 8 hours A produced 300 units and B produced 450 units.

Solution:

Calculation of Piece Rates:

Standard production per hour = 50 units.
Standard production for 8 hours = 50 x 8 = 400 units.
Rate per hour = Rs. 100.
Piece Rate per unit = Rs. 100/50 = Rs. 2 per unit

Straight Piece Rate System

A for 200 units @ Rs. 2 = 200 x 2 = Rs. 400

B for 250 units @ Rs. 2 = 250 x 2 = Rs. 500

Differential Piece Rate System

Low piece rate at 80 % differential = 2 x 80/100 = Rs. 1.60

High piece rate at 120 % differential = 2 x 120/100 = Rs. 2.40

Standard production in 8 hours = 8 x 50 units per hour = 400 units

A Produced 300 units (below standard)	= 300 x 1.60	
Therefore low Piece rate of Rs. 1.60 applicable		} Rs.480
B Produced 450 units (above standard)	= 450 x 2.40	
Therefore high Piece rate of Rs. 240 applicable		}Rs.1,080

(b) Merrick Differential Piece Rate System

This is also termed as Multiple Piece Rate system. This plan is 'designed to overcome the drawback of Taylor's Differential Piece Rate System. Under this method, three piece rates are applied with different levels of performance. Accordingly

Performance	*Differential Piece Rate*
(1) Less than 83%	Normal Piece Rate (or) Basic Piece Rate
(2) From 83% to 100%	110% of Normal Piece Rate
(3) More than 100%	120% of Normal Piece Rate

Illustration: 2

From the following particulars calculate the total earning of the three workers under Merrick Differential Piece Rate System.

Normal rate per hour Rs. 5 per unit
Standard production per hour 10 units
In an 8 hours/day:
A produced 70 units.
B produced 90 units.
C produced 65 units.
D produced 110 units.

Solution:

A's level of performance = Actual output / Standard output x 100
= 70/80 x 100 = 87.5%

B's level of performance = 90/80 x 100 = 112.5%

C's level of performance = 65/80 x 100 = 81.25%

D' s level of performance = 110/80 x 100 = 137.5%

Piece Rate applicable

Up to 83 % - Normal piece rate
83% to 100% - 110% of Normal Piece rate

Above 100% - 120% of Normal Piece rate

A' s earnings = 70 x 5 x 110/100 = Rs 385

B' s earnings = 90 x 5 x 120/100 = Rs 540

C' s earnings = 65 x 5 = Rs 325

A' s earnings = 110 x 5 x 120/100 = Rs 660

(c) Gantt's Task Bonus Plan

This system is designed by Henry L. Gantt. Under this system, standard time for every task is fixed through time and motion study. The main feature of this system is a good combination of time rate, differential piece rate and bonus. In this system day wages are

guaranteed to all workers. Wages under this system are calculated as follows:

Performance (Output)	*Earnings*
(1) Output Below Standard	Time Rate (Guaranteed)
(2) Output at Standard	Wages of Time Rate plus Bonus of 20% of the Time Rate
(3) Output at Above Standard	High Piece Rate on worker's output

Illustration: 3

From the following particulars, calculate total earnings of each worker under Gantt's Task and Bonus Scheme:

Standard production per week per worker is 2000 units, piece work rate Rs. 5 per unit
Actual production during the month:
A -1000 units
B - 2000 units
C - 2500 units

Solution:

Standard production per month =2000 units

Piece work rate = Re. 0.50 per unit

Therefore, guaranteed time rate = 2000/0.5 = Rs 4000 per month
Level of Efficiency:
A = 1000/2000 x 100 = 50%

B = 2000/2000 x 100 = 100%

C = 2500/2000 x 100 = 125%

Earnings:

Under Gantt's Task and Bonus Plan wages are computed as follows:

Output	*Rate*
Below Standard	Guaranteed Time Wages
At Standard	Given piece wages plus bonus of 20%
Above Standard	High piece rate on worker's whole output.

The earnings of the worker will be as follows :

A (50% below the standard)	=	Rs. 4000 (Guaranteed monthly wages)
B (100% efficiency)	=	2000 units x Re. 0.50 per unit + Bonus of 20%
	=	Rs. 1000 + 20% of Rs. 1000
	=	Rs. 1000 + 200 = Rs. 1200
C (125% efficiency above standard)	=	. 2500 units x Re. 0.50 + Bonus of 20%
		Rs. 1250 + 20% of Rs. 1250
	=	Rs.1500

Bonus or Incentives Schemes

Incentive schemes of wage payment are also known as Premium Bonus Plans. introduced in order to increase production with ensuring proper industrial climate. Wage incentive plans may be of two types:

(1) Individual Incentive Plans and (2) Group Incentive Plans.

Under individual incentive plans, remuneration can be measured on the performance of the individual worker. In the case of the group incentive scheme earnings can be measured on the basis of the productivity of the group of workers or entire work force of the organization. Various types of incentive schemes are combinations of time and piece rate systems. The following are the important individual incentive plans discussed below:

(1) Halsey Premium Plan: This Plan was developed by F. A. Halsey. This system also termed as Split Bonus Plan or Fifty-Fifty Plan. Under this plan, standard time is fixed for each job or operation on the basis of past performance. If a worker completes his job within or more than the standard time then the worker is paid a guaranteed time wage. If a worker completes his job within

or less than the standard time, then he gets a bonus of 50% of the time saved plus normal earnings. Under this method, the total earnings is calculated as follows:

Total Earning = Guaranteed Time Wages + Bonus of 50% of Time Saved

(or)

Total Earnings = $T \times R + 50\% (S - T) R$

Where

T - Time Taken
R - Hourly Rate
S - Standard Time

50

.'. Total Earnings = Time Taken x Hourly Rate + -- (Time Saved x Hourly Rate) 100

Illustration: 4

Calculate the total earnings of the worker under Halsey Premium Plans:

Standard Time 12 hours
Hourly Rate Rs. 3
Time Taken 8 hours

Solution:

Earnings under Halsey Premium Plan:

Standard Time :: 12 hours
Time Taken = 8 hours
Time Saved = Standard Time - Time Taken
= 12 - 8 =4 hours
Rate per hour = Rs.3
Total Earnings = $T \times R + 50\% (S - n$ R
= $8 \times 3 + \frac{50}{100} (4 \times 3)$
= 24 + 6 = Rs. 30
Total Earnings = Rs. 30

Merits

(1) It is simple to understand.

(2) Total earnings of each worker can be easy to calculate.

(3) Both employer and employee get equal benefit of time saved.

(4) This system not only benefits efficient worker but also provides average worker to get guaranteed minimum wages.

(5) This system is based on time saved and it can reduce the labour cost.

Demerits

(1) Lack of co-operation among the employees.

(2) Under this system establishment of standard is very difficult.

(3) Earnings are reduced at high level of efficiency.

(2) The Halsey - Weir Scheme: Under this system, the worker gets the bonus of 30% of the time saved instead of 50% of time saved under Halsey Plan. Except for this, Halsey Plan and Halsey-Weir Systems are similar in all other respects.

Illustration: 5

From the following particulars calculate total earnings of a worker under Halsey-Weir Plan :

Standard Time	=	10 hours
Time Taken	::	8 hours
Hourly Rate	::	Rs.2 per hour

Solution:

Earnings under Halsey-Weir Premium Plan:

Standard Time	=	10 hours
Time Taken	=	8 hours
Time Saved	::	Standard Time - Time Taken
		10-8 = 2 hours

Rate per hour = Rs. 2

Total earnings = TxR+30% (S - T) R

= 8 x 2 + 30/100 (10 - 8) x 2

= 16 + 1.20

Total Earnings = Rs.17.20

(3) Rowan Plan: This plan was introduced by James Rowan of England. It was similar to the Halsey Plan in many respects except that it differs in calculation of bonus. Under this system. bonus is determined as the proportion of the time taken which the time saved bears to the standard time allowed. Under this system the following formula is applied to calculation of bonus:

$$\text{Bonus} = \frac{\text{Time Saved}}{\text{Standard Time}} \times \text{Time Wages}$$

$$\text{Total Earnings} = \text{Time Taken} \times \text{Hourly Rate} + \frac{\text{Time Saved}}{\text{Standard Time}} \times T \times R$$

$$\text{Time Saved Time} = \text{Standard Time} - \text{Time Taken}$$

$$\text{Wages} = \text{Time Taken} \times \text{Hourly Rate}$$

Illustration: 6

From the following information, calculate total earnings of a worker under Rowan System:

Standard Time	=	10 hours
Time Taken	=	8 hours
Rate per hour	=	Rs.3

Solution:

Calculation of total earnings under Rowan Plan:

Standard Time
Time Taken
Time Saved

Rate per hour

Total Earnings
= 10 hours
= 8 hours
= Standard Time - Time Taken
= 10 - 8 = 2 hours
= Rs. 3 per hour

$$= TxR + \frac{\text{Time Saved}}{\text{Standard Time}} \times T \times R$$

= 8 x 3+ 2/10 x 8 x 3

24 + 4.8 = Rs. 28.8

Illustration: 7

Calculate the earnings of a worker under (a) Halsey Premium Plan and (b) Rowan Premium Plan:

Time Allowed or Standard Time Time Taken
Rate per hour
= 56 hours
= 48 hours
= Rs.2

Solution:

(a) Earning under Halsey Premium Plan:

Standard Time = 56 hours
Time Taken = 48 hours
Hourly Rate = Rs.2
Time Saved = 56 -48
= 8 hours

Total Earnings = T x R + 50/100 x (S - T)R

= 48 x 2 + 50/100 (56 – 48) 2 = Rs 104

Total Earnings = T x R+ (S – T/S) x T x R
= 48 x 2 + (56-48/56) x 48 x 2
= 96 + 13.71
= Rs.109.7
[ADS: (a) Earning under Halsey plan = Rs. 104
(b) Earnings under Rowan Plan = Rs. 109.71J

(4) Emerson's Efficiency Sharing Plan: Under this plan, earning of a worker is by combining guaranteed day wages with a differential piece rate. Accordingly the level of efficiency is determined on the basis of establishment of standard task for a unit of time. If the level of worker's efficiency reaches 67% the bonus is paid to him at a normal rate. The rate of bonus increases in a given rate as the output increases from 67% to 100% efficiency. Above 100% efficiency, the bonus increases to 20% of the wage earned plus additional bonus of 1% is added for each increase of 1% in efficiency.

Illustration: 8

From the following particulars calculate total earnings of a worker under Emerson's Efficiency Sharing Plan:

Standard output per day of 8 hours is 16 units
Actual output of a worker for 8 hours is 20 units
Rate per hour is Rs. 2.50

Solution:

Calculation of earnings under Emerson's Sharing Plan:

$$\text{Level of performance} = \frac{\text{Actual Output}}{\text{Standard Output}} \times 100$$

$$= \frac{20 \text{ units}}{16 \text{ units}} \times 100 = 125\%$$

Bonus Payable

At 100% efficiency = 20% of time wages

Further increase of 1% in the bonus is given for every 1% increase in the efficiency.

. '. For next 25% efficiency @ 1% for each 1% increase in efficiency = 25% of Time Wages

Total Bonus payable = 45% of Time Wages.

Earning

Time Wages for 8 hours @ Rs. 2.50 per hour = Rs. 20.

Add: 45% bonus of time wages = 45/100 x 20 = Rs. 9

Total Earning = Rs. 20 + Rs. 9 = Rs. 29

(5) Barth Variable Sharing Plan: This scheme introduced to attract newly recruited and skilled employees who are motivated to learn woi'k. It provides sufficient incentives to inefficient workers who are motivated to increase productivity. Earning under this method is calculated by applying the following formula:

Earnings = Rate per hour x $(\text{Standard Time} \times \text{Time Taken})^{1/2}$

Illustration: 9

From the following particulars calculate earnings of a worker under Brath Variable sharing plan:

Standard Time	=	12 hours
Time Taken		8 hours
Rate per hour	=	Rs.5

Solution:

Calculation of earnings under Barth Variable sharing plan:

Earnings = Rate per hour x (Standard Time x Time Taken)$^{1/2}$

$=5x\ (12x8)^{1/2}$

= Rs.48.98

(6) Bedaux Point Premium System: This plan was introduced by Charles E.Bedaux in 1911. Under this plan, standard time fixed for each operation or job is expressed in terms of Bedaux point or'S.' For example, a standard time of 360 B means the operation or job should be completed within 360 minutes. The chief advantage of this plan is that it can be applied to any kind of a job. Under this system, worker is paid at the time for actual hours worked, and 75% of the wages for the time saved are paid as bonus to the worker and 25% to the foremen, supervisors etc. The following is the formula for calculation of total wages of a worker:

Total earnings = S x R + 75% of R (S - T)

Illustration: 10

From the following particulars, calculate total earnings of a worker under Bedaux Point Premium System:

Standard Time	=	360 B
Time Taken	=	240 B
Rate per hour	=	Re. 1

Solution:

Calculation of total earnings under Bedaux Point System:

Standard Time = 360 B's

= 360 /60

= 6 hours

Time Taken = 240 B's =

= 240 /60 = 4 hours

Rate per hour **= Re.1**

Total earnings = S x R + 75% of R (S - T)

= 360 x 1 + 75% x 1 (360 - 240)

= 360 + 75% x 120

= Rs. 360 + Rs. 90 = Rs. 450

(7) Accelerating Premium Bonus Plan: Under this plan, bonus is determined on the basis of time saved unlike a fixed percentage under Halsey Plan and as a decreasing percentage under Rowan Plan. The bonus is paid to workers at an increased rate according to more and more time saved. This provides increasing incentives to efficient workers.

Group or Collective Bonus Plan

The incentive schemes explained so far are applicable to individual performance depending directly on production. However. it is not the individual worker who produce the goods or services (operation) alone but group of several other workers are required to jointly perform a single operation. It is, therefore, essential that a group incentive scheme be introduced. Bonus is calculated for a group incentive scheme. The bonus is calculated for a group of workers and the total amount is distributed among the group of workers on anyone of the following basis :

(a) Equally by all the workers of the group.

(b) Pro rata on the time rate basis.

(c) Pre determined percentage basis.

(d) Specified proportion basis.

Types of Group Incentive Plans

The following are the important types of group incentive bonus plans:

(1) Budgeted Expenses Bonus Plan

(2) Priest Man Bonus Plan

(3) Towne's Gain-sharing Plan

(4) Scanlon Plan

(1) Budgeted Expenses Bonus Plan: Under this method, bonus is determined on the basis of savings in actual expenditure compared with total budgeted expenditure.

(2) Priest Man Bonus Plan: Under this plan, standard performance is fixed by the management and committee of workers. The group of workers get bonus when actual performance exceeds the standard performance irrespective of individual's efficiency or inefficiency.

(3) Towne's Gain-sharing Plan: Under this plan, bonus is calculated on the basis of savings in labour cost. The group of workers get bonus when actual costs is less than the standard costs, one-half of the savings is distributed among workers including foremen in proportion with the wages earned.

(4) Scanlon Plan: Scanlon Plan is designed with the chief aim of reducing the cost of operations in order to increase the production efficiency. This plan is generally applicable in industries where the operation cost is high. Under this scheme, bonus is determined on the basis of standard costs or wastages and percentage of the reduction in operation cost.

Indirect Monetary Incentives

Incentive schemes are regarded beneficial to both employers and workers. In this regard, under indirect monetary incentives by giving them a share of profit and introducing co-partnership schemes or as they have become partners in the business in order to make a very profitable enterprise.

Profit Sharing: Profit sharing and bonus is also known as Profit sharing bonus. Under this scheme, there is an agreement between the employer and employee by which employee receives a share, fixed in advance of the profits. Accordingly profit sharing bonus refers to the distribution of profit on the basis of a certain percentage of one's monthly earnings. The amount to be distributed depends on the profits earned by an enterprise. The proportion of the profits to be distributed among the employees is determined in advance.

Co-partnership: This system provides not only a worker to become partner in the business but also to share in the profits of the concern. There are different degrees of partnership and share of responsibilities allowed to the workers to take part in its control.

Non-Monetary Incentive Schemes: Under this system, employees are provided better facilities, instead of additional monetary payments. Some of the examples of non-monetary incentives are free education for children, rent free accommodation, medical facilities, canteen facilities, welfare facilities, and entertainment facilities etc.

EXERCISES

1. From the following particulars, calculate total earnings of the worker under Halsey Premium Plan :
   Time allowed for job 20 hours
   Time taken 15 hours
   Rate per hour Rs. 1.50 per hour
   [Ans: Total earning = Rs. 26.25]

2. From the following particulars, calculate total earnings of the worker under Rowan Plan:
   Standard time 20 hours
   Time taken 16 hours
   Hourly rate Rs. 2 per hour
   [Ans: Total earnings Rs. 38.40]

3. A worker takes 9 hours to complete a job on daily wages and 6 hours on a scheme of payment by result. His daily rate is 75 paise an hour: the material cost of the product is Rs. 4 and the overheads are recovered at 150% of the total direct wages. Calculate the factory cost of the product under:

   (a) Piece work plan; (b) Rowan plan; and (c) Halsey plan.
   [Ans: Piece work plan Rs. 20.88
   Rowan plan Rs. 19
   Halsey plan Rs. 18.07]

4. A workman's wage for a guaranteed 44 week is Rs. 0.19 per hour. The week time produce of one article is 30 minutes and under incentive scheme the time allowed is increased by 20%. During one week the workman manufactured 100 articles. Calculate his gross wages under each of the following methods of remuneration :
   a. Time rate
   b. Piece work with a guaranteed weekly wage
   c. Rowan premium bonus
   d. Halsey premium bonus, 50% to workman

[Ans:(1) Rs. 8.36 (2) Rs. 11.40 (3) Rs. 10.59 (4) Rs. 9.88]

5. An employee working under a bonus scheme saves in a job for which the standard time is 60 hours. Calculate the rate per hour worked and wages payable to a worker if incentive bonus of 10% on the hourly rate is payable when standard time (namely, 100% efficiency) is achieved, and a further incentive bonus of 1% on hourly rate for each 1% in excess of that 100% efficiency is payable.

   Assume that the normal rate payment is Rs. 5 per hour.

   [Ans: Wages payable to workers = Rs. 325]

6. A worker takes hours to complete a job on daily wages and hours on a scheme of payment by results. His day rate is 75 paise an hour, the material cost on the product is Rs. 4 and the overheads are recorded at 150% of the total direct wages.

   Calculate the factory cast of the product under:

   (a) Piece work plan (b) Rowan plan (c) Halsey plan

   [Ans : Piece work Rs. 15.25 ,Halsey Rs. 18.5, Rowan plan Rs. 19.00]

7. Jobs are issued to operation X, to make 89 units to operation y, to make 204 units, for which a time allowance of 20 standard minutes and 15 standard minutes per units respectively, is credited for every hour saved bonus is paid at 50% of the basic rate which is Rs. 2 per hour for both the employee. The basic working week is 42 hours. Hours in excess are paid at double the normal rate.

   X completes his units in 45 hours and Y completes his units in 39 hours (but works a full week). Due to defective material 6 units of X and 4 units of Y are subsequently scrapped although all units produced are paid for.

   You are required to calculate for each of X and Y:

   a. The amount of bonus payable
   b. Total gross wages payable and
   c. The wages cost per good unit made.

   [Ans: Bonus payable: X Rs. 18; Y Rs. 12 Gross wages: X Rs. 114; Y Rs. 90

   Wage cost per unit: Y Rs. 62; Rs. 42]

5

LABOUR COST CONTROL

Unit Structure :

5.1 INTRODUCTION

Labour cost is the second important element of cost of production. Wages, salaries and other forms of remunerations represent a major portion of the total cost of a product or services. The growth and profitability of the concern depends upon proper utilization of human resources or labour forces which in turn needs proper accounting and control of cost. Thus, control of labour cost is a very significant issue from the viewpoint of management.

5.2 TYPES OF LABOUR COST

The labour cost can be classified into two types :

(1) Direct Labour Cost.

(2) Indirect Labour Cost.

(1) Direct Labour Cost: Any labour cost that is specially incurred for or can be readily charged to or identified with a specific job, contract, work order or any other unit of cost is termed as direct labour cost. Wages for supervision, wages for foremen, wages for labours who are actually engaged in operation or process are the examples of direct labour cost.

(2) Indirect Labour Cost: Indirect labour is for work in general. The importance of the distinction lies in the fact that whereas direct labour can be identified with and charged to the job, indirect labour cannot be so charged and has, therefore to be treated as part of the factory overheads to be included in the cost of production. For example, salaries and wages of supervisors, storekeepers and maintence labour etc.

5.3 CONTROL OF LABOUR COST

Control of labour cost is a significant influence on the growth, profitability and cost of production. Labour cost may become unduly high rate due to inefficiency of labour, ineffective supervision, ideal time, unusual overtime work etc. The primary objective of management therefore is to efficiently utilize the labour as economically as possible.

Techniques of Labour Cost Control

In order to achieve the effective utilization of manpower resources, the management has to apply proper system of labour cost control. The labour cost control may be determined on the basis of establishment of standard of efficiency and comparison of actuals with standards. The management applies various techniques for the effective control of labour costs as under:

(1) Scientific method of production planning.

(2) Use of labour budgets.

(3) Establishment of labour standards.

(4) Proper system of labour performance report.

(5) Effective system of job evaluation and job analysis.

(6) Devise a proper system of control over ideal time and unusual overtime work.

(7) Establish a fair and equitable remuneration system.

(8) Effective cost accounting system.

5.4 ORGANISATION FOR CONTROL OF LABOUR COST

The objectives of proper control on labour cost is effectively achieved through the functions of various departments responsible for controlling labour cost in an organisation. The following are the important departments for control over labour costs:

(1) Personnel Departments.

(2) Engineering and Works Study Department.

(3) Time Keeping Departments.

(4) Pay Roll Department.

(5) Cost Accounting Department.

(1) Personnel Department

Personnel department plays a very important role in control of labour costs. It is primarily concerned with the recruitment of labour on the basis of employee placement requisition and imparting training to them. And thereafter placing them to the job for which they are best suited. In order to achieve the efficient utilization of manpower resources, this department is responsible to execution of labour policies which have been laid down by top management.

(2) Engineering and Works Study Department

Engineering department is primarily concerned with maintaining control over working conditions and production methods for each job, process, operation or departments. It is performed by undertaking the following functions:

(I) Preparation of plan and specification of each job.

(2) Maintaining required safety and efficient working conditions.

(3) Making time and motion studies.

(4) Conducting job analysis, job evaluation and merit rating.

(5) Setting fair and equitable piece rate or time wage system.

(6) Conducting research and experimental work.

In order to maintain control over working conditions and production methods carrying a detailed study of the following operations is necessary:

(a) Method Study

(b) Motion Study

(c) Time Study

(d) Job Analysis

(e) Job Evaluation

(f) Merit Rating.

a. Method Study: It is one of the important components of work study. The chief aim of this study is to find a scheme of least wastage. Method Study is defined as "a systematic and scientific evaluation of existing and proposed plans and performance of any work system and the evaluation of improvement, through analytical process of critical examination."

b. Motion Study: Frank Gilbreth, who is the real founder of Motion Study. According to him motion study may be defined as the "science of eliminating wastefulness resulting from ill-directed

and inefficient motions. The following are the important objectives of the motion study:

(1) Effective utilisation of material, machine and labour.

(2) Elimination of wastage of time and labour.

(3) Maintaining higher standards of safety and health.

(4) Reducing unnecessary movements in order to minimize wastages.

(5) Better design of work place layout for effective production process.

(6) Ensure fair remuneration with job satisfaction.

c. Time Study: Time study is also called work measurement. Time study may be defined as "the art of observing and recording the time required to do each detailed element of an industrial operation."

Uses of Time Study

(1) It assists in setting standard time for each operation.

(2) It facilitates effective labour cost control.

(3) It helps to ascertain ideal time and over time to men and machines.

(4) It is useful to establish fair and suitable wage rates and incentives.

(5) It facilitates effective utilization of resources.

d. Job Analysis: Job Analysis is a formal and detailed study of jobs. Job analysis may be defined as "the process of determining by observation and study the task, which comprise the job, the methods and equipment used and the skills and attitudes required for successful performance of the job."

Advantages of Job Analysis

The following are the important advantages of job analysis:

(1) It is useful in classifying job and interrelationship among them.

(2) If facilitates forecasting of manpower requirements.

(3) It helps in effective utilization of manpower resources.

(4) Effective employee development programme can be established.

(5) Enables in determining performance standards of each process or job.

e. Job Evaluation: Job evaluation may be defined as "a process of analyzing and describing positions, grouping them and

determining their relative value by comparing the duties of different positions in terms of their different responsibilities and other requirements." Job evaluation is determined on the basis of job description and job analysis. The primary purpose of job evaluation is developing appropriate wage and salary structure with internal pay equity between jobs.

f. Merit Rating: Merit rating may be defined as "a systematic evaluation of an employee's performance on the job in terms of the requirement of the job." Merit rating is a system of measuring both qualitatively and quantitatively of an employee's capacity in relation to his job. The following are the personal qualities of an employee which are usually considered for determining merit and worth of labour as:

(1) Academic qualification and knowledge.

(2) Skill and experience.

(3) Attitude to the work.

(4) Quality of work done.

(5) Initiative intelligence.

(6) Accuracy.

(7) Judgment.

(8) Leadership.

(9) Adaptability and Co-operation.

(10) Leadership and self-confidence.

(11) Reliability and Integrity.

(12) Discipline.

Importance of Merit Rating: The following are some of the important advantages of merit rating:

(1) It assists in determining fair rates of wages for each worker on the basis of his / her performance.

(2) It helps to know the suitability of the worker for a particular job.

(3) This method helps in removing grievances and it improves labour-management relations.

(4) Enables to ascertaining an employee's merit for grant of promotion or demotion or transfer or increment etc.

(5) If facilitates effective labour cost control.

Distinction between Job Evaluation and Merit Rating:

The following are the important points of differences between Job Evaluation and Merit Rating:

1. Job evaluation is the assessment of the relative worth of jobs within a company and merit rating is the assessment of the relative worth of the man behind the job.
2. Job evaluation and its accomplishments are means to setup a rational wage and salary structure whereas merit rating provides a scientific basis for determining fair wages for each worker based on his ability and performance.
3. Job evaluation simplifies wage administration by bringing uniformity in wage rates whereas merit rating is used to determine fair rate of pay for different workers.

(3) Timekeeping Department

This department is concerned with following two important activities: (1) Timekeeping and (2) Time Booking

Timekeeping: It refers to recording of each worker's time of coming in and going out of the factory during engagement of the factory. It is essential for the purpose of attendance and determination of wage payable to each worker.

Objectives of Timekeeping: The following are the important objectives of timekeeping:

(1) Preparation of payrolls

(2) Ensuring discipline in attendance

(3) Apportionment of overhead on the basis of labour hours

(4) Effective utilization of human resources

(5) Minimization of labour costs

(6) Ascertaining ideal labour time and ideal machine time.

Methods of Timekeeping: The following are the two important methods of timekeeping:

i) Manual Method:

(a) Attendance Register Method.

(b) Token or Disc Method.

ii) Mechanical Method:

a. Time recording clocks.

b. Dial Time Records.

c. Key Recorder System.

Manual Method: The choice of the manual method adopted by the factory depends upon its size, number of workers employed, nature of the business and policy of a firm. Under manual methods, there

are two important methods which are in use: (a) Attendance Register Method and (b) Token or Disc Method.

(a) *Attendance Register Method:* Under this method, an Attendance Register is maintained by the Timekeeper in the time office. This register may be filled in by the Timekeeper when the worker gets inside the factory and the time of departure, normal time and overtime. Workers may be required to sign both at the time of arrival and time of departure. This method is very simple and most suitable to small-scale industries. It is very difficult to operate when the number of workers is large.

(b) *Token or Metal Disc Method:* In this method, each worker is given a metal disc or a token bearing his identification number. All the tokens or discs are hung on a board serially at the entrance of the gate in the factory. As the worker enters the gates of the factory, he removes his disc from the board and drops it into a box. This process is continued until the scheduled time expires. Latecomers may drop their tokens in a separate box or handover personally to the timekeeper. In the case of absentees the tokens are not removed from the board. Based on the above process, the Timekeeper records the attendance in the register known as Muster Roll for the purpose of pay rolls.

This method is simple and economical. But it suffers from certain disadvantages given below:

(a) There is chance to remove the disc of fellow worker's token from the board to ensure his presence.

(b) Difficult to ascertain about overtime work, early leaving, ideal time etc.

(c) Lack of accuracy regarding the exact time of arrival of a worker which may result in many disputes.

(d) Unless there is strict supervision, the timekeeper may include dummy or ghost workers in the Muster Rolls.

Mechanical Method

In order to achieve the accuracy and reliability of recording of time of workers, the following different mechanical devices are used:

(1) Time Recording Clocks.

(2) Dial Time Records.

(3) Key Recorder System.

Time Recording Clocks: Under this system, each worker is' given a time card for a week or fortnight. These time or clock cards are serially arranged in a tray at the entrance to the factory. When the worker enters the factory, he takes his allotted card from the tray and puts it in the time recording clock that records the exact arrival time at the space provided on the card against the particular day. This process is repeated for recording time of departure for lunch, return from lunch, leaving the factory after his day's work. Late arrivals, early leavings and over time are printed in red so as to distinguish these from normal period spent in the factory. This method is very popular for correct recording of attendance.

Dial Time Records: This is a machine which is used for recording correct attendance time of arrival and departure of worker automatically. This recorder has a number of holes about the circumference. Each hole represents worker's number which corresponds to identification of allotted clock numbers. At the time of arrival and departure of worker, by operating this machine, the dial arm into a hole and the time is automatically recorded on an attendance sheet placed inside. This machine is most suitable in small-scale industries.

Key Recorder System: In this machine there are a number of keys, each key denotes worker's number. When the time of arrival and departure the worker inserts his allotted key in the key hole and gives a turn, the ticket time and clock time are recorded on a sheet of paper. This method is economical and easy to operate.

Time Booking

It refers recording the time of each worker for each department, operation, process or job during engagement of the factory. It is useful for the purpose of cost analysis and effective cost control.

Objectives of Time Booking: The following are the main objectives of time booking:

(1) To ascertain the cost of each job, operation or process.

(2) To ascertain the cost of ideal time.

(3) Apportionment of overhead based on the suitable basis.

(4) To establish the fair and suitable wage system.

(5) To ensure the proper utilization of attendance time.

(6) To ensure the effective cost control and cost reduction.

Methods of Time Booking: In order to achieve the effective utilization of manpower resources, recording the correct time of workers and labour cost control is essential to adopt various

methods of time booking. The following are the important methods used for time booking:

(1) Daily Time Sheet

(2) Weekly Time Sheet

(3) Job Cards or Job Tickets
(a) Job Card For Each Worker
(b) Job Card For Each Job
(c) Combined Time and Job Card
(d) Piece Work Card

(1) Daily Time Sheet: This is one of the important methods which is used for a daily record of the work done by each worker. This record indicates that the nature of work, actual time spent by the worker on each job or operation. The daily time sheet is allotted to each worker on which the record is made by the worker himself or by the official incharge. This method is suitable only for small-scale industries.

(2) Weekly Time Sheet: This system may be done as in the case of daily time sheet. Under this method, instead of recording time on daily time sheets, worker is given a weekly time sheet on which recording by the worker on each job for a week. This method is useful for those concerns where the workers usually carry on a few jobs in a week.

(3) Job Card or Job Tickets: This method is adopted for recording of time booking for a worker's time spent on a job. A job card is prepared for each job giving detailed particulars of the work to be carried out by the worker. Job cards are classified into four types:

(a) Job Card for Each Worker

(b) Job Card for Each Job

(c) Combined Time and Job Card

(d) Piece Work Card.

(a) Job Card For Each Worker: Under this system, job card is issued to each worker at the beginning of each day or week. The job card is used to record the time of starting and finishing the each job or work. It indicates the nature of work, time spent by the worker for each job or operation, idle time, total hours, rates and remuneration of different jobs during a scheduled time.

(b) Job Card for Each Job: In this system, separate card is prepared and allotted to each job. The job card is used to each job passes along with the job from worker to worker. As soon as the worker receives the job card he records the time of

starting and finishing the job or operation. This system is useful not only for correct calculation of wages for each job but also it shows the details of the work to be done by the worker.

(c) *Combined Time and Job Card:* Under this system, job card is prepared on the basis of attendance time and actual time spent by the worker. This system is useful to ascertain idle time, time taken and time booking on account of pay rolls.

(d) *Piece Work Card:* This system is adopted where the piece wage payment is applicable. Accordingly wage payment is made on the basis of quantity of output produced by the worker. A piece work card is allotted to each worker on which recording the quantity of work to be done by each worker. For determination of piece wage payment, the time spent by the worker is not taken into account. This method is suitable only for small-scale industries.

I. Idle Time

Idle Time is that time during which the workers spend their time without giving any production or benefit to the employer and concern. The idle time may arise due to non-availability of raw materials, shortage of power, machine breakdown etc.

Types of Idle Time: It refers that any loss of time is inherent in every situation which cannot be avoided. Any costs associated with the normal idle time are mostly fixed in nature. The normal idle time arises due to the following reasons:

(1) Time taken for personal affairs.

(2) Time taken for lunch and tea break.

(3) Time taken for obtaining work.

(4) Time taken for changing from one job to another.

(5) Waiting time for getting instructions, tools and or raw materials, spare parts etc.

(6) Time taken by the workers to walk between factory gate and place of work.

II. Abnormal Idle Time

Abnormal idle time refers that any loss of time which may occur due to some abnormal reasons. Abnormal idle time can be prevented through effective planning and control. The abnormal idle time may arise due to the following avoidable reasons:

(1) Faulty planning.

(2) Lack of co-operation and co-ordination.

(3) Power failure.

(4) Time lost due to delayed instructions.

(5) Time lost due to inefficiency of workers.

(6) Time lost due to non-availability of raw materials, spare parts, tools etc.

(7) Time lost due to strikes, lock outs and lay-off.

Accounting Treatment of Normal Idle Time and Abnormal Ideal Time

Normal Idle Time: Normal idle time wages is treated as a part of cost of production. Thus, in case of direct workers an allowance for normal idle time is built into labour cost rates. In the case of indirect workers, normal idle time wage is spread over ,all the products or jobs through the process of absorption of factory overheads.

Abnormal Idle Time: Abnormal idle time cost is not included as a part of production cost and is shown as a separate item in the Costing Profit and Loss Account. So that normal cost are not distributed.

Over Time: The term "over time" refers to when a worker works beyond the normal working hours or scheduled time is known as 'overtime.' According to Factories Act, the wage rate of overtime work to be paid at double the normal rate of wages. The extra amount of remuneration is paid to the worker in addition to normal rate of wages is said to be overtime premium.

Effect of Over Time Payment on Productivity: The following are the effects of over time payment on productivity:

(1) Overtime premium is an extra payment over normal wages and hence will increase the production cost.

(2) The efficiency of workers during overtime work may fall and hence output may be reduced.

(3) To earn more, workers may not concentrate on work during normal hours, and thus the output during normal hours may fall.

(4) Reduced output and increased premium will increase the cost of production.

Accounting Treatment of Overtime Wages

The following are the ways of charging of overtime premium:

(I) If overtime is resorted to at the desire of the customer then overtime premium is charged to concerned job directly.

(2) If overtime is required to cope with general production schedule or for meeting urgent orders, the overtime

premium should be treated as overhead cost of particular department or cost center which works overtime.

(3) If overtime is worked on account of abnormal conditions such as flood, earthquake etc. that should be charged to costing profit and loss account.

Control of Overtime: Control of overtime is essential to minimize the cost of production and increase the overall performance of the efficiency. Effective control of overtime can be possible through the following ways:

(1) Effective sound planning of production

(2) Adequate supervision

(3) Ensuring availability of raw materials, spare parts

(4) Encouraging productivity

(5) Reducing labour turnover

(6) Ensuring effective system of repairs and maintenance, material handling and smooth flow of production

(7) Fair and equitable remuneration to efficient and inefficient workers.

Casual Workers: Casual workers are those who are engaged casually whenever there is extra load of work or due to planned maintenance during off season.

System of Control: In order to achieve the effective control of casual workers the following system to be adopted:

(1) Assess work load, for example, planned maintenance during off season.

(2) Assess manpower requirement.

(3) Obtain prior sanction for number of workers giving the period for which engagement is to be done.

(4) Obtain periodical report on performance and compare with the plan to ensure that there is no lagging behind.

(5) Provide for automatic termination after the period for which sanction is given expenses.

Out Workers: Out workers are those who are engaged in production operations outside the factory. For example, works carried on construction and electricity.

Control of Out Workers: The following are the important aspects to be considered for effective control of out workers:

(1) Keep a log book at reception.

(2) Record complaint specifying date and time of receipt of complaint.

(3) Keep proper complaint slips and send the same to technical department.

(4) Prepare duty sheets in duplicate to note down time on and time off.

(5) Summarise time spent by each service man daily.

(6) Summarise chargeable amount and non-chargeable amount.

(7) Advise accounts department for billing.

(4) Pay Roll Department

This is one of the important departments which is responsible for computation, preparation and payment of wages to all employees of the entire organization. Wage Sheet or Pay Roll is prepared on the basis of the Piece Work Card or Time Card or both. It is a statement which shows the detailed records of the employees' remunerations such as gross wages, various reductions and net wages for particular period.

In order to ensure the proper determination and preparation of wage sheet, the pay roll department should be taken a special care. A systematic procedure for payment of wages should be adopted to preventing of frauds and irregularities in wage payments. Effective supervision and strict control are essential to ensure that the worker is not paid twice or no dummy names of workmen have been entered in the pay roll.

Labour Turnover: Labour Turnover may be defined as "the rate of changes in labour force, i.e., the percentage of changes in the labour force of an organization during a specific period. Higher rate of labour turnover indicates that labour is not stable and there are frequent changes in the labour force in the organization. It will affect the efficiency of the workers and overall profitability of the firm. The determinant result of labour turnover is expressed in terms of percentage.

Methods of Measurement of Labour Turnover: The following are the important methods of measuring labour turnover:

(a) Separation Method

(b) Replacement Method

(c) Flux Method.

(a) Separation Method: Under this method, labour turnover is calculated by dividing the total number of separation (number of employees left or discharged) during the period

by the average number of workers on the pay roll. Thus the formula is :

$$\text{Labour turnover} = \frac{\text{Number of separations during the period}}{\text{Average number of workers during the period}} \times 100$$

(b) *Replacement Method:* In this method, labour turnover is measured by dividing the number of replacement of workers during the period by average number of workers during the period. Thus formula may be expressed as:

$$\text{Labour turnover} = \frac{\text{Number of workers replaced during the period}}{\text{Average number of workers during the period}} \times 100$$

(c) *Flux Method:* Under this method, labour turnover is measured by dividing the total number of separation and replacement of workers by the average number of workers during the period. Thus the formula is :

$$\text{Labour turnover} = \frac{\text{Number of separations + number of replacements}}{\text{Average number of workers during the period}} \times 100$$

Illustration: 1

From the following information, calculate labour turnover ratio and turnover flux rate

No. of workers as on 1" Jan. 2003 = 7,600

No. of workers as on 31" Dec. 2003 = 8,400

During the year, 80 workers left while 320 workers were discharged, 1,500 workers were recruited during the year of these, 300 workers were recruited because of exits and the rest were recruited in accordance with expansion plans.

Solution

Labour Turnover Ratio

(1) Replacement Method:

(A) Due to Exit:

No. of Replacement = 300

Average No. of Workers = 7600 + 8400/2 = 8000

$$\text{Labour turnover} = \frac{\text{Number of workers replaced}}{\text{Average number of workers during the period}} \times 100$$

$$= 800/3000 \times 100 = 3.75\%$$

(B) Due to new recruitment =

Number of new recruitment = 1200 workers

Labour turnover = Number of new recruitment x 100
Average number of workers during the period

=1200/8000 x 100 = 15%

Labour turnover = Number of accession x 100
Average number of workers during the period

=1500/8000 x 100 = 18.75%

(2) Flux Method

Labour turnover = Number of separations + number of replacements x 100
Average number of workers during the period
= 400 + 300/8000 = 8.75%

Causes for Labour Turnover: The causes for labour turnover can be classified into two categories:

(1) Avoidable Causes
(2) Unavoidable Causes.

(1) Avoidable Causes

(1) Lack of job involvement
(2) Lack of co-operation among the employees
(3) Lack of smooth relationship between employer and employees
(4) Dissatisfaction with wages and incentives
(5) Bias attitude of Management
(6) Poor working conditions
(7) Dissatisfaction with promotion, recognition, transfer etc.
(8) Lack of Co-ordination
(9) Non-availability of adequate protection, proper instructions, accommodation etc.

(2) Unavoidable Causes

(1) Retirement or Death of employer

(2) Marriage in the case of female workers

(3) Permanent disability due to accident or illness

(4) Dismissal or discharged due to inefficiency or disciplinary ground

(5) Dissatisfaction with job

(6) Shortage of power, raw materials etc.

(7) Personal responsibilities

(8) Personal betterment with regard to new job

(9) Change in nature of business and plant location.

Effect of Labour Turnover:

(1) Increased cost of recruitment, training and placement

(2) Increased cost of production

(3) Decrease in output due to inefficient or newly recruited workers

(4) Higher accident rate due to negligence or mishandling of machines

(5) Low team spirit due to lack of co-operation and co-ordination between the workers and employers.

Cost of Labour Turnover:

The chief aim of the preventive costs which are incurred in order to keep the workers satisfied and reduce the labour turnover rate as much as possible. These preventive costs which include the following:

(a) Cost of providing medical facilities, canteen and other welfare facilities

(b) Cost of administration

(c) Cost of providing better working conditions

(d) Cost of pension, gratuity, provident fund and other retirement benefits.

Replacement Costs:

These costs include the following:

(a) Cost of recruitment, training and placement

(b) Increase wastages and scrap

(c) Cost of repairs and maintenance including machine breakdowns

(d) Cost of compensation on account of accidents

(e) Loss of output due to inefficiency or newly recruited workers.

Exercise

From the following particulars calculate labour turnover rate by applying:

(1) Separation Method; (2) Replacement Method; and (3) Flux Method.
No. of workers on the pay roll
At the beginning of the month =900 At the end of the month = 1100

During the month 10 workers left, 40 workers were discharged and 150 workers were recruited. Of these 25 workers are recruited in the vacancies of those leaving while the rest were engaged for an expansion scheme.

[Ans: (1) Separation Method = 5%, (2) Replacement Method = 25% and (3) Flux Method = 7.5%]

5.5 OVERHEADS

Meaning and Definition

Aggregate of all expenses relating to indirect material cost, indirect labour cost and indirect expenses is known as Overhead. Accordingly, all expenses other than direct material cost, direct wages and direct expenses are referred to as overhead.

According to Wheldon, Overhead may be defined as "the cost of indirect material, indirect labour and such other expenses including services as cannot conveniently be charged to a specific unit."

Blocker and Weitmer define overhead as follows:

"Overhead costs are operating cost of a business enterprise which cannot be traced directly to a particular unit of output. Further such costs are invisible or unaccountable."

Importance of Overhead Cost

Nowadays business is a dynamic organism. Advancement of technological development and innovation, economic situations and social considerations are the important factors for modernization of industries at mass production to meet its more demand. The

overhead charges are heavily increased and they represent major portion of total cost. Therefore, it assumes greater importance for cost control and cost reduction.

Classification of Overheads

Classification of overheads is the process of grouping of costs based on the features and objectives of the business organization. The following are the important methods on which the overheads are classified:

(3) On the basis of Nature.

(4) On the basis of Function.

(5) On the basis of Variability.

(6) On the basis of Normality.

(7) On the basis of Control.

2 On the Basis of Nature

One of the important classifications is on the basis of nature or elements. Based on nature the aggregate of all indirect material cost, indirect labour cost and indirect other expenses are known as overheads. Accordingly, overheads are grouped into (a) Indirect Material Cost (b) Indirect Labour Cost and (c) Indirect Expenses.

1 **Indirect Material Cost:** Indirect materials do not form part of the finished products. Indirect materials are indirectly or generally used for production which cannot be identified directly. For example, oil, lubricants, cotton waste, tools for repairs and maintenance etc. are indirect materials.

2 **Indirect Labour Cost:** Indirect labour is for work in general. The importance of the distribution lies in the fact that whereas direct labour can be identified with and charged to the job, indirect labour cannot be so charged and has, therefore, to be treated as part of the factory overheads to be included in the cost of production. Examples are salaries and wages of supervisors, storekeepers, maintenance labour etc.

3 **Indirect Expenses:** Any expenses that are not specifically incurred for or can be readily charged to or identified with a specific job. These are the expenses incurred in general for more than one cost centre. Examples of indirect expenses are rent, insurance, lighting, telephone, stationery expenses ·etc.

(J) On the Basis of Function

The classification of overheads on the basis of the various function of the business concern is known as function wise overheads. Here there are four important functional overheads such as:

a) Production Overhead (b) Administration Overhead
(c) Selling Overhead (d) Distribution Overhead

(a) Production Overhead: Production overhead is also termed as manufacturing overhead or works overhead or factory overhead. It is the aggregate of all indirect expenses which are incurred for work in operation or factory. These costs are normally incurred during the period when the production process is carried on. For example, factory rent, factory light, power, factory employees' salary, oil, lubrication of plant & machinery, etc.

Administrative Overhead: Administrative expenses are incurred in general for management to discharge its functions of planning organizing, controlling, co-ordination and directing. These expenses are not specifically incurred and cannot be identified with the specific job. It is also termed as office cost. For example, office rent, rates, printing, stationery, postage, telegram, legal expenses etc. are the office and administrative costs.

Selling Overheads: Selling expenses are overheads which are incurred for promoting sales, securing orders, creating demand and retaining customers. For example, salesmen's salaries, advertisement, rent and rates of show room, samples, commission etc.

Distribution Overhead: Distribution overhead are incurred for distribution of products or output from producers to the ultimate consumers. For example, warehouse staff salaries, expenses of delivery van, storage expenses, packing etc.

(7) On the Basis of Variability

One of the important classifications is on the basis of variability. According to this, the expenses can be grouped into (a) Fixed Overhead (b) Variable Overhead and (c) Semi-Variable Overhead.

b **Fixed Overhead:** Fixed cost or overhead incurred remain constant due to change in the volume output or change in the volume of sales. For example, rent and rates of buildings, depreciation of plant, salaries of supervisors etc.

c **Variable Overhead:** Variable overhead may be defined as "they tend to increase or decrease in total amount with changes in the volume of output or volume of sales." Accordingly the change is in direct proportion to output. Indirect materials, Indirect labour, repair and maintenance, power, fuel, lubricants etc. are examples of variable overhead costs.

d **Semi-Variable Overheads:** Semi-variable overheads are incurred with a change in the volume of output or turnover. They neither remain fixed nor do they tend to vary directly with the output. These costs remain fixed upto a certain volume of output but they will vary at other part of activity. Semi-variable overheads are mixed cost, i.e., partly fixed and partly variable. For example, power, repairs and maintenance, depreciation of plant and machinery telephone etc.

(4) On the Basis of Normality

Overheads are classified into normal overheads and abnormal overheads on the basis of normality features. According to this normal overheads are incurred in achieving the target output or fixed plan. On the other hand, abnormal overhead costs are not expected to be incurred at a given level of output in the conditions in which the level of output is normally produced. For example, abnormal idle time, abnormal wastage etc. Such expenses are transferred to Profit and Loss Account.

On the Basis of Control

It is one of important classifications of overhead on the basis of control. Based on control it is grouped into controllable overhead and uncontrollable overhead. Controllable overhead are which can be controlled by the action of a specified number of undertaking. For example, idle time, wastages etc. can be controlled. Uncontrollable overheads cannot be controlled by the action of the executive heading the responsibility centre. For example, rent and rates of building cannot be controlled.

Usefulness of Overhead Classification

(6) It ensures effective cost control.

(7) It helps the management for effective decision making.

(8) The application of marginal costing is essentially for profit planning, cost control, decision making etc. are based on the classification of overheads.

(9) On the basis of classification of fixed and variable cost, flexible budgets are prepared at different levels of activity.

(10) It facilitates fixing of selling price.

(11) Cost classification is useful for break-even analysis. Break-even analysis mainly depends on overall cost and profit which can be useful for making or buying decision.

(12) It helps to find out the unit cost of production.

Codification of Overhead

Codification is a process of representing each item by a number, the digits of which indicate the group, the subgroup, the type and the dimension of the item.

Advantages of Codification

(2) It enables systematic grouping of similar items and avoids confusion caused by long description of the items.

(3) It serves as the starting point of implication and standardization.

(4) It helps in avoiding duplication of items and results in the minimisation of number of items, leading to accurate records.

(5) It helps in allocation and apportionment of overheads to different cost centres.

(6) It assists the grouping of overheads for cost control.

(7) It helps in reducing clerical efforts to the minimum.

Methods of Codification

There are different methods used for codification. The following are the three important methods used:

b Numerical Codes Method.

c Decimal Codes Method.

d Codes with a Combination of Numbers and Alphabets.

(1) Numerical Method: Under this method, numerical codes are assigned to each item of expenses. For example,

100 Indirect labour.

400 Power.

500 Maintenance.

800 Fixed charges.

Decimal Codes: Under this method, the whole numbers are allotted to indicate master group and the decimals indicate the sub-group. For example,

Factory Overheads:

(10) Indirect materials.

(11) Consumable stores.

(12) Lubricating oils.

(13) **Codes with a Combination of Numbers and Alphabet :** Under this method the alphabet indicates the main group and the type of expenses is indicated by the numerical. For example,

R1 - Repairs to machinery.

R2 - Repairs to plant.

R3 - Repairs to furniture.

Procedure or Steps in Overhead

Overheads are incurred for work in general. Overhead is added tQ the prime cost in order to measure the total cost of production or cost of goods sold. For allocation and apportionment of overhead in the cost of production or cost of goods sold the following procedures are involved:

(6) Classification of Overhead

(7) Collection of Overhead

(8) Overhead Analysis:

(a) Distribution of overhead to production and service departments, i.e., Allocation and
Apportionment of overhead to cost centre.

(b) Re-distribution of overhead from service department to production department, i.e.,

Allocation and Apportionment of service centres to production centres or departments.

1 Absorption of overhead by cost units, i.e., computation of overhead absorption rates.

Classification Overhead: We have already discussed the classification of overhead in the preceding pages, and the discussion on other procedures would follow in this chapter and the subsequent one.

Collection of Overhead: The production overheads or factory overheads are collected and identified under separate overhead code numbers or standing order numbers. These overheads are collected from different sources and documents. The following are the important sources and documents :

Overhead Expenses	*Sources and Documents Used*
(1) Indirect Materials	Materials Requisition
(2) Power and light	Meter Reading
(3) Indirect wages	Time Cards, Pay Rolls, Wage Analysis
(4) Salaries	Salaries Sheet
(5) Depreciation	Plant Register, Machinery Register
(6) Rates	Lease
(7) Rates	Local Government Assessment
(8) Office Stationery	Supplier's Invoices
(9) Postage	Postage Book

(3) Overhead Analysis: (a) Allocation and Apportionment of Overhead to Cost Centres

The first step of overhead analysis is distribution of overhead to production department and service department. Before analysing overhead, we should know the concept of Allocation, Absorption and Apportionment.

Allocation: Cost allocation refers to the allotment of whole item of cost to cost centres. The technique of charging the entire overhead expenses to a cost centre is known as cost allocation.

Absorption: Cost absorption refers to the process of absorbing all overhead costs allocated to apportioned over particular cost centre or production department by the unit produced.

Apportionment: Apportionment is the process of distribution factory overheads to cost centres or cost units on an equitable basis. The term apportionment refers to the allotment of expenses which cannot be identified wholly with a particular department. Such expenses require division and apportionment over two or more cost centres in proportion to estimated benefits received.

Allocation Vs Apportionment

(3) Allocation deals with whole amount of factory overheads while apportionment deals with proportion of item of cost or proportion to cost centres.

(4) The item of factory overhead directly allocated and identified with specific cost centers. Whereas apportionment requires suitable and equitable basis. For example, factory rent may be allocated to the factory and

has to be apportioned among the producing and service departments on an equitable basis.

Basis of Apportionment

Overhead apportionment depends upon matching with principles. Accordingly the basis for apportionment should be related to the basis on which the expenditure is incurred. The following are the usual basis adopted for apportionment of overhead :

	Basis of Apportionment
Overhead Cost	*Basis of Distribution*
(1) Lighting	- No. of light points, floor space or meter reading
(2) Rent, Rates and Taxes	- Floor Area
(3) Insurance of building } Depreciation of building, Heating	Area of floor
(4) Depreciation of plant } and Machinery and Equipments	- Book value
(5) E S I, Canteen, Safety, compensation, supervision welfare, fringe benefits	- No. of employees
(6) Delivery Van, } Internal Transport	- Weight, volume ton
(7) Audit fees	- Sales or Total Cost
(8) Storekeeper's expenses	- Weight, value of materials or Number of requisitions
(9) Power	- H. P. Hours or K. W. Hours

Illustration: 1

A departmental store has several departments. What bases would you recommend for apportioning the following items of expenses to its departments :

(c) Fire Insurance of building

(e) Sales commission

(f) Advertisement

(g) Salesmen's salaries

(h) Commission paid to salesmen

(i) Show room expenses

(j) Depreciation on plant

(k) Rent of finished goods, warehouse

(l) Factory power

(m) Delivery Van expenses

Solution:

Items	*Basis of Apportionment*
(I) Fire Insurance Building	Floor space or Value
(2) Sales Commission	Sales value
(3) Advertisement	Sales value
(4) Salesmen's Salaries	Sales value
(5) Commission paid to Salesmen	Sales value
(6) Show room expenses	Sales value or Total cost
(7) Depreciation on plant	Value of plant
(8) Rent of finished goods warehouse	Floor space or Area
(9) Factory power	H.P. Power (or) K.W. hours
(10) Delivery Van expenses	Weight, Volume

Illustration: 2

A factory has three production departments and two service departments. The following figures have been extracted from the financial books :

	Rs.
Supervision	6,000
Repairs of Plant and Machinery	3,000
Rent	8,000
Light	2,000
Power	3,000
Employer's contribution to ESI	600
Canteen Expenses	1,000

The following further details have been extracted from the books of the respective departments :

Particulars	*A*	*B*	C	*D*	*E*
Direct Wages (Rs.)	4,000	3,000	2,000	2,000	1,000
Area of Square feet	2,000	1,000	500	500	100
No. of Employees	50	40	20	20	10
Value of Machinery	10,000	5,000	3,000	3,000	1,000
Light Points	80	60	30	30	20
H.P. of Machines	200	100	50	50	20

Solution:

Primary Overhead Distribution Summary

Particulars	*Basis of Apportionment*	*Total Rs.*	*Production Department*			*Service Dept.*	
			Departments			*Department*	
			A	*B*	C	*D*	*E*
Supervision	No. of Employees 5:4:2:2:1	6,000	2,142	1,715	857	857	429
Repairs of Plant }	Value Machinery	3,000	1,364	681	409	409	137

and Machinery	10:5:3:3:1						
Rent	Area of square feet 20:10:5:5:1	8,000	3,902	1,951	976	976	195
Light	Light points 8: 6: 3 : 3: 2	2,000	727	545	273	273	182
Power	H.P. of Machines 20:10:5:5:2	3,000	1,429	714	357	357	143
Employers Contribution to ESI	Direct Wages 4: 3 : 2 : 2: 1	600	200	150	100	100	50
Canteen Expenses	No. of Employees 5:4:2:2:1	1,000	357	286	143	143	71
	Total	23,600	10,121	6,044	3,115	3,115	1,207

(b) Re-apportionment (Re-distribution): Re-distribution of overhead from various service departments to production departments is known as Re-apportionment or Secondary distribution. Accordingly, allocation and apportionment of overheads from service departments or centres to production centres or departments. The following are the important bases adopted for apportionment of secondary distribution:

Service Department	*Basis of Apportionment*
(1) Purchase Department Maintenance and Repairs	Number of Purchase Orders or Number of Purchase Requision or Value of Materials
(2) Department	Hours worked
(3) Stores Department	No. of Requisition or Value of Materials
(4) Personnel Department (Canteen, Welfare, Medical, Employer's liability)	No. of Employees or Direct wages
(5) Time Keeping Department	No. of Employee or Labour Hours or

	Direct Wages
(6) Pay roll Department	No. of Employees or Direct Wages
(7) Accounts Department	No. of Employees
(8) Tool Room	Direct Labour Hours or Machine Hours or Direct Wages

Service Department	*Basis of Apportionment*
(9) Transport Department	Car hours, Truck hours, Tonnage handled
(10) Power House	K.W. Hours
(11) Fire Insurance	Stock Value

Methods or Re-apportionment or Re-distribution

The following are the important methods of re-distribution of service department overheads to production department:

(4) Direct Re-distribution Method

(5) Step Distribution Method

(6) Reciprocal Service Method - this method further grouped into:

(a) Repeated Distribution Method

(b) Simultaneous Equiation Method

(c) Trial and Error Method

(1) Direct Re-distribution Method: Under this method, the cost of service department is directed to re-distribution to the production departments without considering the services rendered by one service department to another service department.

Illustration: 3

Ramesh Ltd. has three production departments A, Band C and six service departments. The following figures are extracted from the records of the company :

Production Departments

A	Rs.16,000
B	Rs.1O,OOO
C	Rs.12,OOO
Total	Rs.38,OOO

Service Departments

Stores	Rs.2,000
Timekeeping	Rs.3,000
Maintenance	Rs. 1,000
Power	Rs.2,000
Walfare	Rs. 1,000
Supervision	Rs.2,000
Total	Rs.49,000

The other information available in respect of the production departments:

Particulars	**Production Departments**		
	A	*B*	C
No. of Employees	40	30	20
No. of Stores Requisition	30	20	10
Horse Power of Machines	500	500	600
Machine Hours	2500	1500	1000

You are required to apportion the costs of various service departments to production departments.

Solution:

Departmental Overhead Re-distribution Summary

Expenses	*Basis*	*Total*	*Production Departments*		
		Rs.	A *Rs.*	*B* *Rs.*	C *Rs.*
As per primary } Departmental summary Service Departments	-	38,000	16,000	10,000	12,000
Stores	No. of Stores Requisitioned 30: 20 : 10	2,000	1,000	667	333

Timekeeping	No. of Employees 40:30:20	3,000	1,333	1,000	667
Maintenance	Machine Hours 25: 15: 10	1,000	500	300	200
Power	Horse Power 5:5:6	2,000	625	625	750
Welfare	No. of Employees 40:30:20	1,000	445	333	222
Supervision	No. of Employees 40: 30: 20	2,000	889	667	444
Total		49,000	20,792	13,592	14,616

(2) Step Method: Under this method the cost of most serviceable department is first distributed to production departments and other service departments. Thereafter, the next service department is distributed and later the last service department until the cost of all the service departments are redistributed to the production department.

Illustration: 4

A manufacturing company has two production departments A and B and three Service Departments - Timekeeping, Stores and Maintenance. The departmental summary showed the following expenses for Dec. 2003.

Production Departments:	*Rs.*
A	32,000
B	10,000
Service Departments:	
Timekeeping	8,000
Stores	10,000
Maintenance	6,000
Total Overhead Expenses	66,000

The following information about departments is available and is used as a basis for distribution:

Particular	***Production Departments***		***Service Departments***		
	A	*B*	*Timekeeping*	*Stores*	*Maintenance*
No. of Employees	20	15	10	8	5
No. of Stores Requisitions	12	10	-	-	3
Machine Hours	1200	800	-	-	-

You are required to apportion these costs to production departments :

Solution:

Departments	**Primary Distribution Rs.**				
Timekeeping	8000	(-) 8,000			
Stores	10,000	3,334	(-) 13,334		
Maintenance	6,000	2,500	1,600	(-) 10,100	
A	32,000	1,333	6,400	6,060	45,793
B	10,000	833	5,334	4,040	20,207
Total	66,000				66,000

Basis of Apportionment:

Timekeeping: 20 : 15 : 8 : 5 (No. of Employees)

Stores: 12 : 10 : 3 (No. of Stores Requisition)

Maintenance: 12 : 8 (Machine Hours)

(3) Reciprocal Service Method: This method recognizes the fact that if a service department receives services from other department, the services should be charged in the receiving department. Thus, the cost of inter departmental services is taken

into account on reciprocal basis. The following are the three important methods available for dealing with reciprocal distribution:

Simultaneous Equation Method.

Repeated Distribution Method.

Trial and Error Method.

(4) ***Simultaneous Equation Method:*** Under this method, the true cost of total overhead of each service department is ascertained with the help of Simultaneous or Algebraic Equation. The obtained result reapportioned to production department on the basis of given percentage.

(5) ***Repeated Distribution Method:*** Under this method, the total overhead costs of the service departments are distributed to service and production departments according to given percentage of the service departments are exhausted, in tum repeatedly until the figures become too small to matter.

(6) ***Trail and Error Method:*** In this method, the cost of a service centre is apportioned to another service centre. Then, the cost of another service centre along with the apportioned cost from the first centre is again apportioned back to the first service centre. This process is repeated till the amount to be apportioned becomes zero or negligible.

Illustration: 5

The following particulars related to a manufacturing company has three production departments : P, Q, and R and two service departments X and Y:

Production Departments:

2	Rs.2,000
3	Rs.1,500
4	Rs.1,000

Service Departments:

(e)	Rs. 500
(f)	Rs. 400

The service department expenses are charged on a percentage basis as follows:

	Productions Departments			*Service Departments*	
Service Depts. :	P	Q	R	S	T
S	20%	30%	40%		10 %
T	30%	30%	20%	20 %	

Prepare a statement showing the distribution of the two service departments expenses to three production departments under (1) Simultaneous Equation Method and (2) Repeated Distribution Method.

Solution:

(1) Simultaneous Equation Method:

Let X be the total expenses of Departments S
Let Y be the total expenses of Department T
X = 500 + 0.20 Y
Y = 400 + 0.10 X
X = 500 + 0.20 (400 +
O.10X) X
= 500 + 80 + 0.02X
X - 0.20X = 580
(or) 0.98 X = 580
X = 5591.83

B = 400 + 0.10 (592)
= 400 + 59
Y = 459

Departmental Overhead Distribution Summary

Particulars	*Production Departments*			*Service Departments*	
	P	*Q*	*R*	*S*	*T*
	Rs.	*Rs.*	*Rs.*	*Rs.*	*Rs.*
Overhead as per Summary	2,000	1,500	1,000	500	400
Department S	118	178	237	(-) 592	59
Department T	138	137	92	92	(-) 459
Total	2,256	1,815	1,329	-	-

Repeated Distribution Method

Particulars	*Production Departments*			*Service Departments*	
	P	*Q*	*R*	*S*	*T*
	Rs.	*Rs.*	*Rs.*	*Rs.*	*Rs.*

Total Department overhead as per					
Primary Distribution	2,000	1,500	1,000	500	400
Service Department S	100	150	200	(-) 500	50
Service Department T	135	135	90	90	(-) 450
Service Department S	18	27	36	(-) 90	9
Service Department T	3	3	3	-	(-) 9
Total	2,256	1,815	1,329	-	-

Illustration: 6

You are supplied with the following information and required to work out the production hour rate of recovery of overhead in Departments X, Y and Z.

Particulars	*Total*	*Production Deptts.*			*Service Deptts.*	
		X	*Y*	Z	*P*	*Q*
	Rs.	*Rs.*	*Rs.*	*Rs.*	*Rs.*	*Rs.*
Rent	12,000	2,400	4,800	2,000	2,000	800
Electricity	4,000	800	2,000	500	400	300
Indirect Labour	6,000	1,200	2,000	1,000	800	1,000
Depreciation	5,000	2,500	1,600	200	500	200
Sundries	4,500	910	2,143	847	300	300
Estimated working Hours		1,000	2,500	1,400		

Expenses of Service Department P and Q are apportioned as under :

	X	*y*	z	*P*	*Q*
P	30%	40%	20%		10%
Q	10%	20%	50%	20%	

Solution:

Departmental Overhead Distribution Summary

Particulars	*Total* Rs.	*Production Deptts.* X Rs.	*Y* Rs.	Z Rs.	*Service Deptts.* *P* Rs.	*Q* Rs.
Rent	12,000	2,400	4,800	2,000	2,000	800
Electricity	4,000	800	2,000	500	400	300
Indirect Labour	6,000	1,200	2,000	1,000	800	1,000
Depreciation	5,000	2,500	1,600	200	500	200
Sundries	4,500	910	2,143	847	300	300
Total	31,500	7,810	12,543	4,547	4,000	2,600

Repeated Distribution Method

Particulars	*Total*	*Production Depts.* X	*Y*	Z	*Service Depts.* *P*	*Q*
Total Departmental Overheads as per Primary distribution		7.810	12.543	4.574	4.000	2.600
Exp. of P Dept		1.200	1.600	800	(-) 4.000	400
Total		9.010	14.143	5,437	-	3.000
Exp. of Q Dept.		300	600	1.500	600	(-) 3000
Total		9.310	14.743	6.847	600	-
Exp. of P Dept.		180	240	120	(-600)	60
Total		9.490	14.983	6.967	-	60
Exp. of Q Dept.		6	12	30	12	(-60)
Total		9,496	14.995	6.997	12	-

Exp. of P Dept		4	5	3	(-12)	-
Total	31.500	9.500	15.000	7.000	-	-
Working hours		1.000	2.500	1,400		
Rate per hour		Rs.9.53	Rs.6	Rs.5.00		

(ii) Simultaneous Equations Method

Let p be the expenses of Service Dept. P and

Let q be the expenses of Service Dept. Q

Then $p = 1{,}000 + q$ (service 20% of q will be apportioned to dept. P) and $\frac{1}{5}$

$q = 2{,}600 +$

$q = 2.600 + 1/10(4{,}000 + 1/5\ q)$ (putting the value of p)

$q = 2{,}600 + 400 + 1/50\ q$

$q = 3{,}000 + 1/50\ q$

$50q = 1{,}50{,}000 + q$

$49q = 1{,}50.000$

$q = 3{,}061$

$P = 4.000 + 1/5(3061) = 4612$

Departmental Overhead Distribution Summary

	x	*y*	z	*P*	*Q*
	Rs.	*Rs.*	*Rs.*	*Rs.*	*Rs.*
Total (given)	7,810	12,543	4,547	4,000	2,600
Exp. of P Dept. Rs. 4,612	1,384	1,845	922	(-4,612)	461
Exp. of Dept. Q Rs. 3,061	306	612	1,531	612	(-3,061)
	9,500	15,000	7,000		-
Estimated Working Hours	1,000	2,500	1,400		
Rate Per Hour Rs.	9.50	6.00	5.00		

QUESTIONS

(d) The following particulars were obtained from the books of a light Engineering Company for the half year ended 30th September, 2003. Calculate the departmental overhead rate for each of the production departments assuming the overheads are recovered as a percentage of direct wages.

Particulars	*Production Departments*			*Service Departments*	
	A	*B*	C	X	*Y*
	Rs.	*Rs.*	*Rs.*	*Rs.*	*Rs.*
Direct wages	7,000	6,000	5,000	1,000	1,000
Direct materials	3,000	2,500	2,000	1,500	1,000
Employees	200	150	150	50	50
Electricity	8,000	6,000	6,000	2,000	3,000
Light points	10	15	15	5	5
Assets value	50,000	30,000	20,000	10,000	10,000
Area occupied	800	600	600	200	200

The expenses for 6 months were:

Stores overhead	Rs. 400	Depreciation	Rs. 6,000
Motive power	Rs. 1500	Repairs & Maintenance	Rs. 1,200
Electric lighting	200	General overheads	Rs. 10,000
Labour welfare	Rs. 3000	Rent and Taxes	Rs. 600

Apportion the expenses of Department X in the ratio of 4 : 3 : 3 and that of department Y, in proportion of direct wages, to departments A, B, and C respectively.

[ADS: Total overheads cost: A - Rs.11,396, B - Rs.8663, C - Rs.7341 Dept. overhead rate: A - 162.8%, B - 144.4%, C - 146.8%]

MODULE - III

6

MARGINAL COSTING

Unit Structure :

6.1 MARGINAL COSTING

- **Marginal Costing** is a technique of controlling by bringing out the relationship between profit & volume.
- The ICMA has defined the marginal cost as "the amount at any given volume of output by which aggregate costs are changed if the volume of output is increased or decreased by one unit.
- Thus it is clear that increase/decrease in one unit of output increases / reduces the total cost from the existing level to the new level. This increase / decrease in variable cost from existing level to the new level is called as marginal costing
-

Units Produced	100Units	101Units	99 Units
Total Cost	Rs.200	Rs.202	Rs.198
Cost Per Unit	Rs.2	Rs.2	Rs.2

Cost can be classified in to Fixed Cost & Variable Cost.
Fixed Cost – This expenditure remains same – irrespective of output. Total fixed costs will remain fixed but fixed cost per unit will be variable.

Variable Cost – As against fixed cost – variable cost as the name suggest varies directly with output. They vary in the proportion to proportion to with the output. Total variable costs will be variable but variable cost per unit will be fixed.

Marginal costing is based on this concept of fixed and variable costs. It refers to segregating these 2 costs. In simple

words marginal cost means the change in the total costs due to change in output y one unit – single unit.

Marginal costing is also known as direct costing, contributory costing & incremental costing.

6.2 FEATURES OF MARGINAL COSTING

- Elements of cost are differentiated between fixed costs & variable costs
- Only the variable or marginal cost is considered while calculating product cost
- Stock of F/G & WIP are valued at variable cost
- Contribution is the difference between sales & marginal cost
- Fixed cost do not find place in the product cost
- It is a technique of cost recording and cost reporting
- Profitability of various products is determined in terms of marginal contribution

Advantages of Marginal Costing

Constant in Nature – marginal cost remains constant per unit of output whereas fixed cost remains constant in total

Pricing Decisions – It assists the management in fixing the prices based on marginal costing

Determination of Profits – It is very important in determination of profits especially in export oriented firm

Break Even Point – The point where neither profits nor losses have been made is known as BEP. It can be determined only on the basis of marginal costing.

Fixing responsibility – Responsibility cab be fixed easily using the technique of marginal costing.

Cost Control – Marginal costing helps management in cost control. Classification of costs in to fixed and variable helps in greater control in costs

Cost reporting – the reporting of the management is more meaningful as the reports are based on sales figures rather than production

Decision making – Marginal costing helps the management in taking a number of business decisions like make or buy,

discontinuance of a particular product, replacement of machines etc.

6.3 LIMITATIONS OF MARGINAL COSTING

Difficult to separate fixed and variable cost- marginal costing needs costs to be classified in to fixed and variable. Now there are many costs, the classification of which is difficult. The segregation becomes difficult and cannot be done with precision

Over emphasis on sales – this technique depends upon sales and does not consider production. However business depends upon production and sales.

Fixed costs ignored – it ignores fixed costs in the value of finished goods and work in progress. The understating of costs affects profit and loss a/c and also the balance sheet

Not suitable for long term - Marginal costing is suitable for short run. It is desirable that in long term profit should be based of full cost basis and not on marginal costs.

Cost control – at times marginal costing is not an effective tool for cost control. Infact budgetary control and standard costing are more effective tools in controlling costs

Not applicable to contract costing – marginal costing is not applicable to contract costing, since it ignores fixed cost in valuation of work in progress. This will not serve the purpose.

Not acceptable for tax – Income tax authorities does not accept marginal costing for inventory valuation

Marginal Cost Statement

Sales	**Xx**
Less – Variable Cost	**Xx**
Contribution	**Xx**
Less – Fixed Cost	**Xx**
Profit	**Xx**

Contribution

Contribution is the profit before adjusting fixed costs. It is known as contribution because it contributes towards recovery of the fixed costs and profits. Contribution = Sales – Variable Cost OR Contribution = Fixed cost + Profit

Contribution	Profit
It includes fixed cost and profit	Fixed Cost are excluded
It is a concept used in marginal costing	It is a concept that decides the profit or loss of the business concern
It is equal to fixed cost at break-even point	It is an excess of sales over break-even point
Contribution = Sales – Variable Cost	Profit = Contribution – Fixed Cost

Profit/Volume Ratio = It is known as PV Ratio. It expresses the relationship between contribution & sales. It is also known as contribution to sales ratio. It is expressed in percentage. It is the indicator of the rate at which the organization is earning profits.
PV Ratio = (Contribution/Sales)*100
PV Ratio = (Change in Profits/Change in Sales)*100

Break-Even Analysis
An enterprise must operate beyond the break- even point, otherwise it will suffer loss. Break- even point is a level of production and sales, where –

- There is no profit or no loss
- Total sales and total cost is the same
- Contribution equals fixed cost

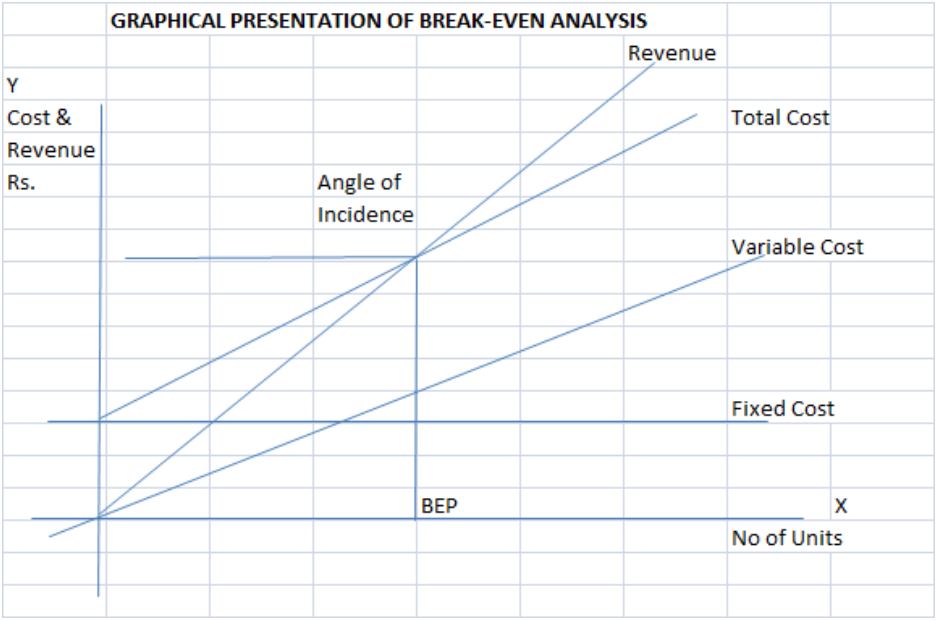
Break-even point may be expressed in terms of number of units or rupees of sales or percentage of capacity operation. The study of cost-volume-profit relationship is requently referred to as “Break-even Analysis” It is an analysis that can be used to determine the probable profit at any level of operation.

Basic assumptions for BEP analysis
- Cost can be split in to fixed and variable components
- Fixed cost remains constant irrespective of level of activity
- Variable cost changes with change in volume of output
- Selling price does not change with change in volume
- There is no change in general price level
- Efficiency of workers does not change with change in volume of output
- The plant capacity can be predicted

A change in any of the above factors will alter the break-even point. Thus break even analysis must be interpreted in the light of limitations of underlying assumptions, especially with respect to price and sales mix factors.

The break-even analysis refers to a system of determination of that level of activity where total cost equals total sales. The

broader interpretation refers to that system of analysis which determines the probable profit at any level of activity. The relationship among cost of production, volume of production, the profit and the sale value is established by break-even analysis. Hence, this analysis is also designated as Cost-Volume Profit Analysis.



Angle of Incidence

The angle at which the Total sales Line intersects the Total Cost Line is known as angle of incidence. Higher angle of incidence shows a chance of earning higher profits after break-even point because the gap between the total sales line and the total cost line will be wider, that is profit margin will be higher. However, it also indicates higher degree of risk because, the angle on the opposite side is also equal. Risk and profit are always co-related to each other. Higher the risk, higher is the chances of making profits.

BEP (Units) = Fixed Cost / Contribution per unit
BEP (Rs.) = Fixed Cost / PV Ratio
MARGIN OF SAFETY

It indicates the strength of a business. High margin of safety indicates that profits will be earned even if the selling price falls. However the lower margin of safety means that is walking a tight rope. Fall in selling price can put company in to losses.

Margin of Safety = Profit / PV Ratio

6.4 COST VOLUME PROFIT RELATIONSHIP

CVP analysis is the analysis of variable cost, volume and profit. It explores the relationship between costs, revenue, activity

levels and the resulting profits. It aims at measuring variations in cost and volume.

The above three factors depends upon many factors like

- Volume of production
- Efficiency of employees
- Size of plant
- Method of production
- Cost of raw materials
- Price levels
- Others

Volume of production depends upon

- Cost of the product
- Size of plant
- Availability of inputs
- Price levels
- Others

Profits of any firm depends upon cost and volume. Cost volume profit analysis helps the management to correctly analyse the effects of changes of cost and volume on the profits of the firm.

CVP Analysis is useful for the following

1- Estimating profits at different levels
2- Development of flexible budgets
3- Helps the management in decision making
4- Evaluating the effect of costs on profitability
5- Help in fixing in the selling price

6.5 APPLICATION OF MARGINAL COSTING TECHNIQUES

1. PROFIT PLANNING:

Profit planning is the planning of future operations to attain maximum profit. Under the technique of marginal costing, the contribution ratio, i.e., the ratio of marginal contribution to sales, indicates the relative profitability of the different products of the business whenever there is any change in volume of sales, marginal cost per unit, total fixed costs, selling price, and sales-mix etc. Hence marginal costing is an useful tool in planning profits as it ensures sufficient return on capital employed.

2. PRICING OF PRODUCTS:

Sometimes pricing decisions have to be taken to cater to a recessionary market or to utilise spare capacity where only marginal cost is recovered. For export market, sometimes full cost is loaded to the sale price to remain competitive. Sometimes

special prices are to be offered with expansion in mind, fixation of price below cost can be made on a short-term basis.

It may be advisable to fix prices equal to or below marginal cost under the following cases:

(i) To maintain production and employees occupied.
(ii) To keep plant in use in readiness to go 'full team ahead'.
(iii) To prevent loss of future orders.
(iv) To dispose of perishable product.
(v) To eliminate competition of nearer rivals.
(vi) To popularize a new product.
(vii) To keep the sales of a conjoined product which is making a considerable amount of profit.
(viii) Where prices have fallen considerably or a loss has already been made.

3. INTRODUCTION OF A PRODUCT:

When a new product is introduced without incurring any additional fixed cost the additional contribution helps to increase profitability.

4. SELECTION OF PRODUCT MIX:

The most-profitable product mix can be determined by applying marginal costing technique. Fixed cost remaining constant, the most profitable product-mix is determined on the basis of contribution only. That product-mix which gives maximum contribution is to be considered as best product mix.

5. PROBLEM OF KEY/LIMITING FACTOR:

A key factor is a factor which limits the volume of production and profit of business. It may be scarcity of any factor of production such as material labour, capital, plant capacity etc. Usually, when there is no key or limiting factor, the product is selected on the basis of highest P/V ratio of the product. But with key factor the selection of product will be on the basis of contribution per unit of limiting/key factor of production.

6. ALTERNATIVE METHOD OF MANUFACTURE:

When alternative use of production facilities or alternative methods of manufacturing a product are being considered, the alternative which gives the maximum marginal contribution is selected.

7. MAKE-OR-BUY DECISION:

A company may have idle capacity which may be utilised for making a component or a product, instead of buying them from outside sources. In taking such 'make-or-buy' decision, a

comparison should be made between the variable (or marginal) cost of manufacture of the product and the supplier's price for it.

It will be advantageous to manufacture than to purchase an item if the variable cost is lower than the purchase price provided that the decision to manufacture does not result in substantial increase in fixed costs and that the existing manufacturing facilities cannot be otherwise utilised more profitably.

When there is no idle capacity and accordingly making the item in the factory involves putting aside other work, the loss of contribution from displaced work should also be considered along with marginal cost of manufacture. Again, if the decision to manufacture involves increase in fixed cost, it should also be added to marginal cost for the purpose of comparison with purchase price of component.

So, the decision will be to purchase if the marginal cost of manufacture plus traceable fixed costs plus the loss of contribution is more than the purchase price.

8. ACCEPTING ADDITIONAL ORDERS AND EXPLORING FOREIGN MARKET:

Sometimes goods are sold at a price above total cost (i.e., at a profit) and still there remains some spare or unused capacity. In such circumstances, extra order may be accepted or goods may be sold in a foreign market at a price above marginal cost but below total cost.

This will add to the profits as, after full recovery of the fixed cost, any contribution—either from additional orders or from selling in the foreign market—will make extra profit. In this way the spare plant capacity can be used to earn additional profit.

9. INCREASING OR DECREASING DEPARTMENTS OR PRODUCTS:

Sometimes general fixed costs are apportioned to departments or products for ascertaining total cost but it may give misleading results. However, specific fixed costs traceable to departments or products should be deducted from individual contribution to get the Net contribution. If the net contribution of a department or product is positive, then it should not be discarded.

10. CLOSING DOWN/SUSPENDING ACTIVITIES:

While taking a decision in this line, the effect of fixed cost and contribution will have to be analysed. If the contribution is more than the difference in fixed costs by working at normal operations, and when the plant or product is closed down or suspended, then it is desirable to continue operation

6.6 FIXING SELLING PRICE

Problem No.1

With a view to increase the volume of sales, Ambitious enterprises has in mind a proposal to reduce the price of its product by 20%. No change in total fixed costs or variable costs per unit is estimated. The directors, however, desire the present level of profit to be maintained. Following information has been provided:

Sales 50000 units	Rs.500000
Variable Costs	Rs.5 per unit
Fixed Costs	Rs.50000

Advise management on the basis of the various calculations made from the data given.

Solution

Marginal Cost Statement

Sales	500000
Less – Variable Costs	250000
Contribution	250000
Less – Fixed Costs	50000
Profit	200000

Present Profit Volume Ratio = (Contribution/Sales) * 100

= (250000/500000)*100 = 50%

Future Profit Volume Ratio = (Contribution per unit/Selling price per unit)* 100

= (3/8)*100 = 37.50%

Sales required to maintain present profit = (Fixed Cost + Desired Profit) / PV Ratio

= (50000+200000)/37.50%

=Rs.6,66,667 or 83333 Units

Problem No.2

A firm is selling X product, whose variable cost per unit is Rs.10 and fixed cost is Rs.6000. It has sold 1000 articles during one month at Rs.20 per unit. Market research shows that there is a great demand for the product if the price can be reduced. If the price can be reduced to Rs.12.50 per unit, it is expected that 5000 articles can be sold in the expanded market. The firm has to take a decision whether to produce and sell 1000 units at the rate of Rs.20 or to produce and sell for the growing demand of 5000 units at the rate of Rs.12.50. Give your advice to the management in taking decision.

Solution

Comparative Profit Statement

	Existing Situation Sales 1000 units @Rs.20 per unit	Proposed situation Sales 5000 units @Rs.12.50 per unit
Sales	20000	62500
Less – Variable Cost	10000	50000
Contribution	10000	12500
Less – Fixed Cost	6000	6000
Profit	4000	6500

The above analysis shows that the proposal to manufacture and sell 5000 units will be profitable. The profit will increase by more than 50%. However the management should also consider interest on increased capital outlay and increase in fixed costs, if any, before arriving at final decision.

Problem No.3

Quality products limited, manufactures and markets a single product. The following data are available.

Materials	Rs.16 per unit
Conversion Costs (variable)	Rs.12 per unit
Fixed Cost	Rs.5 Lakhs
Present sales	90000 units
Capacity utilization	60%
Dealer's Margin	Rs.4 per unit
Selling Price	Rs.40

There is acute competition. Extra efforts are necessary to sell. Suggestions have been made for increasing sales:

1. By reducing sales price by 5%
2. By increasing dealer's margin by 25% over the existing rate

Which of these two suggestions you would recommend, if the company desires to maintain the present profit? Give reasons.

Solution

Marginal Cost Statement					
Particulars	Present Costs		Option I	Option II	
	Per Unit	Amt	Per Unit	Per Unit	
Sales	40	3600000	38	40	
Less - Variable Costs					
Materials	16	1440000	16	16	
Conversion Costs	12	1080000	12	12	
Dealers Margin (existing 10% of sales)	4	360000	3.8	5	(Margin increased by 25%)
					So 12.50% of Rs.40
Contribution	8	720000	6.2	7	
Less - Fixed Costs		500000			
Profit		220000			

Sales in units required to maintain present level of profit = Total Contribution required / New contributin per unit

For Option I	=720000/6.20	
	116129	Units
For Option II	=720000/7	
	102857	Units

The second proposal i.e increasing the dealer's margin is recommended because
- the contrbution per unit is higher. It is Rs.7 in comparison to Rs.6.20 in the first proposal
- the sales in units required to earn the same level of profit are lower. They are at 102857 as against 116129 units in the first proposal. This means a lower sales effort and less finance would be required for implementing proposal (b) as against proposal (a). Of course under proposal (a) the company can earn higher profits than at present level if it can increase its sales beyond 102857 units.

6.7 DECISION REGARDING SALES MIX

Problem No.1

Garden products limited manufacture the “Rainpour” garden spray. The accounts of the company for the year 1991 are expected to reveal a profit of Rs.1400000 from the manufacture of “Rainpour” after charging fixed costs of Rs.1000000/- the “Rainpour” is sold for Rs.50 per unit and has a variable unit cost of Rs.20. Units sold 80000.

Market sensitivity test suggests the following responses to price charges

Alternatives	Selling price reduced by	Quantity sold increased by
A	5%	10%
B	7%	20%
C	10%	25%

Evaluate these alternatives and state which, on profitability consideration, should be adopted for the forthcoming year, assuming cost structure unchanged from 1991.

Solution

Garden Products Limited

Statement Showing Results of Proposals for 1992

Alternatives	Reduction in Selling Price	Rate	Revised Contribution per unit	Rate increse in sale	Qty.	Revised Sale Qty (Units)	Total Contribution
	Rs	Rs	Rs				Rs
A	5%	2.5	27.5	10%	8000	88000	2420000
B	7%	3.5	26.5	20%	16000	96000	2544000
C	10%	5	25	25%	20000	100000	2500000

The above statement shows that on profitability consideration, to the exclusion of other factors, alternative B is the best and hence should be adopted for 1992

Problem No.2

Following information has been made available from the cost records of United Automobiles Ltd., manufacturing spare parts.

Direct Materials X Rs.8 per unit, Y Rs.6 per unit

Direct wages X 24 hrs @25 paise per hour, Y 16 hrs@25 paise per hour

Variable Overheads ….. 150% of wages

Fixed Overheads ……..Rs.750/-

Selling price X Rs.25 & Y Rs.20

The directors want to be acquainted with the desirability of adopting any one of the following alternative sales mixes in the budget for the next period.

a. 250 units of X and 250 units of Y, b.400 units of Y only
c. 400 units of X and 100 units of Y, d. 150 units of X and 350 units of Y

State which of the alternative sales mixes you would recommend to the management.

Marginal Cost Statement (per unit)

	X	Y
Direct Materials	8	6
Direct wages	6	4
Variable O/H	9	6
Marginal Cost	**23**	**16**
Contribution	2	4
Selling Price	**25**	**20**

Selection of Sales Alternative

	I			II		III			IV		
	X	Y	Total	Y	Total	X	Y	Total	X	Y	Total
	250 un	250 un		400 un		400 un	100 un		150 un	350 un	
Contribution per unit	2	4		4		2	4		2	4	
Total Contribution	500	1000	1500	1600	1600	800	400	1200	300	1400	1700
Less - Fixed Cost			750		750			750			750
Profit			**750**		**850**			**450**			**950**

Alternative IV is most profitable since it gives the maximum profit of Rs.950/-

Problem No.3

Vinak limited which produces 3 products furnishes you the following data for 1991-92

	A	B	C
Selling price per unit (Rs.)	100	75	50
Profit Volume Ration (%)	10	20	40
Maximum sales potential (units)	40000	25000	10000
Raw material content as % age of variable costs (%)	50	50	50

The fixed expenses are estimated at Rs.680000. The company uses a single raw material in all the three products. Raw material is in short supply and the company has a quota for the supply of raw materials of the value of Rs.18,00,000 for the year 1991-92 for the manufacture of its products to meet its sales demand.

You are required to

- Set a product mix which will give the maximum overall profit keeping the short supply of raw materials in view
- Compute that maximum profit

Marginal Cost Statement

			A	B	C
1	Selling price per unit	Rs.	100	75	50
2	Profit Volume Ratio	%	10	20	40
3	Contribution		10	15	20
4	Variable Cost		90	60	30
5	Raw material cost - 50% of variable cost		45	30	15
6	Contribution as %age of Raw Material Cost		22.22%	50%	133.33%

The above statement shows that on the basis of percentage of contribution to material, the priorities of products will be C,B & A respetively. The output of the different products should, therefore be, as shown in the following statement of product mix.

Statement of Product Mix

Product	**Units**	**Cost of Raw Materials**
C	10000	150000
B	25000	750000
A	20000	900000
	55000	**1800000**

Statement of Profit (Rs.)

	A	B	C	Total
Sales	2,000,000	1,875,000	500,000	4,375,000
Less - Variable Costs	1,800,000	1,500,000	300,000	3,600,000
Contribution	200,000	375,000	200,000	775,000
Less - Fixed Cost				680,000
Profit				95,000

6.8 ACCEPTING FOREIGN ORDER/EXPLORING NEW MARKETS

Problem No.1

A company annually manufactures 10000 units of a product at a cost of Rs.4 per unit and there is home market for consuming the entire volume of production at the sale price of Rs.4.25 per unit. In the year 1987, there is a fall in the demand for home market which can consume 10000 units only at the sale price of Rs.3.72 per unit. The analysis of the cost per 10000 units is as follows:

Materials Rs.15000
Wages Rs.11000
Fixed Overheads Rs.8000
Variable Overheads Rs.6000

The foreign market is explored and it is found that this market can consume 20000 units of the product if offered at a sale price of Rs.3.55 per unit. It is also discovered that for additional 10000 units of the product (over initial 10000 units) the fixed overheads will increase by 10 percent. Is it worthwhile to try to capture the foreign market?

Solution:

Statement showing the advisability of selling goods in foreign market

	Year 1986		Year 1987				
Particulars	**Home Market**		**Home Market**		**Foreign Market**		**Total**
	10000 units		**10000 units**		**20000 units**		**30000 units**
	PU	**Rs.**	**PU**	**Rs.**	**PU**	**Rs.**	**Rs.**
Materials		15,000		15,000		30,000	45,000
Wages		11,000		11,000		22,000	33,000
Overheads							
Fixed		8,000		8,000		1,600	9,600
Variable		6,000		6,000		12,000	18,000
Total Cost	4.00	40,000		40,000	-	65,600	- 105,600
Profit	0.25	2,500		(2,800)		5,400	2,600
Sales	4.25	42,500	3.72	37,200	3.55	71,000	- 108,200

From the above, it is clear that it is advisable to sell goods in the foreign market. It will compensate not only for the loss on account of sale in the domestic market but will also result in an overall profit of Rs.2600/-

Problem No.2

Due to industrial depression, a plant is running, at present, at 50% of its capacity. The following details are available. Cost of Production (per unit) is as follows.

Direct Material Rs.2
Direct Labour Rs.1
Vriable o/h Rs.3
Fixed O/h Rs.2
Total Cost Rs.8

Production per month 20000 units,
Total cost of production Rs.160000
Sale Price Rs.140000
Loss Rs.20000

An exporter offers to buy 5000 units per month at the rate of Rs.6.50 per unit and the company hesitates to accept the offer for fear of increasing its already large operating losses. Advise whether the company should accept or decline this offer.

Statement of Profit										
Particulars				**Existing Situation**		**Proposed Situation**				**Total**
				20000 Units		**20000 units**		**5000 units**		**25000 units**
				PU	**Rs.**	**PU**	**Rs.**	**PU**	**Rs.**	**Rs.**
Sales				7.00	**140,000**	7.00	**140,000**	6.50	**32,500**	**172,500**
Variable Costs:										
	Direct Material			2.00	40,000	2.00	40,000	2.00	10,000	50,000
	Direct Labour			1.00	20,000	1.00	20,000	1.00	5,000	25,000
	Variable Overheads			3.00	60,000	3.00	60,000	3.00	15,000	75,000
	Total Variable Costs			**6.00**	**120,000**	**6.00**	**120,000**	**6.00**	**30,000**	**150,000**
Contribution				1.00	20,000	1.00	20,000	0.50	2,500	22,500
Fixed Costs				2.00	40,000	2.00	40,000		-	40,000
Profit/(Loss)				(1.00)	**(20,000)**	(1.00)	**(20,000)**		**2,500**	**(17,500)**
The company should accept the offer since the amount of loss will stand reduced from Rs.20000 to Rs.17500										
Moreover, acceptance of such an order will result in earning of foreign exchange for the country which may										
entitle the company to get some subsidy from the Government. The domestic market will not also be affected										

Problem No.3

A factory produces 24000 units. The cost sheet gives the following information

Direct Material	Rs.120000
Direct wages	Rs.84000
Direct wages	Rs.48000
Variable overheads	Rs.28000
Semi variable overheads	Rs.28000
Fixed overheads	Rs.80000
Total Cost	**Rs.360000**

The product is sold at Rs.20 per unit.

The management proposes to increase the production by 3000 units for sales in the foreign market. It is estimated that the semi-variable overheads will increase by Rs.1000. But the product will be sold at Rs.14 per unit in the foreign market, However no additional capital expenditure will be incurred. The management seeks your advice as a cost accountant. What will you advise them?

Statement of Marginal cost and contribution		
Total Units…. 24000	**Amt PU**	**Amt Rs.**
Sales	20.00	480000
Less - Variable costs		
Direct materials	5.00	120000
Direct wages	3.50	84000
Variable overheads	2.00	48000
Contribution	9.50	228000
In case the production of additional 3000 units is undertaken for sale in the foreign market at Rs.14 per unit, the position will be as under.		
Total Units…. 3000	**Amt PU**	**Amt Rs.**
Sales	14.00	42000
Less - Variable costs		
Direct materials	0.63	15000
Direct wages	0.44	10500
Variable overheads	0.25	6000
Additional Contribution	12.69	10500
Less-Semi variable o/h increase		1000
Net addition to profit		**9500**
The proposal for increase of production by 3000 units for sale in the foreign market may be accepted since it will result in an additional profit of Rs.9500/-		

MAKE OR BUY DECISIONS

Problem No.1

A radio manufacturing company finds that while it costs Rs.6.25 each to make component X 273 Q, the same is available in the market at Rs.5.75 each, with an assurance of continued supply. The breakdown of cost is

Materials Rs.2.75 each
Labour Rs.1.75 each
Other variable costs Rs.0.50 each
Depreciation and other fixed cost Rs.1.25 each
Total Cost Rs.6.25 each

a. Should you make or buy
b. What would be your decision if the supplier offered the component at Rs.4.85 each

Solution

a. The variable cost of manufacturing a component is Rs.5 calculated as follows

Materials	Rs.2.75
Labour	Rs.1.75
Other variable costs	Rs.0.50
Total	**Rs.5**

The market price is Rs.5.75. This is more than the variable cost by Rs.0.75. It is therefore not profitable to procure from outside because in any case the fixed cost will continue to be incurred. However it the surplus capacity released on account of procuring the component from outside could be put to a more profitable use. It may be better to buy from outside rather than manufacturing the component.

b. In case the supplier is prepared to supply the component at Rs.4.85, there is saving of 15 paise in the variable cost too. Hence, it is profitable to procure from outside. The surplus capacity released may be put to some other profitable use.

Problem No.2

Auto Parts Limited has an annual production of 90000 units for a motor component. The component's cost structure is as follows.

Materials	Rs.270 per unit
Labour (25% fixed)	Rs.180 per unit
Variable Expenses	Rs.90 per unit
Fixed Expenses	Rs.135 per unit
Total	**Rs.675 per unit**

a. The purchase manager has an offer from a supplier who is willing to supply the component at Rs.540. Should the component be purchased and production stopped?
b. Assume the resources now used for this components manufacture are to be used to produce another new product for which the selling price is Rs.485/-

In the latter case material price will be Rs.200 per unit. 90000 units of this product can be produced, at the same cost basis as above for labour and expenses. Discuss whether it would be advisable to divert the resources to manufacture that new product, on the footing that the component presently being produced would, instead of being produced, be purchased from the market?

a.	Statement Showing the Variable cost and Purchase cost of Component			
	90000 Units		Amt PU	Amt Rs.
	Variable Costs:	Materials	270	24300000
		Labour	135	12150000
		Expenses	90	8100000
	Total Variable Cost (when component is produced)		**495**	**44550000**
	Cost of Purchase (when component is purchased)		540	48600000
	Excess of Purchase price over variable cost		**45**	**4050000**
	Since fixed expenses remains constant, it is evident from the above statement that if the component is purchased from the outside supplier, the company will have to pay Rs.45 per unit more.Thus on 90000 units the company will have to spend in all Rs.4050000 more. The company should not, therfore, stop the production of the component.			
b.	Statement showing the contribution per unit if the existing resources are used for the production of another new product.			
		Selling price of new product per unit		Rs.485
	Less:	Variable Costs - Material Costs	Rs.200	
		- Labour (variable)	Rs.135	
		- Expenses (variable)	Rs.90	Rs.425
		Contribution per unit		**Rs.60**
	Loss per unit if the present component is purchased (as per statement (a))			Rs.45
		Net Savings (Rs.60-45)		**Rs.15**
	The above details shows that if the company diverts its resources for the production of another new product, it will benefit by Rs.15 per unit. On 90000 units, the company will save Rs.1350000. It is therefore advisable for the company to divert the resources to manufacture the new product and the component presently being produced should be purchased from the market.			

PROFIT VOLUME RATIO

$$PV\ Ratio = \frac{Contribution}{Sales} \times 100$$

$$= \frac{Sales - Variable\ Cost}{Sales} \times 100$$

$$= \frac{Change\ in\ Contribution\ /\ Profit}{Change\ in\ Sales}$$

Break Even Point		
		Fixed Cost
BEP (Units)	=	**Selling Price per unit - Variabe Cost per unit**
		Fixed Cost
OR	=	**Contribution per unit**
		Break Even Sales (Rs.)
OR	=	**Selling Price per unit**
		Fixed Cost X Sales
BEP (Rs.)	=	**Sales - Variable Cost**
		Fixed Cost X Selling Price per unit
OR	=	**Contribution per unit**
		Fixed Cost
OR	=	**P/V Ratio**
OR	=	**BEP Units X Selling Price per unit**
		Fixed Cost
OR	=	**(1- (Variable Cost / Sales)**

Margin of Safety		
M/S	=	(Sales Units - Break Even Units)
M/S Ratio	=	(Expected/Budgeted/Actual Sales - Break Even Sales) / Break Even Sales
M/S	=	Profit / PV Ratio
Profit	=	M/S X PV Ratio
M/S as a percentage of Total Sales		
	=	Margin of Safety / Total Sales X 100
M/S	=	Profit X Sales / Contribution
Key Factor Analysis	=	Contribution / Key Factor

MODULE IV

7

BUDGETARY CONTROL

Unit Structure :

7.1 INTRODUCTION

Budgets are an important tool of profit planning. The main purpose of budgetary control is to present a general view of budgeting an a device of planning and the preparation of various types of budgets. Let us study in this chapter how the technique of Budgetary control is employed to control costs.

7.2 OBJECTIVES

The first stage in planning and control system is setting the objectives which are defined as the broad and long range desired state or position in the future. They are motivational or directional in nature and are expressed in qualitative terms. The fundamental objectives are identification of the line of business, customer satisfaction, employees welfare and so on. Thus, they are the basic policies.

The second stage in the planning process is specifying the goals. The term goal, as an element in planning, represents targets, specific in quantitative terms to be achieved in a specific period of time.

7.3 DEFINITION

According to CIMA has defined budgets as - “financial and / or quantitative statement, prepared and approved prior to a defined period of time of the policy to be pursued during that period for the

purpose of attaining a given objective, it may include income, expenditure and the employment of capital.

7.4 TYPE OF BUDGET

With reference to planning and control refers to a comprehensive and coordinated budgets generally known as master budget. In operational terms overall budgets has several components. A master budget normally consists of three types of budgets.

i) Operating budgets
ii) Financial budgets
iii) Special decision budgets

Another classification of a master budget is -
1) Fixed / static budget and
2) Flexible / variable / sliding budgets.

i) Operating budgets - It relates to the physical activities / operations of a firm such as sales, production, purchasing, debtors collection and creditors payment schedules. In specifics terms, on operating budget has the following components -

1) Sales Budget
2) Production Budget
3) Purchase budget
4) Direct labour budget
5) Manufacturing expense budget and
6) Administrative and selling expenses budget and so on.

ii) Financial budgets - It is concerned with expected costs receipts / disbursement, financial position and results of operation. It has the following components :

1) Budgeted income statement
2) Budgeted statement of retained earnings
3) Cash Budget and
4) Budgeted balance sheet

i) Operational Budgets

1) Sales Budget - The Sales Budget is the most important budget and forms on the basis on which all other budgets are build up. This budget is a forecast of the quantities and values of sales to be achieved in a budget period. Every effort should be made to ensure that its figure are as made to ensure that its figure are as accurate as possible because this is usually the starting budget on which all the other budgets are built up. The Sales Manager should be made

directly responsible for the preparation and executive of this budget. While preparing sales budget, the following factors are to be taken into consideration -

1) Past sales figures and trends
2) Relative Products Profitability
3) Pricing policies
4) Production capacity
5) Market Research studies

FORMAT OF SALES BUDGET

ABC CO. LTD.
Sales budget for the period ending
Product wise

Months / Details	Product A		Product A	
	Quantity	Value	Quantity	Value
Jan				

Dec				

2) Production budget :

Production budget is a forecast of the total output of the whole organization broken down into estimates of output of each type of product with a scheduling of operations by weeks and months to be performed and a forecast of the closing finished stock. The budget may be expressed in quantitative. i.e. weights, units etc. or financial rupees or both. This budget is prepared after taking into consideration the estimated opening stock, the estimated sale and the desired closing finished stock of each product.

FORMAT OF PRODUCTION BUDGET

XYZ CO. LTD.
For the period ending

Items / Month	J	F	M	A	M	J	J	A	S	O	N	D
1) Units required for sale												
2) Add : Closing stock of finished goods. (1 + 2)												
3) Total Required (Units)												
4) Less : - Opening												

Stock of Finished Goods (units)												
5) Production units to be completed (3-4)												
6) Add : Equivalent Units in closing W.I.P.												
7) Less : Equivalent units in opening W.I.P.												
8) Total Equivalent units to be completed (5+6-7)												

3) Purchase Budget : When we prepared the production budget, it is necessary to determine the different in puts required to carry out the production activities. The purchase budget shows the number of units of material either direct or indirect and the services to be purchased during the budget period. It also contains the monetary value of units of materials to be purchased for producing the goods and services as per the production budget. The following factor has to consider while preparing the purchase budget.

1) Sales and Production budgets
2) Expected changes in prices of raw materials
3) Storage facilities
4) Inventory level, economic ordering quantity.
5) Nature of availability of raw material.

FORMAT OF PURCHASE BUDGET

XYZ CO. LTD.
For the period ending

Particulars	**A**	**B**	**Total**
Direct Material (Kg)			
a) Direct Material usage			
b) Budgeted closing Direct Material inventory			
c) Total Requirements (a + b)			
d) Opening Direct Material Inventory			
e) Purchase of Direct Material (c-d)			
f) Cost Per Kg (₹)			
g) Cost of Purchases (e × f)			

4) Direct Labour Budget - This budget shows the number of employees and or number of labour hours i.e. skilled, semi-skilled,

unskilled for the production required to produce or sell, the budgeted output and or budgeted sales. The following Factors are to be considered while preparing direct labour budget as -

1) Output and sales
2) Capital expenditure programmes
3) Research and Development activities.

This budget also provides the monetary value of labour as well as appropriate wages rate are used.

FORMAT OF DIRECT LABOUR BUDGET

For the year ended

Particulars	**A**	**B**	**Total**
a) Budgeted production requirements units			
b) Direct Labour Hours per unit			
c) Total Direct Labour Hours (a × b)			
d) Direct Labour Cost Per Hours (₹)			
e) Total Direct Labour Cost (₹) (c × d)			

5) Manufacturing expenses Budget : This budget gives an estimate for the work overhead expenses to be incurred in a budget period to achieved the production target. It includes the cost of indirect labour indirect material and indirect work expenses. It may be classified into fixed cost, variable cost and semi variable cost also. In preparing this budget, fixed overheads can be estimated on the basis of past information, and variable expenses are estimated on the basis of budgeted output.

6) Administrative and selling expenses Budget : The administrative budget provides an estimate of the expenses of all the central offices and of management salaries. It can be prepared with the help of past experience and anticipated changes. Such expenses may be fixed and related to the different executives.

Selling expenses budget is a forecast of selling and distribution expenses for the company's products during the budget period. This budget is closely connected with the sales budget as the selling and distribution expenses will be in proportion to sales.

ii) Financial Budget :

Cash Budget : This budget provides an estimate for the anticipated receipts and payments of cash during the budget period. This budget is prepared by the Chief Accountant under the

guidance of management because whenever there is any requirement of financial help arranged by the management people to meet the production and sales programmes. This budget is prepared in two parts i.e. (i) Receipts and (ii) Payment.

i) Receipts include cash sales, collection from debtors, dividend received, & any other receipts.
ii) Payments include payment to creditors, cash purchases, income tax paid, purchase of assets and any other miscellaneous expenses.

FORMAT OF CASH BUDGET

For the year ended

Particulars	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
A) Opening Cash Balance												
B) Receipts :												
- Cash Sales												
- Collection from debtors												
- Sale of fixed assets												
- Collection of BIR												
- Loan Received												
- Interest on Investment												
Issue of Shares / Debentures												
Total (A + B)												
C) Less : Payment												
- Cash Purchases												
- Payment to suppliers												
- Payment of BIP												
- Dividend paid												
- Expenses paid												
- Taxes paid												
- Interest on loan												
- Purchase of fixed												

assets												
- Repayment of loans												
Total Payment (C)												
Closing Balance of												
Cash (A + B - C)												

iii) Special decision on budget :

Master budget - it can be classified as a fixed budget and flexible budget. The master budget is a consolidated summary of the various functional budgets. It is defined as "a summary of the budget schedules in capsule form made for the purpose of presenting on one report, the highlighting of the budget forecast". This budget is prepared by the budget committee on the basis of coordinated functional budgets and became the target for the company during the budget period when the committee finally approves it.

i) Fixed Budget : The fixed budget can be defined as a budget prepared for given level of activity. It does not take into consideration any changes in expenditure arising out of changes in the level of activity.

ii) Flexible Budget : Flexible budget is defined as, designed to change in accordance with the level of activity actually attained. Thus, a flexible budget gives different budgeted costs for different levels or activity. It is prepared after making an intelligent classification of all expenses between fixed, semi-variable and variable because the usefulness of such a budget depends upon the accuracy with, which the expenses can be classified.

7.5 FIXED BUDGET V/S FLEXIBLE BUDGET

Fixed Budget	Flexible Budget
1) It is prepared for unchanged irrespective of level of capacity or volume.	It is prepared to show change in relation to the level of activity attended by recognizing the different between fixed, semi fixed and variable costs.
2) It is fixed or rigid and cannot be change or adjusted to actual volume of activity.	It is not fixed or rigid. It can be recast on the basis of volume of activity.
3) Full costs one related to one level of activity only.	Cost are analysed by behaviour and variable costs are allowed to adjusted as per the level of

	activity.
4) Under fixed budget cost ascertainment or price fixation do not give a correct picture.	Under flexible budget it gives a clear idea about cost ascertainment, price fixation or tendering quotation.
5) If the level of activity change then the comparison of actual performance will not be meaningful with the budgeted targets	It provides a meaningful basis for comparison of the actual performance with the budgeted targets.

7.6 BUDGETARY CONTROL

Budgetary Control is defined as, "the establishment of budgets relating the responsibilities of executive to the requirements of a policy and the continuous comparison of actual with budgeted results, either to secure by individual action the objective of that policy or to provide a basis for its revision."

7.6.1 Advantages of Budgetary Control :

There are a number of benefits / Advantages of Budgetary Control are as follows :

1) Budget control by formalizing their responsibilities for planning, compels managers to thing ahead to anticipate and prepare for changing conditions.
2) It co-ordinates the activities of various departments and functions of the business.
3) It increase the production efficiency through proper communication with the employees and management and also motivate the employees to maximize the production and profits also.
4) It ensures that working capital is available for the efficient operation of the business.
5) It provides the night direction of capital expenditure in the most profitable manner.
6) A budget motivates the employees to attain the given goals.
7) It also help in obtaining the bank credit whenever required.
8) It creates cost consciousness and introduces an attitude of mind in which waste and efficiency thrive.

7.6.2 Limitations of Budgetary Control :

1) The budgets are based on estimates. The strength and weakness of budgetary control system depends to a large extent, on the accuracy with which estimates are made. So, it is

always remember that the budget is prepared on estimated and not on actual accuracy.

2) The budget programme must be dynamic and continuously with the change business conditions. It cannot be fixed for all the times, as the business circumstances change, the result is also change.

3) Budgetary control is only a tool of management. Sometimes it is believed that the introduction of a budget programme is sufficient to ensure its success. It is necessary that the entire organization must participate enthusiastically in the programme for the realization of budgetary goals.

4) Preparation of budget, it requires a maximum amount of time and efforts. While budgeting is not a major expenditure for a large or medium size organizations, smaller companies may find it difficult to justify the cost involved.

Illustration :
Case Study :
1) Cash Receipts :

The estimated monthly sales for a company is as follows :

Month	Sales
January	8000
February	14000
March	12000
April	20000
May	25000
June	10000

Sales are 20% cash and 80% for credit each month. Of the credit sales 70% are collected in the month following and the balance in the second month following. Calculate the amount of cash sales collection from debtors in each month from January to June.

Solution :

Particulars	Jan	Feb	March	April	May	June
Total Sales	8000	14000	12000	20000	25000	10000
20% cash Sales (-)	1600	2800	2400	4000	5000	2000
80% Credit Sales	6400	11200	9600	16000	20000	8000

Out of 80% Credit Sales						
70% collect next month	--	4480	7840	6720	11200	14000
30% next to next month	--	--	1920	3360	2880	4800
Total Collection from Debtors	--	4480	9760	10080	14080	18800
Cash Sales	1600	2800	2400	4000	5000	2000
Collection from Debtors	--	4480	9760	10080	14080	18800

Illustration No. 2
Cash Payment

In a firm the forecasts relating to wages factory expenses and administrative expenses are as follows :

Particulars	Dec	Jan	Feb	March
Wages	20000	20000	30000	30000
Factory expenses	8000	8000	12000	12000
Administrative Expenses	10000	10000	5000	5000

The time lag in payment of wages is 1/8 months, in case of factory expenses ¼ month and that of administrative expenses is ½ months. Estimate the amount of wages, factory expenses and administrative expenses in each month from January to March.

i) Estimation of wage Payment (O/S 1/8)

Particulars	Dec	Jan	Feb	March
Wages	20000	20000	30000	30000
Paid 7/8 in the same month	17500	17500	26250	26250
1/8 paid in the next month	--	2500	2500	3750
Total wages paid during the month	17500	20000	28750	30000

Note : If outstanding or time lag is given 1/8, it means 1/8 paid in the next month and the remaining 7/8 is paid to be paid in the same month.

ii) Estimation of Factory Expenses (O/S ¼ month)

Particulars	Dec	Jan	Feb	March
Factory Expenses	8000	8000	12000	12000
¾ paid in the same month	6000	6000	9000	9000

¼ paid in the next month	--	2000	2000	3000
Total Factory expenses paid during the month	6000	8000	11000	12000

Note : ¼ month time lag or outstanding, it means ¼ to be paid in the next month ¾ to paid in the same month.

iii) Estimation of Administrative Expenses (O/S ½ month)

Particulars	Dec	Jan	Feb	March
Administrative Expenses	10000	10000	5000	5000
½ paid in the same month	5000	5000	2500	2500
½ paid in the next month	--	5000	5000	2500
Total Administrative expenses paid during the month	5000	10000	7500	5000

Note : ½ month time lag or outstanding, it means ½ to be paid in the same month and ½ to paid in the next month.

Illustration 3 :

The following are the estimated sales of a company for 8 months ending in 31.08.2011.

Month	Estimated Sales (in units)
January 2011	6000
February 2011	6500
March 2011	4500
April 2011	4000
May 2011	5000
June 2011	6000
July 2011	7000
August 2011	6000

As a matter of policy, the company the closing balance of finished goods and raw materials as follows. Stock items closing Balance of a month finished goods - 50% of the estimated sales for the next month.

Raw Material - Estimated consumption for the next month.

Each unit of production requires 2 kgs of Raw Materials costing ₹5 per kgs.

Prepare production budget (in units) and Raw material purchase budget (in unit and cost) of the company for the half year ending on 30.06.2011.

Solution :

Production Budget (in units) for the half year ending 30.06.2011.

Month	Sales (in units)	Closing Balance 50% of Estimated Sales for next month	Opening Balance	Production (2+3-4)
1	2	3	4	5
Jan	6000	3250	3000	6250
Feb	6500	2250	3250	5500
Mar	4500	2000	2250	4250
April	4000	2500	2000	4500
May	5000	3000	2500	5500
June	6000	3500	3000	6500
July	7000	3000	3500	6500
Total	32000			32500

Production Budget (in costs of units) for the half year ending 30.06.2011.

Month	Production (in units)	Consumption 2kg Per Units 2 × 2	Opening Balance	Closing / Purchases Opening Balance	Rate per Kg	Amount (5 × 6)
1	2	3	4	5	6	7
Jan	6250	6250 × 2 = 12500	12500	11000	5	55000
Feb	5500	5500 × 2 = 11000	11000	8500	5	42500
Mar	4250	4250 × 2 = 8500	8500	9000	5	45000
April	4500	4500 × 2 = 9000	9000	11000	5	55000
May	5500	5500 × 2 = 11000	11000	13000	5	65000
June	6500	6500 × 2 = 13000	13000	13000	5	65000
July	6500	6500 × 2 = 13000	13000	--	--	--
						3,27,500

Illustration 4 :

A company estimate sales of Product ‘A’ during the last five months of 2008 as under.

Month	Units
August	2160
September	3120
October	2440
November	2080
December	1960

Inventory of product 'A' at the end of every month is to be equal to 50% of sales estimate for the next month. Closing inventory of July was maintained on the above basis. There was no work in progress at the end of any month. Every unit of product requires two types of material in the following quantities.

Material x - 5 Ltr.
Material y - 6 Ltr.

Material equal to 25% of the requirement for the next month consumption are kept as closing stock. The stock position on 31st July was as under.

Material x - 3200 Ltr.
Material y - 2800 Ltr.

The purchase price of materials x ₹3 per ltr. And material y ₹2 per ltr. There was no closing stock of material x & y on 30th November 2008. From the above prepare the following budget for the period August to November.

1) Production budget
2) Material Consumption budget
3) Purchase Budget showing quantity and value.

Production on Budget (Units)

Particulars	Aug	Sept	Oct	Nov	Dec
Units Required to Sale					
Add : Closing Stock	2160	3120	2440	2080	1960
(50% of next month sales)	1560	1220	1040	980	
Total Units Required	3720	4340	3480	3060	
(-) Opening Stock					
(50% of current Sales)	1080	1560	1220	1040	
Production units	2640	2780	2260	2020	

Material Consumption Budget (in Units)

Particulars	Aug	Sept	Oct	Nov
1) Material x (5 Ltrs. × units) from Production Budget	13200	13900	11300	10100
2) Material y (6 Ltrs. × units)	15840	16680	13560	12120
Total Material Consumption	29040	30580	24860	22220

Purchase Budget (Quantity & Value)

Particulars	Aug		Sept		Oct		Nov	
	x	y	x	y	x	y	x	y
Material Consumption	13200	15840	13900	16680	11300	13560	10100	12120
(+) Closing Stock (25% of next month Consumption)	3475	4170	2825	3390	2525	3030	1225	1470
(-) Opening Stock given and 25% of current months)	3200	2800	3475	4170	2825	3390	2525	3030
Purchase of Material (Ltrs.)	13475	17210	13250	15900	11000	13200	8800	10560
Price Per Ltr.	3	2	3	2	3	2	3	2
Purchase Price	40425	34420	39750	31800	33000	26400	26400	21120

Note : It is assumed that sales unit for December 1960.
∴ Closing Stock (25% of next consumption) in taken as. For material Production units 1960

∴ 1960 × 50% = 980 units

∴ Material Consumption
Material x = 980 × 5 = 4900
Material y = 980 × 6 = 5880

∴ Closing Stock x = 4900 × 25% = 1225
y = 5880 × 25% = 1470

Illustration 5 :

The budgeting department of HL Ltd. Provides the following information.

You are required to prepare a comprehensive quarter wise budget for the next year.

Balance Sheet as on 31.03.2013

Liabilities	Amount	Assets		Amount
Share Capital	31,77,428	Fixed Assets	48,00,000	
Retained earnings	18,96,400	(-) Acc. Depn.	12,00,000	36,00,000
Creation	44,000			
Taxes Payable	74,000	**Inventories**		
		Direct Material	1,35,828	
		Finished goods	1,60,000	2,95,828
		Debtors	11,20,000	
		(-) Provision		
		For bad debtors	64,000	10,56,000
		Cash		2,40,000
	51,91,828			51,91,828

Note :

1) Direct material include 6300 kgs of material A @ ₹5.88 per kg and 12600 kgs of material B ₹7.84 per kg and Finished goods include 4000 units @ ₹40 per unit.
2) Budget assumption. Selling Price ₹60 per unit and quarterly sales forecast in units as follows.

Quarter	Next year	Year following next year
First	20,000	30,000
Second	30,000	
Third	40,000	
Fourth	20,000	

3) Inventory Policy :

- Finished goods 20% of the following quarter's requirement at the end of each quarter.
- Raw Material 30% of the following quarter's requirement at the end of each quarter.
- The firm wishes to have 9200 Kgs. Of each type of direct material on hand as on 31st March of the next year.

4) Manufacturing Cost per unit -

Direct Material -		
1kg of A @ ₹5.88	5.88	
2kg of B @ ₹7.84	15.68	21.56
Direct Labour 0.5 × Direct Labour Hour @ ₹8		4.00

Overheads

Variable (0.5 × direct labour hours @ ₹12)	6.00	
Fixed (₹844000 per year / Normal level of activity 100000 units)	8.44	
		14.44
Total		40.00

The quarterly fixed manufacturing cost of ₹211000 include depreciation totaling ₹50000.

5) Selling distribution costs
Commission & distribution ₹6 per unit sold
Advertising ₹10,000 per quarter
Administrative ₹20,000 per quarter.

Prepare :
1) Quarter wise Sales Budget
2) Production Budget (units)
3) Quarterly manufacturing Cost Budget
4) Quarterly Administrative & Selling Cost budget.

Solution 9 :

1) Quarterly Sales Budget -

Particulars	First	Second	Third	Fourth
Units Sales	20,000	30,000	40,000	20,000
Selling price (Per Unit)	60	60	60	60
Total Sales Revenue	12,00,000	18,00,000	24,00,000	12,00,000

2) Production Budget (in units) -

Particulars	First	Second	Third	Fourth
Sales	20,000	30,000	40,000	20,000
Add : Closing Stock (20%) of the next quarter	6,000	8,000	4,000	6,000
Total Requirement of finished goods	26,000	38,000	44,000	26,000
(-) Opening Stock	4,000	6,000	8,000	4,000
Required Production	22,000	32,000	36,000	22,000

1) Quarterly Manufacturing Cost Budget -

Particulars	First	Second	Third	Fourth
Required Production (in units)	22,000	32,000	36,000	22,000
Variable cost				
A (₹5.88 per units)	1,29,360	1,88,160	2,11,680	1,29,360
B (₹15.68 per units)	3,44,960	5,01,760	5,64,480	3,44,960
Direct Labour (₹4 per units)	88,000	1,28,000	1,44,000	88,000
Overheads (₹6 per units)	1,32,000	1,92,000	2,16,000	1,32,000
Total Variable cost (A)	6,94,320	10,09,920	11,36,160	6,94,320
Fixed Assets :				
Depreciation	50,000	50,000	50,000	50,000
Other Overheads	1,61,000	1,61,000	1,61,000	1,61,00
Total Fixed Cost	2,11,000	2,11,000	2,11,000	2,11,000
Total Cost (A+B)	9,05,320	12,20,920	13,47,160	43,78,720

Total Fixed Cost is calculated in another way i.e.

Fixed Overheads ₹8.44 per unit.

∴ Variable cost remain the same as above fixed cost only changed.

Particulars	First	Second	Third	Fourth
Variable Cost (A)	6,94,320	10,09,920	11,361,60	6,94,320
(+) Fixed Cost (B) (₹8.44 per unit)	1,85,680	2,70,080	3,03,840	1,85,680
Total Cost (A+B)	8,80,000	12,80,000	14,40,000	8,80,000

4) Quarterly Administrative & Saving Expenses Budget -

Particulars	First	Second	Third	Fourth
Units Sold	20,000	30,000	40,000	20,000
Variable Cost	2,20,000	1,80,000	2,40,000	1,20,000
Commission of distribution (₹6 per unit) (A)				
Fixed Cost				
Advertising	10,000	10,000	10,000	10,000
Administrative	20,000	20,000	20,000	20,000
Total Fixed Cost (B)	30,000	30,000	30,000	30,000
Total (A + B)	1,50,000	2,10,000	2,70,000	1,50,000

Illustration 6 :

From the following data prepare a cash budget according to Adjusted Profit & Loss method and Budget Balance Sheet.

Balance Sheet as on 31st December 2015

Liabilities	Amount	Assets	Amount
Share Capital	50,000	Premises	25,000
General Reserve	10,000	Machinery	12,500
Profit & Loss A/c	5,000	Debtors	20,000
Creditors	25,000	Closing Stock	10,000
Bills Payable	5,000	Bills Receivable	2,500
Outstanding Rent	1,000	Prepaid Commission	500
		Bank	25,500
	96,000		96,000

Projected Trading & Profit & Loss A/c for the year ending 31.12.2015

Particulars	Amount	Particulars	Amount
To Opening Stock	10,000	By Sales	1,00,000
To Purchase	75,000	By Closing Stock	7,500
To Octroi	1,000		
To Gross Profit C/d	21,500		
	1,07,500		1,07,500
To Interest	1,500	By Gross Profit b/d	21,500
To Salaries	3,000	By Sundry Receipts	2,500
To Depreciation	3,750		
(10% on Premises and Machinery)			
To Rent 3,000			
(-) O/s 1,000			
(Previous year)			
O/S 2,000			
(C.Y.) 500	2,500		
To Commission 1,500			
(+) Prepaid 500	2,000		
(Previous Year)			
To Office Expenses	1,000		
To Advertisement Expenses	500		
To Net Profit C/d	9,750		
	24,000		24,000

To Dividend	4,000	By Balance of Profit (Last year)	5,000
To Additions to Reserves	2,000	By Net Profit b/d	9,750
To Balance C/d	8,750		
	14,750		14,750

Closing balance of Certain items :
Share Capital ₹60,000
10% Debentures ₹15,000
Creditors ₹20,000
Debtors ₹30,000
Bills Payable ₹6,000
Bills Receivable ₹2,000
Furniture ₹7,500
Plant ₹25,000
(both these assets are purchased at the end of the year)

Solution :

Cash Budget for the year ending 31.12.2015

Particulars	**₹**	**₹**
Opening Balance as on 1.1.2015		25,500
Add : Net Profit for the year	9,750	
Depreciation	3,750	
Decrease in Bills Receivable	500	
Increase in Bills Payable	1,000	
Issue of share Capital	10,000	
Issue of Debentures	15,000	
Decrease in Prepaid Commission	500	
Decrease in Stock	2,500	43,000
		68,500
Less : Purchase of Plant	25,000	
Purchase of furniture	7,500	
Increase in debtors	10,000	
Decrease in Creditors	5,000	
Decrease in Outstanding Rent	500	
Dividends Paid	4,000	(52,000)
		16,500

Budgeted Balance Sheet as on 31.12.2015

Liabilities	Amount	Assets		Amount
Share Capital	60,000	Premises	25,000	
10% Debentures	15,000	(-) Depreciation	2,500	22,500
General Reserve	12,000	Machinery	12,500	
(10,000 + 2000)		(-) Depreciation	1,250	11,250
Profit & Loss A/c	8,750	Furniture		7,500
Creditors	20,000	Debtors		30,000
Bills Payable	6,000	Bills Receivable		2,000
Outstanding Rent	500	Plant		25,000
		Closing Stock		7,500
		Bank (Balancing Figure)		16,500
	1,22,250			1,22,250

Illustration 7 :

Jay Company making for a stock in the first quarter of the year is assisted by its bankers with overdraft accommodation. The following are the relevant budget figures.

Month	Sales	Purchase	Wages
November	1,20,000	83,000	9,800
December	1,28,000	96,000	10,000
January	72,000	1,62,000	8,000
February	1,16,000	1,64,000	4,000
March	84,000	1,79,000	10,400

Budgeted cash at Bank, 1st January, 2004 is ₹17,200. Credit terms of sales on payment by the end of the month following the month of supply. On an average, one half of sales are paid on the due date while the other half are paid during the next month. Creditors are paid during the month following the month of supply. You are required to prepare a Cash Budget for the quarter, 1st January - 31st March, 2004, showing the budgeted amount of bank facilities required at each month.

Solution : Cash Budget for quarter ending 31.3.2004.

Particulars	Jan	Feb	Mar
A. Opening Balance	17,200	37,200	(28,800)
B. Receipts			
Received from Debtors	1,24,000	1,00,000	94,000
Total (A + B)	1,41,200	1,37,200	65,200
C. Payment			
Paid to Creditors	96,000	1,62,000	1,64,000
Wages	8,000	4,000	10,400
Total (C)	1,04,000	1,66,000	1,74,400
Closing Balance (A+B-C)	37,200	(28,800)	(1,09,200)

Working Note :

Particulars	Nov	Dec	Jan	Feb	Mar
1) Sales	1,20,000	128000	72000	116000	84000
50% Received in the following Month		60000	64000	36000	58000
50% Received in the next to next month			60000	64000	36000
Total Collection from Debtors			124000	100000	94000
2) Purchases	83000	96000	162000	164000	179000
Paid in the next Month	--	83000	96000	162000	164000
3) Wages	9800	10000	8000	4000	10400

No Information is given so it is assumed that the wages are paid in the same month.

Illustration 8 :

From the following information prepare a cash Budget for Six months ended 31st December, 2014 of India Co. Ltd.

Estimated Revenue & Expenditure

Month - Year	Total Sales	Material	Wages	Production Overheads	Selling Overheads
June 2014	11000	8000	2000	1500	350
July 2014	10000	10000	2000	1600	400
August 2014	11000	7000	2000	1650	450
September 2014	12000	7000	2300	1650	400
October 2014	13000	6000	2300	1700	450
November 2014	14000	6000	2400	1750	450
December 2014	15000	8000	2400	1800	500

Cash balance on 1st July was ₹5000. A new machine is to be installed at ₹15,000 on credit, to be repaid in two equal installments in September 2014 & October 2014. Sales commission at 5% on total sales is to be paid within the month following actual sales. ₹500 being the amount of second call may be received in September 2014. Share premium amounting to ₹1000 is also obtainable with second call. Period of credit allowed by supplier is 1 month. Period of credit allowed to customers is 1 month. Delay in payment of overheads is 1 month. Delay in payment of wages is ½ month. Assume cash sales to be 50% of total sales.

Solution :

Cash Budget

Particulars	July	Aug	Sept	Oct	Nov	Dec
A) Opening Balance	5000	3100	(1000)	(7400)	(14350)	(12000)
Add : Receipts						
Cash Sales	5000	5500	6000	6500	7000	7500
Collection from Debtors	5500	5000	5500	6000	6500	7000
Second Call	--	--	500	--	--	--
Share Premium	--	--	1000	--	--	--
Total B	10500	10500	13000	12500	13500	14500
(A+B)	15500	13600	12000	5100	(850)	2500
Less : Payments						
Paid to creditors	8000	10000	7000	7000	6000	6000

Wages	2000	2100	2250	2300	2350	2400
Production overheads	1500	1600	1650	1650	1700	1750
Selling overheads	350	400	450	400	450	450
Commission	550	500	550	600	650	700
Machine Installment	--	--	7500	7500	--	--
Total (C)	12400	14600	19400	19450	11150	11300
Closing Balance (A+B-C)	3100	(1000)	(7400)	(14350)	(12000)	(8800)

Working Note :

Particulars	June	July	Aug	Sept	Oct	Nov	Dec
Sales	11000	10000	11000	12000	13000	14000	15000
1) 50% Cash Sales	5500	5000	5500	6000	6500	7000	7500
2) Credit Sales Collection from Debtors		5500	5000	5500	6000	6500	7000
3) Commission @ 5% to be paid in next month on total Sales	--	550	500	550	600	650	700
4) Wages	2000	2000	2200	2300	2300	2400	2400
50% pad in same	1000	1000	1100	1150	1150	1200	1200
50% paid in next month		1000	1000	1100	1150	1150	1200
Total Wages paid	1000	2000	2100	2250	2300	2350	2400

Note : All other expenses, i.e. payment to creditors, production and selling overheads, credit period is given 1 month, i.e. to be paid in the next month, it means June paid in July, July paid to August and so on.

Illustration 9 :

Prepare a Cash Budget for the 3 months ending 30th June from the following information.

a)

Month	Sales	Materials	Wages	Overheads
February	140000	96000	30000	17000
March	150000	90000	30000	19000
April	160000	92000	32000	20000
May	170000	100000	36000	22000
June	180000	104000	40000	23000

b) Credit terms are - sales / debtors - 10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month.

c) Creditors - Materials 2 months
Wages ¼ month
Overheads ½ month

d) Cash and Bank balance on 1st April is expected to be ₹60,000.

e) Plant & Machinery will be installed in February at a cost of ₹960000. The monthly installments of ₹12000 are payable from April onwards.

f) Dividends @ 5% on preference share capital of 1200000 will be paid on 1st June.

g) Advance to be received for sale of vehicles ₹80,000 in June.

h) Dividends from investments amounting to ₹20,000 are expected to be received in June.

i) Income tax (advance) to be paid in June is ₹15000.

Cash Budget from April to June

Particulars	April	May	June
A) Opening Balance	60000	47500	46000
Add : B) Receipts			
Cash Sales	16000	17000	18000
Collection from Debtors	130500	139500	148500
Dividend Received	--	--	20000
Advance Received from sale of Machinery	--	--	80000
Total B	146500	156500	266500
(A+B)	206500	204000	312500
Less : Payments :			
Payment to creditors	96000	90000	92000
Wages	31500	35000	39000
Overheads	19500	21000	22500
Installment of Machinery	12000	12000	12000
Income Tax Paid	--	--	15000
Dividend Paid	--	--	60000
Total (C)	159000	158000	240500
Closing Balance (A+B-C)	47500	46000	72000

Working Note :

Particulars	Feb	Mar	April	May	June
Sales	140000	150000	160000	170000	180000
1) 10% Cash Sales	14000	15000	16000	17000	18000
- Credit Sales	126000	135000	144000	153000	162000
50% Collected in the next month	--	63000	67500	72000	76500
50% collected next to next month	--		63000	67500	72000
2) Total Collection from Debtors	--	63000	130500	139500	148500
3) Purchases	96000	90000	92000	100000	104000
2 months credit	--	--	96000	90000	92000
Wages	30000	30000	32000	36000	40000
¾ paid in same month	22500	22500	24000	27000	30000
¼ paid in next month	--	7500	7500	8000	9000
4) Total Wages paid	22500	30000	31500	35000	39000
5) Overheads	17000	19000	20000	22000	23000
½ paid in same month	8500	9500	10000	11000	11500
½ paid in next month	--	8500	9500	10000	11000
Total Overheads Paid	8500	18000	19500	21000	22500

Illustration 10 :

M/s Anushree Enterprises is currently working at 50% capacity and produces 10000 units.

At 60% working raw material cost increases by 2% and selling price falls by 2%.

At 80% working raw material cost increases by 5% and selling price falls by 5%.

At 50% capacity working the product costs ₹18 per unit and is sold at ₹20 per unit.

The unit cost of ₹18 is made up as follows :

Material ₹10

Wages ₹3

Factory Overheads ₹3 (40% fixed)

Administrative Overheads ₹2 (50% fixed)

Prepare a statement showing the estimated profit of the business when it is operated at 60% and 80% capacity.

It may be noted the fixed overhead remain constant upto 100% capacity. Increase in raw material cost and decrease in selling price are to be calculated with reference to the figure given for 50% capacity usage.

Solution :

Flexible Budget

Particulars	50%		60%		80%	
	10000 Units		12000 Units		16000 Units	
	Per Unit	₹	Per Unit	₹	Per Unit	₹
Sales (A)	20.00	200000	19.60	235200	19.00	304000
(-) Variable Cost						
Direct Material	10.00	100000	10.20	122400	10.50	168000
Wages	3.00	30000	3.00	36000	3.00	48000
Factory Overheads	1.80	18000	1.80	21600	1.80	28800
Adm. Overheads	1.00	10000	1.00	12000	1.00	16000
Total Variable Cost (B)	15.80	158000	16.00	192000	16.30	260800
Contribution C = A - B	4.20	42000	3.60	43200	2.70	43200
(-) Fixed Costs						
Factory O/H	1.20	12000	1.00	12000	0.75	12000
Adm. O/H	1.00	10000	0.83	10000	0.63	10000
Total Fixed Cost (D)	2.20	22000	1.83	22000	1.38	22000
Profit (E = C - D)	2.00	20,000	1.77	21200	1.32	21200

Working Note :

1) Capacity - Production

50% - 10000

$\therefore$ 50=10000

60 ? 12000 units

50 = 10000 $10000 \times \frac{80}{50}$

80 = ? 16000 units

2) At 60% level units 12000
   i) Raw material cost increase by 2%
      ∴ At 50% level Raw Material
      ∴ Increased by 2%
      ∴ 10+2% = 10.20 per units.

   ii) Selling price falls by 2%
      At 50% level selling price per unit ₹20
      Decrease by 2%
      ∴ 20 - 2% = 19.60

3) At 80% level - units 16000
   i) Raw material cost at 50% level ₹10 per unit
      increase by 5%
      ∴ 10 + 5% = ₹10.50 per unit

   ii) Selling price per unit fail by 5%
      At 50% level selling price per unit ₹20
      ∴ 20 - 5% = ₹19 per unit.

4) Factory Overheads Partly fixed partly variable
   ∴ At 50% level given
   ₹3 (40% Fixed)
   ∴ 1.20 per unit fixed
      1.80 per unit variable
   ∴ Variable cost changes as per units changed &
      fixed cost 1.20 × 10000 = 12000
      it is fixed at all the levels of activity.

Note : Same for Administrative overheads

Illustration No. 11

The following information relates to the productive activities of S.K. Ltd. for three months ending on 31st March, 2012.

Particulars	**₹**
Fixed Expenses :	
Management Salaries	210000
Rent & Taxes	140000
Depreciation of machinery	175000
Sundry Office Expenses	222500
	747500
Semi variable Expenses (at 50%) Capacity)	
Plant Maintenance	62500
Indirect Labour	247500

Salesmen's Salaries	72500
Sundry	65000
	447500
Variable Expenses (at 50% Capacity)	
Material	600000
Labour	640000
Salesman's Commission	95000
	1335000

It is further noted that semi variable expenses remain constant between 40 and 70% capacity, increase by 10% of the above figures between 70 and 85% capacity and increase by 15% of the above figures between 85 and 100% capacity.

Fixed expenses remain constant whatever the level of activity may be. Sales at 60% capacity are 25,50,000, 80% capacity ₹34,00,000 and 100% capacity ₹42,50,000.

Assuming that all items produced are sold you are required to prepare a flexible budget at 60,80 & 100% capacity.

Solution :

In the books of S.K. Ltd.

Flexible Budget

Particulars	50%	60%	80%	100%
A) Variable Expenses				
- Material	600000	720000	960000	1200000
- Labour	640000	768000	1024000	1280000
- Salesmen's Commission	95000	114000	152000	190000
Total (A)	1335000	1602000	2136000	2670000
B) Semi Variable Expenses				
Plant Maintenance	62500	62500	68750	71875
Indirect Labour	247500	247500	272250	284625
Salesmen's Salaries	72500	72500	79750	83375
Sundry	65000	65000	71500	74750
Total (B)	447500	447500	492250	514625
C) Fixed Expenses				
Management Salaries	210000	210000	210000	210000

Rent & Taxes	140000	140000	140000	140000
Depreciation of Machinery	175000	175000	175000	175000
Sundry Office Expenses	222500	222500	222500	222500
Total (C)	747500	747500	747500	747500
Total Costs (D) (A+B+C)	2530000	2797000	3375750	3932125
Sales (E)	--	2550000	3400000	4250000
Less : Profit (F=D-E)	--	(247000)	24250	317875

Working Note :

1) Variable expenses changed as per the level of activity changed.
For e.g. At 50% Capacity given Material ₹600000 =50%

$$600000 \times \frac{60}{50} = 720000$$

$\therefore$ Material at 60% ₹720000

2) Semi variable Expenses -
It is constants between 40 & 70% capacity.
$\therefore$ for 40%, 50%, 60% & 70%, it is remain same.

Then income by 10% between 70 % 85% capacity.
$\therefore$ for e.g. plant maintenance for 50% capacity = 62500 increased by 10%

$\therefore$ 62500+10% = 68750

$\therefore$ from 70% upto 85% capacity increase by 10% of each semi variable expenses.

3) Fixed expenses remain constant at whatever the level of activity, it means at all the levels it remain same, as fixed.

Exercises :
A) Theory Questions -

1) What is a budget? What are the objectives of budgets.
2) What is Budgetary control?
3) Types of Budget, explain in detail.
4) Distinguish between fixed budget & flexible budget.
5) Define Master Budget.
6) What are the advantages and disadvantages of Budgetary Control?

7) Write a note on Cash Budget.
8) Explain in detail flexible budget.
9) Write a note on manufacturing overheads budget.
10) Define variable, semi-variable and fixed cost.
11) What is financial Budgets?
12) Note on Operational Budget?

B) Multiple Choice Questions -

1) The classification of fixed and variable cost has a special significance in the preparation of
   a) Flexible budget b) Cash Budget
   c) Capital Budget d) Zero based budget

2) When a flexible budget is used, then increase in actual production level within a relevant range would increase.
   a) Total Cost b) Variable Cost
   c) Fixed Cost d) Both (a) and (b)
3) When a flexible budget is used a decrease in actual production level within a relevant range would
   a) Decrease variable cost per unit
   b) Decrease variable cost
   c) Increase total fixed costs
   d) Increase variable cost per unit

4) If the activity level is reduced from 90% to 70%, in the fixed cost
   a) Will decrease by 20% b) Will increase by 20%
   c) Per unit will decrease d) Per unit will increase

5) A budget that gives a summary of all the functional budget is known as
   a) Capital budget b) Flexible budget
   c) Master budget d) Fixed budget

6) Which of the following may be considered on independent item in the preparation of the master budget?
   a) Direct material budget b) Indirect labour budget
   c) Production budget d) Capital expenditure budget

7) A master budget comprises
   a) The budget profit & loss account
   b) Budget cash flow, budget profit & loss, budget balance sheet
   c) Budgeted cash Flow
   d) Entire sets of budgets prepared

8) In the process of preparing normal budget, which of the following is prepared last?
   a) Sales budget b) Cash budget
   c) Direct labour budget d) Cost of goods

9) In which budget do you add credit sales and deduct cash received from debtors?
   a) Cash budget b) Debtors budget
   c) Creditors budget d) Sales budget

10) Of the four costs shown below, which would not be included in the cash budget of an insurance firm?
   a) Depreciation of fixed assets
   b) Commission paid to agents
   c) Office salaries
   d) Capital cost of a new compute

11) Which one of the following items would not be included in a cash budget?
   a) Capital repayments of loans
   b) Depreciation changes
   c) Dividend payments
   d) Proceeds of sale of fixed assets

12) Which of the following item is not included in a cash budget?
   a) Loan repayments b) depreciation charge
   c) Tax paid d) Wages paid

Answer :
1-a, 2-d, 3-b, 4-d, 5-c, 6-d, 7-b, 8-b, 9-b, 10-a
11-b, 12-b

C) State whether True or False.

1) Master budget is a budget which is designed to remain unchanged irrespective of the level of capacity.
2) A functional budget is the summary budget incorporating its component functional budgets.
3) Current budget is a budget which is established for use unaltered over a long period of time.
4) Functional budget is a budget which is established for use over a short period of time.
5) Fixed budget refers to budget for fixed assets.
6) The process of creating a formal plan and translating goals into a quantitative format is process costing.
7) Budget is a statement of the policy to be pursued for the purpose pursued for the purpose of attaining a given objective.
8) Flexible budgeting involves a careful differentiation between fixed and variable expenses.
9) A flexible budget is a budget for semi variable overhead costs only.
10) Sales budget provides the necessary input data for Direct labour budget.

Answer : True - 7,8
False - 1,2,3,4,5,6,9,10

Practical Problem :

1) For production of 50000 electrical tubes the following are budgeted expenses.

Particulars	**(₹)Cost Per Unit**
Direct Material	6.00
Direct Labour	3.00
Direct Expenses	1.00
Variable Expenses	2.50
Fixed Overheads (₹15000)	3.00
Selling expenses (10% fixed)	3.00
Administrative expenses (₹20000 fixed)	1.00
Distribution expenses (20% fixed)	1.00
Total Cost of sales	20.50

Prepare a budget for production of 30000, 40000 and 60,00 units of electric tubes.

2) From the information given below prepare flexible budget for 60% and 80% capacities and fix the total overhead rates as a percent on direct wages at these capacities.

Variable Overheads 75% capacity
Indirect Material 750
Indirect Labour 2250

Semi-Variable Overheads
Electricity (40% Fixed, 60% Variable) 3750
Repairs & Maintenance 375
- 80% Fixed
- 20% Variable

Fixed Overheads
Salaries 10000
Insurance 500
Depreciation 2500
Estimated Direct Wages 4025

3) The following data are available of a manufacturing company for a year

Fixed Expenses	₹
Salaries & Wages	1520
Rent, Rates & Taxes	1056
Depreciation	1184
Sundry Administrative Expenses	-1040

Variable Expenses at 50% Capacity	
Material	₹3472
Labour	3264
Other Expenses	1264

Semi variable Expenses remain constant between 45% and 65% of capacity, increasing by 10% between 65% and 80% capacity and by 20% between 80% and 100% capacity.

Sales at various levels are
50% Capacity - ₹16000
60% Capacity - ₹19200
75% Capacity - ₹24000
90% Capacity - ₹28800
100% Capacity - ₹32000

Prepare a Flexible budget for the year and forecast the profit at 50%, 60%, 75% and 100% of capacity.

4) From the following information and the assumption that the balance in hand on 1st January is 72500, prepare cash Budget.

Month	Sales	Materials	Wages	Selling / Distribution Cost	Production cost
Jan	72000	25000	10000	4000	6000
Feb	97000	31000	12100	5000	6300
Mar	86000	25500	10600	5500	6000
April	88600	30600	25000	6700	6500
May	102500	37000	22000	8500	8000
June	108700	38800	23000	9000	8200

Assume that 50% are cash sales. Assets are to be acquired in the month of Feb. and April. Therefore provision should be made for the payment of ₹40,000 and ₹25000 for the same. An application has been made to the Bank for the grant of loan of ₹30,000 and it is hoped that it will be received in the month of may. It is anticipated that a dividend of ₹40000 will be paid in June.

Debtors are allowed 1 months credit. Sales commission @ 5% on cash sales and 2% on cash collection from debtors is to be paid. Creditors grant one month credit.

5) The following information is extracted from the various functional budgets prepared for a concern whose financial year starts from 1st April.

i)

Particulars	Jan	Feb	Mar	April	May	June	July	Aug	Sept
Sales	3000	3500	3000	2500	2250	3250	3500	3750	4000
Material	1250	1500	1500	1250	900	1500	1500	2000	1500
Wage	500	550	550	500	450	450	500	500	550
Overhead									
Manufacturing	400	450	450	400	350	350	400	400	450
Administrative	150	200	200	150	150	150	200	200	200
Selling	200	200	200	250	200	150	150	150	200
Distribution	150	200	200	150	100	100	150	200	200

ii) Plant to be purchased for ₹3000. The price to be paid in six equal installment the first installment to start in June.
iii) A provision of ₹250 per month has to be made for machinery purchased in the previous period.
iv) A commission of 10% is required to be paid on sale in the month following the actual sales.
v) Cash sales would amount to ₹200 per month on which no commission is paid.
vi) Dividend to shareholders amounting to ₹5000 is to be paid on 1st July.
vii) Interest on investment amounting to ₹4000 will be received on 1st August.
viii) Income tax paid in August ₹4000.
ix) Balance of call on ordinary shares to be received on 1st April ₹2000.

The period of credit allowed to debtors and allowed by creditors are 3 months and 2 months respectively and payment of wages and overheads expenses are made one month in arrears.

The estimated cash balance on 1st April was ₹5000.

Prepare a monthly cash budget for six months from April to September assuming suitable figures for loan overdraft whenever required.

6) Prepare Cash Budget for January - June from the following information.

1) The estimated sales and expenses are as follows :

Month	Sales	Wages	Misc. Expenses
November	100000	15000	13500
December	110000	15000	13500
January	60000	12000	11500
February	50000	12000	15000
March	75000	12000	12000
April	120000	15000	13500
May	100000	13500	13500
June	100000	13500	13500

2) 20% of the sales are on cash and the balance on credit.
3) The firm has a gross margin of 25% on sales.
4) 50% of the credit sales are collected in the month following the sales, 30% in the second month and 20% in the third month.
5) Material for the sales of each month is purchased one month in advance on a credit for two months.
6) Wages are paid after ⅓ month. Expenses are paid after 1 month.
7) Debentures worth ₹20,000 were sold in January.
8) The firm maintains a minimum cash balance of ₹20,000. funds can be borrowed at 12% p.a. in multiples of ₹1000, the interest being payable on monthly basis.
9) Cash balance at the end of December is ₹30,000

7) A newly started SMG Co. Ltd. wishes to prepare cash budget from May. You are required to prepare a cash budget for the first six months from the following estimated revenue and expenses.

Month	Sales	Materials	Wages	Production	Selling
May	10000	10000	2000	1600	400
June	11000	7000	2200	1650	450
July	12000	7000	2300	1650	400
August	13000	6000	2300	1700	450
September	14000	6000	2400	1750	450
October	15000	8000	2400	1800	500

i) Cash balance on 1st May was ₹5000.

ii) A new machine is to be installed at ₹15000 on credit to be repaid by two equal installment in July and August.

iii) Sales commission at 2.5% on total sales is to be paid within the month following actual sales.

iv) ₹5000 being the amount of second call may be received in July, share premium amounting to ₹1000 is also obtainable with second call.

v) Period of credit allowed by suppliers is to be 2 months.

vi) Period of credit allowed to customers is to be one month.

vii) Delay in payment of overheads is one month.

viii) Delay in payment of wages is 15 days (i.e. ½ month)

ix) Assume cash sales to be 50% of total sales.

8) Prepare cash budget of a company for April, May and June 2015 in a columnar form using the following information.

Month (2015)	Sales	Purchases	Wages	Expenses
January (Actual)	160000	90000	40000	10000
February (Actual)	160000	80000	36000	12000
March (Actual)	150000	84000	44000	12000
April (Budgeted)	180000	100000	48000	12000
May (Budgeted)	170000	90000	40000	12000
June (Budgeted)	160000	70000	36000	10000

You are further informed that :

a) 10% of the purchases and 20% of the sales are for cash.

b) The average collection period of the company is ½ month and the credit purchases are paid off regularly one month.

c) Wages are paid half monthly and rent of ₹1000 is paid monthly.

d) Cash and Bank Balance as on 1st April is ₹30000 and the company wants to keep it on the end of every month of this figure, the excess cash being put in fixed deposits.

❖❖❖❖

8

VARIANCE ANALYSIS STANDARD COSTING

Unit Structure :

8.1 INTRODUCTION

In corporate sector, there is a separation of ownership from management. The owners do not manage the business and the managers are not the owners. Even in non-corporate sector, with gigantic business affairs, it is almost impossible for the owners to manage the business themselves.

Accordingly, owners are compelled to delegate authority to the managers. Since the managers have no proprietary interest in the business, it is quite possible that they may tend to be inefficient and a bit careless and because of this, the sales may come down, cost and rejection may increase resulting thereby in substantial loss or profit.

For this reason, the owners full and rightly so, that the performance of various managers should be subjected to some degrees of stringent control. There is a need to follow carrot and stick approach.

Control always presupposes some yard stick or standard. Accordingly, well before the period commences, detailed standards are laid down for various managers. These standards clearly show what is expected of the concerned managers. For example, in respect of sales, we lay down for sales manager, the types of products to be sold, the quantity of each of them to be sold and the price to be charged. At the end of the relevant period the actual results are compared with the expected ones (the standards) and the difference known as variance is analysed to throw light on the precise factors responsible for the variation. As far as the

examination is concerned, this is the end. in real life, further investigation is undertaken, if the variance amount is varied significant and corrective actions are taken so as to prevent adverse past from repeating itself in future.

8.2 DEFINITION OF STANDARD COSTING

According to ICWA standard costing is defined as “the preparation of standard costs and applying them to measure the variance of actual costs from standard cost and analysing the causes of variations with a view to maintain maximum efficiency in production.”

It is nothing but the difference between the standard and actual costing.

According to ICWA standard cost is defined as “a pre-determined cost based on a technical estimate for material, labour and overheads for a selected period of time and for a prescribed set of working conditions.

Use of Standard Costing :

1) Analysis of variance is useful for cost control, cost reduction and increase of profitability. The wastage is checked and inefficiency does not go undetected.
2) The standard provide incentive and motivation to work, as every workman tries to achieve the standard set for him. This helps in the increase the efficiency and productivity.
3) Cost information is kept ready under this system. The promptness of cost information helps in various other fields of costing, e.g. fixation of selling prices, valuation of work in progress and so on.
4) The principle of ‘management by exception’ is facilitated in application by the variance analysis and reporting. The top level management feels interested in going through the causes of variances only to know the weak points for corrective action.
5) It also helps in budgetary control and in decision making.

From the above it is very much cleat that, standard costing system involves the following steps or procedure :

i) Preparation and use of standard costs
ii) Comparison of standard costs with Actual costs and
iii) Analysis of variances as to their causes.

8.3 TYPES OF STANDARDS

Standard means a predetermined specification. The specification of standards is determined in cost of quantity as well as price. Therefore the two basis types of standards -
- Quantity Standard &
- Price Standard

To produce a particular product raw material is required as well as consider the rate of raw material is also essential.

Total Standard Cost :

The total standard cost is made up of -

- Standard Direct Material Cost
- Standard Direct Labour Cost
- Standard Overheads (Fixed & Variable)

Standard Direct Material Cost -

Quantity standard are fixed by production engineers. Standard are fixed of the quantity of input required for obtaiing a unit of output.

For example A production engineer may determine that 150 units of raw material are required to produced 130 units of output. This automatically determine the standard waste or scrap. The standard Quantity for a given actual output is calculated as under -

$$Standard\ Quantity\ (SQ)\ for\ Actual\ Output = \frac{Standard\ Input}{Standard\ Output} \times Actual\ Output$$

Standard Direct Labour Cost :

Standard Direct Labour Cost means fixing the standard time and also the standard Rate of wages.

Standard Time - It means the time expected to be required for the workers to complete a job or to produce one unit of output.
Standard wages of all worker are determined by the accounts manager with the co-operation of the personal manager. The standard wages may be fixed on the basis of historical data or expected rates of wages.
Standard Hours - (SH) - A hypothetical hour which represents the amount of work which should be performed in one hour under standard condition according to CIMA.

$$Standard\ Hours\ (SH)\ for\ Actual\ Output = \frac{Standard\ Hours}{Standard\ Output} \times Actual\ Output$$

Standard Overheads - Standard Overheads means the standard Rate for Absorption of overheads. It may be for per unit or per hour, depending upon the method of absorption.

Therefore,

$$Standard\ Overhead\ Rate\,(Per\ hour) = \frac{Budgeted\ Overheads\,(BO)}{Budgeted\ Hours\,(BH)}$$

$$Standard\ Overhead\ Rate\,(Per\ Unit) = \frac{Budgeted\ Overhead\,(BO)}{Budgeted\ Quantity\ of\ Output\,(BQ)}$$

The above formula also can be used to calculate separately, the standard fixed overheads and variable overheads.

8.4 VARIANCE ANALYSIS

Variance represents the difference between Actual cost and Standard cost. If actual cost (AC) is less than (SC) standard cost, this sign of efficiency and the difference is termed as “favourable” variance (F). IF the AC is more than SC this is sign of inefficiency and the difference is turned as “unfvourable” variance (A) / adverse.

They need not necessarily be good or bad from the point of view of firm. Such a qualitative evaluation can be made only after the underlying cause of the variance has been determined.

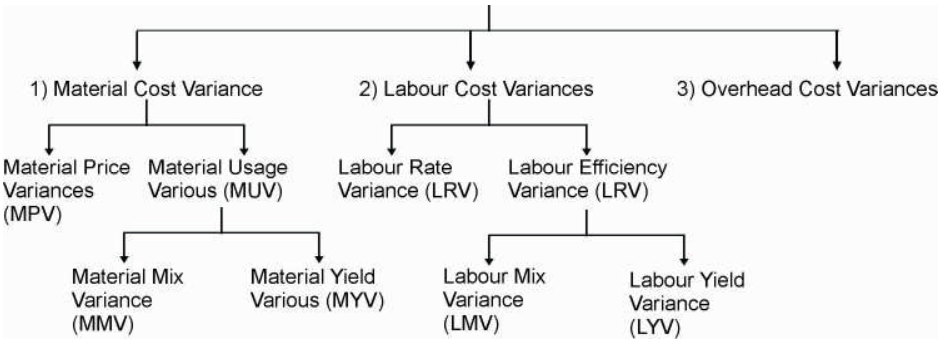
Variance as a control device, are calculated to assign responsibility for deviations from the standard cost and thus, to control the cost. For the purpose of control, variances are classified as controllable and uncontrollable cost variances.

If a variance can be traced with the responsibility of a particular individual, it is said be a controllable variance. If variance stems from causes beyond the control of responsible individual, it is said to be uncontrollable.

The three elements of the costs of such enterprises.

i) Material variances
ii) Labour variances
iii) Ovherhead Variances

Cost variances



8.4.1 Material Variances :

1) Material Cost Variances (MCV) -

Material Cost variances is the difference between the standard cost of materials that should have been incurred in manufacturing the actual output and the cost of materials that has been actually incurred. It is nothing but the difference between the standard cost of material specified for the output achieved and the Actual Cost of direct material used.

$$MCV = Standard\ Cost\ for\ Standard\ Quantity - Actual\ cost\ for\ Actual\ Quantity$$
$$= (SQ \times SP) - (AQ \times AP)$$

Where, SQ = Standard Quantity
SP = Standard Price
AQ = Actual Quantity
AP = Actual Price

MCV is favourable when the actual cost is less than the standard cost and vice-versa.

It is further dividend into

a) Material Price Variance (MPV)
b) Material Usage Variance (MUV)

2) Material Price Variance (MPV) -

Material Price Variance is that portion of material cost variance which is due to the difference between the standard price specified for the Actual Output and the actual price paid. MPV will occur when then the actual price paid for the purchase of materials is different from the standard price.

$$MPV = (Standard\ Price - Actual\ Price) \times Actual\ Quantity$$
$$= (SP - AP) \times AQ$$

Where,

SP = Standard Price

AP = Actual Price
AQ = Actual Quantity

When actual price exceeds standard price, the variance is unfavourable, and the standard price is greater than the actual price then MPV is favourable.

3) Material Usage Variance (MUV) :

Material usage variance is that portion of material cost variance, which is due to the difference between the standard quantity specified for the actual output and the actual quantity used for actual output.

It is the second component of MCV it measures how well the material are utilised in production. This variance occurs when actual usage of material differ from standard usage.

$$MUV = \left(Standard\ Quantity - Actual\ Quantity\right) \times Standard\ Price$$
$$= \left(SQ - AQ\right) \times SP$$

When the actual consumption of material is more than the standard quantity required for producing the actual output, then MUV is favourable and vice-versa.

4) Material Mix Variance (MMV) :

Material Mix Variance is that portion of material usage variance which is due to difference between the standard mixture specified for actual output and the Actual Mixture.

It is possible that a product may use more than one type of raw material or combination of materials. This combination is called as Material Mix. It is necessary to compute standard mixture of each input for actual output known as Revised Standard Quantity (RQ).

Thus it is assumed that to Produced 'A' product material input x, y, z is required, then the revised quantity of input x is calculated as

$$Revised\ Quantity\ of\ x = \frac{Total\ Quantity\ of\ Actual\ Mix}{Total\ Quantity\ of\ Standard\ Mix} \times Standard\ Quantity\ of\ x$$

$$\therefore MMV = \left(Revised\ Quantity - Actual\ Quantity\right) \times Standard\ Price$$
$$= \left(RQ - AQ\right) \times SP$$

When the actual mix is less than the standard mix then MMV is favourable and when the actual mix is more than the standard mix than MMV is adverse.

5) Material Yield Variance (MYV) :

Material Yield Variane is that portion of material usage variance which is due to the difference between standard yield specified and the actual yield.

$$MYV = \left(Standard\ Quantity - Revised\ Quantity\right) \times Standard\ Price$$
$$= \left(SQ - RQ\right) \times SP$$

When the revised quantity is less than the standard quantity then MYV is favourable and when the revised quantity is more than the standard quantity then MYV is adverse. It shows the abnormal loss or abnormal gain arising in a process.

Verification :

$$MCV = MUV + MPV$$
$$MUV = MYV + MMV$$

8.4.2 Labour Variances :

1) Labour Cost Variances -

It is the second component of standard cost. Labour cost variance is the difference between the standard cost of labour specified for output achieved and the actual cost of direct labour used. It is calculated as

$$LCV = \left(SH \times SR\right) - \left(AH \times AR\right)$$

Where,
SH = Standard Hours
SR = Standard Rate
AH = Actual Hours
AR = Actual Rate

When the actual cost of labour is less than the standard cost then LCV is favourable and when the actual cost is more than the standard cost then LCV is adverse. This variance is caused by the variation in the efficiency of labour and wage rate. LCV is further divided in 2 points.

- Labour Efficiency Variance (LEV)
- Labour Rate Variance (LRV)

2) Labour Efficiency Variance (LEV) (Time Variance) :

LEV is that portion of LCV which is due to the difference between the standard hours specified for the actual output and the actual hours used for the production of actual output.

$$LEV = \left(Standard\ Hours - Actual\ Hours\right) \times Standard\ Rate$$
$$= \left(SH - AH\right) \times SR$$

When the actual hours is less than the standard hours then LEV is favourable and vice-versa. The labours are used for production purpose either it is of one kind or may be different kinds. If only one kind of labour is used and the variance show the difference then it is due to yield. On the other hand if different kinds of labour is used and the variance shows the difference due to the mix. Therefore labour efficiency variance is again divided into

- Labour Yield Variance
- Labour Mix Variance

3) Labour Rate Variance (LRV)

Labour Rate Variance is that portion of labour cost variance which is due to the difference between the standard rate specified for the actual output and the actual rate paid.

$$LRV = \left(Standard\ Rate - Actual\ Rate\right) \times Actual\ Hour$$
$$= \left(SR - AR\right) \times AH$$

When the actual rate is less than the standard rate then LRV is favourable and when the actual rate is more than the Standard Rate the LRV is adverse. LRV may be caused by several factors such as changes in basic wage rate, different method of wage payment, overtime and so on.

4) Labour Mix Variance (LMV) :

Labour Mix Variance is that portion of the Labour Efficiency Variance which due to the different between the Standard Mix Specified for the actual output and the Actual Mix. Mostly this variance is arises when two or more types of workers are used. It is necessary to compute the standard mix of each type of worker. Which is known as Revised Standard Hour, before calculating the actual variance.

It is assumed that to produce a material 3 types of labour are required A, B & C.

$$\therefore Revised\ Hours\ of\ A = \frac{Total\ Hours\ of\ Actual\ Mix}{Total\ Hours\ of\ Standard\ Mix} \times Standard\ Hours\ of\ A$$

$$LMV = \left(Revised\ Hours - Actual\ Hours\right) \times Standard\ Rate$$
$$= \left(RH - AH\right) \times SR$$

When the Actual Mix is less than the standard mix then the Labour Mix Variance is favourable and when the actual mix is more than the standard then Labour Mix Variance is adverse.

5) Labour Yield Variance (LYV) :

Labour Yield Variance is that portion of the Labour Efficiency Variance (LEV) which is due to the difference between the Standard Yield specified and the actual yield.

$$LYV = (Standard\ Hours - Revised\ Hours) \times Standard\ Rate$$

$$= (SH - RH) \times SR$$

When the revised hours are less than the standard hours then the LYV in favourable & when the revised hours are more than the standard hours then the LYV is adverse.

Verification :

LCV = LEV + LRV

LEV = LYV + LMV

8.4.3 Overhead Variances :

At the outset, it may be noted that unlike direct materials and labour, the manufacturing overhead is not entirely variable with the level of production. Therefore, standard costs for factory overheads are based upon budgets and not on standards.

Overheads means the total indirect costs. It is nothing but variation in absorption or recovery of overheads. i.e. under absorption or over absorption.

Overheads are absorbed on the basis of Standard Overhead Rate (SR) such rate may be calculated per hour

$$= \frac{Budgeted\ Overheads}{Budgeted\ Hours}$$

Standard Hours for Actual Output (SH) :

$$SH = \frac{Budgeted\ Hours}{Budgeted\ Output} \times Actual\ Output$$

$$Standard\ Overheads\ (SO) = SH \times SR$$

$$Recovered\ Overheads\ (RO) = AH \times SR$$

$$Budgeted\ Overheads\ (BO) = BH \times SR$$

$$Actual\ Overheads = AH \times AR$$

Standard Rate Per Unit :

$$Standard\ Quantity\ for\ Actual\ Hours = SQ$$

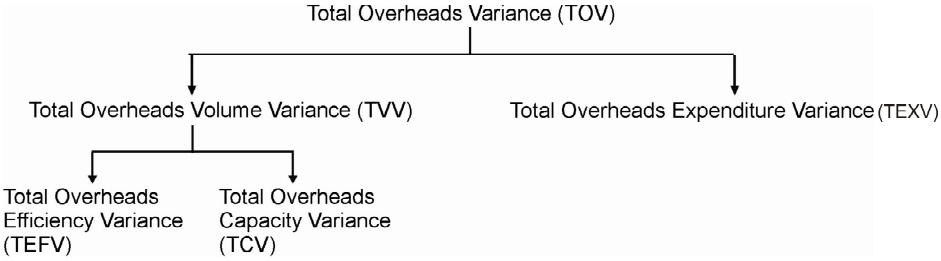
$$SQ = \frac{Budgeted\ Quantity}{Budgeted\ Hours} \times Actual\ Hours$$

$$Standard\ Overheads\ (SO) = SQ \times SR$$

$$Recovered\ Overheads\ (RO) = AQ \times SR$$

$$Actual\ Overheads = AO \times AR$$

Total Overheads Variance :



i) Total Overheads Variance (TOV) is the difference between the standard overheads specified for the output achieved and the Actual Overheads.

$$TOV = Standard\ Overheads\ for\ standard\ Hours - Actual\ Overheads\ for\ Actual\ Hours$$
$$(SH \times SR) - (AH \times AR)$$

When the actual overheads are less than the standard overheads then total overheads variance is favourable and when the actual overheads are more than the standard overheads then total overheads variance is adverse.

ii) Total Overheads Volume Variance (TVV) is the portion of total overheads variance due to difference between the standard volume of output and the budgeted volume of output.

$$TVV = (Standard\ Hours - Budgeted\ Hours) \times Standard\ Rate$$
$$= (SH - BH) \times SR$$

When the budgeted hours are less than the standard hours then the total overheads volume variance is favourable and vice-versa.

It is further divided into

1) Total Overheads Efficiency Variance (TEFV)
2) Total Overheads Capacity Variance (TCV)

iii) Total Overheads Expenditure Variance (TEXV) is the portion of total overheads variance due to the difference between the budgeted expenditure specified and the actual expenditure.

$$TEXV = Budgeted\ Overheads\ for\ Budgeted\ Hours - Actual\ Overheads\ for\ Actual\ Hours$$
$$= (BH \times SR) - (AH \times AR)$$

When the actual overheads are less than the budgeted overheads then total overheads expenditure variance is favourable and when the actual overheads are more than the budgeted overheads then the total overheads expenditure is adverse.

iv) Total Overheads Efficiency Variance (TEFV), is the portion of total overheads volume variance due to the difference between the standard volume of output specified and the actual volume of output.

$$TEFV = (Standard\ Hours - Actual\ Hours) \times Standard\ Rate$$
$$= (SH - AH) \times SR$$

When the actual hours are less than the standard hours than the total overheads efficiency variance is favourable and when the actual hours are more than the standard hours then the total overheads efficiency variance in adverse.

v) Total Overheads capacity variance (TCV) is the portion of total overheads volume variance due to the difference between the actual volume of output specified and the budgeted volume of output.

$$TCV = (Actual\ Hours - Budgeted\ Hours) \times Standard\ Rate$$
$$= (AH - BH) \times SR$$

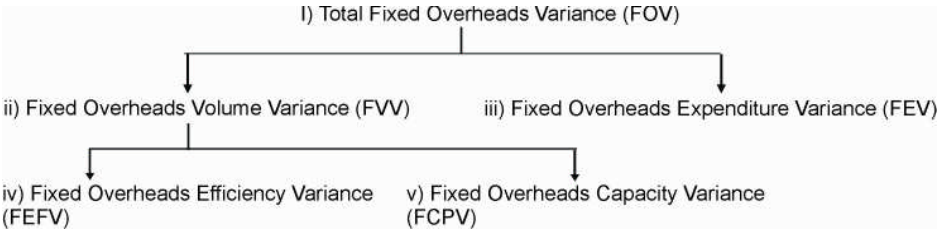
When the actual hours are less than the budgeted hours then the total overheads capacity variance is favourable and when the actual hours are more than the budgeted hours then the total overheads capacity variance is adverse.

Verification

TOV = TVV + TEXV

TVV = TEFV + TCV

8.4.4 Fixed Overheads Variances :



i) Total Fixed Overheads Variance (FOV) is difference between the standard Fixed Overheads specified for the output achieved and the actual fixed overheads.

$$FOV = \text{Standard Fixed Overheads for standard Hours - Actual Fixed Overheads for Actual Hours}$$
$$= (SH \times SR) - (AH \times AR)$$

When the actual overheads are less than the standard overheads then the fixed overheads variance is favourable and when the actual overheads are more than the standard overheads then the fixed overheads variance is adverse.

This variance is caused by the variations in the volume of actual production and the amount of fixed expenses actually incurred. Therefore, it is classified into -

- Volume Variance and
- Expenditure Variance

ii) Fixed Overheads volume variance (FVV) is the portion of the total fixed overheads variance due to the difference between the standard volume of output and the budgeted volume of output.

$$FVV = (\text{Standard Hours - Budgeted Hours}) \times \text{Standard Rate}$$
$$= (SH - BH) \times SR$$

When the budgeted hours are less than the standard hours then the Fixed Overheads variance is favourable and when the budgeted hours are more than the standard hours then the fixed overheads variance is adverse it is further divided into

- Fixed Overheads Efficiency Variance
- Fixed Overheads Capacity Variance

iii) Fixed Overheads Expenditure Variance - (FEV) - is the portion of total fixed overheads variance due to the difference between the budgeted expenditure specified and the actual expenditure.

$$FEXV = Budgeted\ Fixed\ Overheads\ for\ Budgeted\ Hours - Actual\ Fixed\ Overheads\ for\ Actual\ Hours$$
$$= (BH \times SR) - (AH \times AR)$$

When the actual fixed overheads are less than the budgeted fixed overheads then fixed overheads expenditure variance is favourable and vice versa.

iv) Fixed Overheads Efficiency variance (FEFV) is the portion of fixed overheads volume variance, due to the difference between the standard volume of output specified and the actual volume of output.

$$FEFV = (Standard\ Hours - Actual\ Hours) \times Standard\ Rate$$
$$= (SH - AH) \times SR$$

When the actual hours are less than the standard hours then the fixed overheads efficiency variance is favourable and when the actual hours are more than the standard hours then the fixed overheads efficiency variance is adverse.

v) Fixed overheads Capacity variance (FCPV) - is the portion of fixed overheads volume variance, due to the difference between the actual volume of output specified and the budgeted volume of output.

$$FCPV = (Actual\ Hours - Budgeted\ Hours) \times Standard\ Rate$$
$$= (AH - BH) \times SR$$

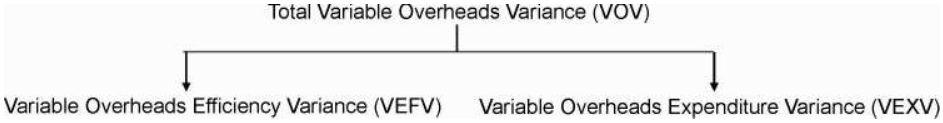
When the actual hours are less than the budgeted hours then the fixed overheads capacity variance is favourable and when the actual hours are more than the budgeted hours then the fixed overheads capacity variance is adverse.

Varification -

FOV = FVV + FEV

FVV = FEFV + FCPV

8.4.5 Variable Overheads Variances :



i) Total Variable Overheads Variances (VOV) is the difference between the standard variable overheads specified for the output achieved and the actual variable overheads.

$$VOV = Standard\ Variable\ Overheads\ for\ Standard\ Hours - Actual\ Variable\ Overheads\ for\ Actual\ Hours$$
$$= (SH \times SR) - (AH \times AR)$$

When the actual overheads are less than the standard overheads then the variable overheads variance is favourable and when the actual overheads are more than the standard overheads then the variable overheads variance is adverse it is further classified as -

- Efficiency Variance
- Expenditure Variance

ii) Variable Overheads Efficiency Variances (VEFV) - is the portion of the total variable overheads variance, due to the difference between the standard volume of output specified and the actual volume of output.

$$VEFV = (Standard\ Hours - Actual\ Hours) \times Standard\ Rate$$
$$= (SH - AH) \times SR$$

When the actual hours are less than the standard hours then variable overheads efficiency variance is favourable and when the actual hours are more than the standard hours then the variable overheads efficiency variance is adverse.

iii) Variable Overheads Expenditure Variance (VEXV) is the portion of variable overheads variance due to the difference between the recovered expenditure and the actual expenditure.

$$VEXV = (Standard\ Rate - Actual\ Rate) \times Actual\ Hours$$
$$= (SR - AR) \times AH$$

When the actual variable overheads are less than the recovered variable overheads then the variable overheads expenditure variance is favourable and when the actual variable overheads are more than the recovered variable overheads then the variable overheads expenditure variance is adverse.

Verification -

VOV = VEFV + VEXV

Illustration -
Material Variances -

Illustration No. 1 - From the following particulars in respect of a product ‘x’ in which raw materials ‘A’ and ‘B’ are used, calculate.

i) MCV, ii) MPV, iii) MUV, iv) MMV v) MYV

Material (Input)	Standard		Actual	
	Tons	Rate	Tons	Rate
A	120	10.00	140	9.50
B	80	7.50	60	9.00
	200		200	
Loss	20		18	
Net Production	180		182	

Solution :

$$SQ = Standard\ Quantity\ for\ Actual\ Output = \frac{Standard\ Input}{Standard\ Output} \times Actual\ Output$$

$$SQ\ for\ A = \frac{120}{180} \times 182 = 121.33$$

$$SQ\ for\ B = \frac{80}{180} \times 182 = 80.89$$

$$RQ = Revised\ Quantity\ for\ Material\ A = \frac{Total\ Quantity\ of\ Actual\ mix}{Total\ Quantity\ of\ Standard\ mix} \times Standard\ Quantity\ of\ A$$

$$RQ\ of\ A = \frac{200}{200} \times 120 = 120$$

$$RQ\ of\ B = \frac{200}{200} \times 80 = 80$$

	A	B
SQ =	121.33	80.89
SP =	10.00	7.50
AP =	9.50	9.00
AQ =	140	60
RQ =	120	80

$$MCV = (SQ \times SP) - (AQ \times AP)$$
$$A = (121.33 \times 10) - (140 \times 9.50)$$
$$= 1213.3 - 1330$$
$$= 116.70(A)$$
$$B = (80.89 \times 7.50) - (60 \times 9)$$
$$= 606.68 - 540$$
$$= 66.68(F)$$
$$MCV = A + B$$
$$= 116.70(A) + 66.68(F)$$
$$MCV = 50.02(A)$$

$$MPV = (SP - AP) \times AQ$$
$$A = (10 - 9.50) \times 140$$
$$= 0.50 \times 140$$
$$= 70(F)$$
$$B = (7.50 - 9.00) \times 60$$
$$= (1.50) \times 60$$
$$= 90(A)$$
$$MPV = A + B$$
$$= 70(F) + 90(A)$$
$$MPV = 20(A)$$

$$MUV = (SQ - AQ) \times SP$$
$$A = (121.33 - 140) \times 10$$
$$= (18.67) \times 10$$
$$= 186.7(A)$$
$$B = (80.89 - 60) \times 7.50$$
$$= 20.89 \times 7.50$$
$$= 156.68(F)$$
$$MUV = A + B$$
$$= 186.70(A) + 156.68(F)$$
$$MUV = 30.02(A)$$

$$MYV = (SQ - RQ) \times SP$$
$$A = (121.33 - 120) \times 10$$
$$= 1.33 \times 10$$
$$= 13.3(F)$$
$$B = (80.89 - 80) \times 7.50$$
$$= 0.89 \times 7.50$$
$$= 6.68(F)$$
$$MYV = A + B$$
$$= 13.3(F) + 6.68(F)$$
$$= 19.98(F)$$

$$MMV = (RQ - AQ) \times SP$$
$$A = (120 - 140) \times 10$$
$$= (20) \times 10$$
$$= 200(A)$$
$$B = (80 - 60) \times 7.50$$
$$= 20 \times 7.50$$
$$= 150(F)$$
$$MMV = A + B$$
$$= 200(A) + 150(F)$$
$$= 50(A)$$

Verification,

MCV = MPV + MUV

$$50.00(A) = 20(A) + 30.02(A)$$
$$50.02(A) = 50.02(A)$$

MUV = MYV + MMV

$$30.02(A) = 19.98(F) + 50(A)$$
$$30.02(A) = 30.02(A)$$

Illustration No. 2

The Standard Material cost for 100 Kgs of Chemical D is made up of :

Chemical A = 30Kg @ ₹4 per kg
Chemical B = 40Kg @ ₹5 per kg

Chemical C = 80Kg @ ₹6 per kg

A batch of 500kg of chemical D was produced from a mix of :

Chemical A = 140Kg at a cost of ₹588
Chemical B = 220Kg at a cost of ₹1056
Chemical C = 440Kg at a cost of ₹2860

How do the yield, mix and the price factor contribute to the variance in the actual cost per 100kg of chemical D over the standard cost?

Solution :

	A	B	C
SQ	30	40	80
SP	4	5	6
AQ	$28 = \frac{140}{500} \times 100$	44	88
AP	$4.2 = \frac{588}{140}$	4.8	6.50
RQ	32	42.67	85.33

Total Actual Mix = A + B + C
140+220+440
= 800

Total Standard Mix = A + B + C
30+40 +80
= 150

$\therefore$ Actual Mix is given for 500Kg
$\therefore$ Standard Mix is also taken for 500 Kg
$150 \times 5 = 750$

$$RQ \text{ of } A = \frac{\text{Total Quantity of Actual Mix}}{\text{Total Quantity of Standard Mix}} \times \text{Standard Quantity of } A$$

$$= \frac{800}{750} \times 30 = 32$$

$$RQ \text{ of } B = \frac{800}{750} \times 40 = 42.67$$

$$RQ \text{ of } C = \frac{800}{750} \times 80 = 85.33$$

$$MCV = (SQ \times SP) - (AQ \times AP)$$

$$\begin{aligned} A &= (30 \times 4) - (28 \times 4.20) \\ &= 120 - 117.60 \\ &= 2.40(F) \end{aligned}$$

$$\begin{aligned} B &= (40 \times 5) - (44 \times 4.80) \\ &= 200 - 211.20 \\ &= 11.2(A) \end{aligned}$$

$$\begin{aligned} C &= (80 \times 6) - (88 \times 6.50) \\ &= 480 - 572 \\ &= 92(A) \end{aligned}$$

$$\begin{aligned} MCV &= A + B + C \\ &= 2.40(F) + 11.2(A) + 92(A) \\ MCV &= 100.8(A) \end{aligned}$$

$$MPV = (Sp - AP) \times (AQ)$$

$$\begin{aligned} A &= (4 - 4.2) \times 28 \\ &= (0.20) \times 28 \\ &= 5.6(A) \end{aligned}$$

$$\begin{aligned} B &= (5 - 4.8) \times 44 \\ &= 0.20 \times 44 \\ &= 8.8(F) \end{aligned}$$

$$\begin{aligned} C &= (6 - 6.50) \times 88 \\ &= (0.50) \times 88 \\ &= 44(A) \end{aligned}$$

$$\begin{aligned} MPV &= A + B + C \\ &= 5.60(A) + 8.8(F) + 44(A) \\ &= 40.8(A) \end{aligned}$$

$$MUV = (SQ - AQ) \times SP$$

$$\begin{aligned} A &= (30 - 28) \times 4 \\ &= 2 \times 4 \\ &= 8(F) \end{aligned}$$

$$\begin{aligned} B &= (40 - 44) \times 5 \\ &= (4) \times 5 \\ &= 20(A) \end{aligned}$$

$$C = (80-88)\times 6$$
$$= (8)\times 6$$
$$= 48(A)$$
$$MUV = A+B+C$$
$$= 8(F)+20(A)+48(A)$$
$$= 60(A)$$

$$MYV = (SQ-RQ)\times SP$$
$$A = (30-32)\times 4$$
$$= (2)\times 4$$
$$= 8(A)$$
$$B = (40-42.67)\times 5$$
$$= (2.67)\times 5$$
$$= 13.35(A)$$
$$C = (80-85.33)\times 6$$
$$= (5.33)\times 6$$
$$= 31.98(A)$$
$$MYV = A+B+C$$
$$= 8(A)+13.35(A)+31.98(A)$$
$$= 53.33(A)$$

$$MMV = (RQ-AQ)\times SP$$
$$A = (32-28)\times 4$$
$$= (4)\times 4$$
$$= 16(F)$$
$$B = (42.67-44)\times 5$$
$$= (1.33)\times 5$$
$$= 6.65(A)$$
$$C = (85.33-88)\times 6$$
$$= (2.67)\times 6$$
$$= 16.02(A)$$
$$MMV = A+B+C$$
$$= 16(F)+6.65(A)+16.02(A)$$
$$= 6.67(A)$$

$$MCV = MPV + MUV$$
$$100.8(A) = 40.8(A) + 60(A)$$
$$100.8(A) = 100.8(A)$$

$$MUV = MYV + MMV$$
$$60(A) = 53.33(A) + 6.67(A)$$
$$60(A) = 60(A)$$

Solution No. 3 :

Sunflower chemical industries provide the following information from their records. For making 10Kg of CIMCO, Standard material requirement is :

Material	Quantity (Kg)	Rate Per Kg (₹)
A	8	6
B	4	4

During the year 2012, 1000 Kg of CIMCO were produced the actual consumption of material is as under

Material	Quantity (Kg)	Rate Per Kg (₹)
A	750	7
B	500	5

Calculate all material variances.

Solution :

Note : Standard is given for 10 KG & actual consumption is given for 1000 Kg

$\therefore$ for calculating RQ, standard converted into for 1000 Kg

Particulars	**A**	**B**
SQ	800	400
SP	6	4
AQ	750	500
AP	7	5
RQ	833	417

Standard Quantity for Actual Output SQ

$$SQ = \frac{Standard\ Input}{Standard\ Output} \times Actual\ Output$$

$$RQ = Revised\ Quantity\ \ for\ A = \frac{Actual\ mix}{Standard\ mix} \times Standard\ Quantity\ of\ \ A$$

$$A = \frac{1250}{1200} \times 800 = 833$$

$$B = \frac{1250}{1200} \times 400 = 417$$

$$Actual\ Mix = 750 + 500 = 1250$$

$$Standard\ Mix = 800 + 400 = 1200$$

$$MCV = (SQ \times SP) - (AQ \times AP)$$

$$\begin{aligned} A &= (800 \times 6) - (750 \times 7) \\ &= 4800 - 5250 \\ &= 450(A) \end{aligned}$$

$$\begin{aligned} B &= (400 \times 4) - (500 \times 5) \\ &= 1600 - 2500 \\ &= 900(A) \end{aligned}$$

$$\begin{aligned} MCV &= A + B \\ &= 450(A) + 900(A) = 1350(A) \end{aligned}$$

$$MPV = (SP - AP) \times AQ$$

$$\begin{aligned} A &= (6 - 7) \times 750 \\ &= (1) \times 750 \\ &= 750(A) \end{aligned}$$

$$\begin{aligned} B &= (4 - 5) \times 500 \\ &= (1) \times 500 \\ &= 500(A) \end{aligned}$$

$$\begin{aligned} MPV &= A + B \\ &= 750(A) + 500(A) \\ &= 1250(A) \end{aligned}$$

$$MUV = (SQ - AQ) \times SP$$
$$A = (800 - 750) \times 6$$
$$= 50 \times 6$$
$$= 300(F)$$
$$B = (400 - 500) \times 4$$
$$= (100) \times 4$$
$$= 400(A)$$
$$MUV = A + B$$
$$= 300(F) + 400(A)$$
$$= 100(A)$$

$$MYV = (SQ - RQ) \times SP$$
$$A = (800 - 833) \times 6$$
$$= (33) \times 6$$
$$= 198(A)$$
$$B = (400 - 417) \times 4$$
$$= (17) \times 4$$
$$= 68(A)$$
$$MYV = A + B$$
$$= 198(A) + 68(A)$$
$$= 266(A)$$

$$MMV = (RQ - AQ) \times SP$$
$$A = (833 - 750) \times 6$$
$$= 83 \times 6$$
$$= 498(F)$$
$$B = (417 - 500) \times 4$$
$$= (83) \times 4$$
$$= 332(A)$$
$$MMV = A + B$$
$$= 498(F) + 332(A)$$
$$= 166(F)$$

Verification :

$$MCV = MPV + MUV$$
$$1350(A) = 1250(A) + 100(A)$$
$$1350(A) = 1350(A)$$

$$MUV = MYV + MMV$$
$$100(A) = 266(A) + 166(F)$$
$$100(A) = 100(A)$$

Labour Variances :
Illustration No. 4

A gang of workers usually consists of 10 skilled, S semi-skilled and 5 unskilled labour in a factory. They are paid at standard hourly rates of ₹5.00, ₹3.20, and ₹2.80 respectively. In a normal working week of 40 hours, the gang is expected to produce 1000 units of output. in a certain week, the gang consisted of 13 skilled, 4 semi-skilled and 3 unskilled labour. Actual wages were paid at the rates of ₹4.80, ₹3.40 and ₹2.60 respectively. Two hours were lost due to abnormal idle time and 960 units of output were produced. You are required to calculate.

i) LCV, ii) LRV, iii) LEV, iv) LYV, v) LMV

Solution :

Standard is given for 1000 units of output and actual data is given for 960 units of output.

$$SH = Standard\ hours\ for\ Actual\ Output = \frac{Standard\ Hours}{Standard\ Output} \times Actual\ Output$$

$$RH = Revised\ Hours\ of\ skilled\ worker = \frac{Total\ Actual\ Hours}{Total\ Standard\ Hours} \times Standard\ Hours\ of\ skilled\ worker$$

	(A) Skilled	(B) Semi skilled	(C) un skilled
SH	$\frac{40}{100}\times 960\times 10=384$	$\frac{40}{100}\times 960\times 5=192$	192
SR	5	3.20	2.80
AH	$38\times 13=494$	$38\times 4=152$	$38\times 3=114$
AR	4.80	3.40	2.60
RH	$\frac{40}{40}\times(40\times 10)=400$	$\frac{40}{40}\times(40\times 5)=200$	$\frac{40}{40}\times(40\times 5)=200$

$$LCV=(SH\times SR)-(AH\times AR)$$

$$\begin{aligned}Skilled\ (A)&=(384\times 5)-(494\times 4.80)\\&=1920-2371.20\\&=451.20(A)\end{aligned}$$

$$\begin{aligned}Semi\ Skilled\ (B)&=(192\times 3.20)-(152\times 3.40)\\&=(614.40)-516.80\\&=97.60(F)\end{aligned}$$

$$\begin{aligned}Unskilled\ (C)&=(192\times 2.80)-(114\times 2.60)\\&=537.60-296.40\\&=241.20(F)\end{aligned}$$

$$\begin{aligned}LCV&=A+B+C\\&=451.20(A)+97.60(F)+241.20(F)\\&=112.40(A)\end{aligned}$$

$$LEV=(SH-AH)\times SR$$

$$\begin{aligned}A&=(384-494)\times 5\\&=(110)\times 5\\&=550(A)\end{aligned}$$

$$\begin{aligned}B&=(192-152)\times 3.2\\&=40\times 3.2\\&=128(F)\end{aligned}$$

$$\begin{aligned}C&=(192-114)\times 2.80\\&=78\times 2.80\\&=218.4(F)\end{aligned}$$

$$LEV = A + B + C$$
$$= 550(A) + 128(F) + 218.40(F)$$
$$= 203.60(A)$$

$$LRV = (SR - AR) \times AH$$
$$A = (5 - 4.80) \times 494$$
$$= 0.20 \times 494$$
$$= 98.80(F)$$
$$B = (3.20 - 3.40) \times 152$$
$$= (0.20) \times 152$$
$$= 30.40(A)$$
$$C = (2.80 - 2.60) \times 114$$
$$= 0.20 \times 114$$
$$= 22.8(F)$$
$$LRV = A + B + C$$
$$= 98.80(F) + 30.40(A) + 22.8(F)$$
$$= 91.20(F)$$

$$LYV = (SH - RH) \times SR$$
$$A = (384 - 400) \times 5$$
$$= (16) \times 5$$
$$= 80(A)$$
$$B = (192 - 200) \times 3.2$$
$$= (8) \times 3.2$$
$$= 25.6(A)$$
$$C = (192 - 200) \times 2.8$$
$$= (8) \times 2.8$$
$$= 22.4(A)$$
$$LYV = A + B + C$$
$$= 80(A) + 25.6(A) + 22.4(A)$$
$$= 128(A)$$

$$LMV = (RH - AH) \times SR$$

$$A = (400 - 494) \times 5$$

$$= (94) \times 5$$

$$= 470(A)$$

$$B = (200 - 152) \times 3.20$$

$$= 48 \times 3.20$$

$$= 153.60(F)$$

$$C = (200 - 114) \times 2.80$$

$$= 86 \times 2.80$$

$$= 240.8(F)$$

$$LMV = A + B + C$$

$$= 470(A) + 153.60(F) + 240.8(F)$$

$$= 75.6(A)$$

Verification :

$$LCV = LEV + LRV$$

$$112.40(A) = 203.60(A) + 91.20(F)$$

$$112.40(A) = 112.40(A)$$

$$LEV = LYV + LMV$$

$$203.60(A) = 128(A) + 75.6(A)$$

$$203.60(A) = 203.60(A)$$

Illustration No. 5

The following details are available from the records of xyz Co, engaged in manufacturing Article x for the month ended on April, 2014.

The standard labour hours and rates of payment were as follows :

Particulars	Hours	Per hour (SR)	Total
Skilled (A)	10	3	30
Semi - Skilled (B)	8	1.50	12
Unskilled (C)	16	1	16
			58

The actual production was 1000 articles ‘x’ for which the actual hours worked and rates are given below :

Particulars	Hours (AH)	Per hour (AR)	Total
Skilled (A)	9,000	4	36,000
Semi - Skilled (B)	8,400	1.50	12,600
Unskilled (C)	20,000	0.90	18,000
	37,400		66,600

Solution :

Standard given for a single product and actual data given for 1000 articles.

$\therefore$ Standard also take for 1000 articles

$$SH = Standard\ Hours\ for\ Actual\ Output = \frac{Actual\ Output}{Standard\ Output} \times Standard\ Hours$$

$$A = \frac{1000}{1} \times 10 = 10000$$

$$B = \frac{1000}{1} \times 8 = 8000$$

$$C = \frac{1000}{1} \times 16 = \underline{16000}$$

$$\underline{34,000}$$

$$RH = Revised\ Standard\ hours\ for\ labour\ A = \frac{Actual\ Mix}{Standard\ Mix} \times SH\ of\ A$$

$$Standard\ Mix = 10 + 8 + 16 = 34$$

Production 1000 units

$$\therefore Standard\ Mix = 34 \times 1000 = 34000$$

$$Actual\ Mix = 37400$$

$$\therefore RH\ of\ A = \frac{37400}{34000} \times 10000 = 11000$$

$$RH\ of\ B = \frac{37400}{34000} \times 8000 = 8800$$

$$RH\ of\ C = \frac{37400}{34000} \times 16000 = 17600$$

$$LCV = (SH \times SR) - (AH \times AR)$$

$$A = (10000 \times 3) - (9000 \times 4)$$
$$= 30000 - 36000$$
$$= 6000(A)$$

$$B = (8000 \times 1.50) - (8400 \times 1.50)$$
$$= 12000 - 12600$$
$$= 600(A)$$

$$C = (16000 \times 1) - (20000 \times 0.90)$$
$$= 16000 - 18000$$
$$= 2000(A)$$

$$LCV = A + B + C$$
$$= 6000(A) + 600(A) + 2000(A)$$
$$= 8600(A)$$

$$LEV = (SH - AH) \times SR$$

$$A = (10000 - 9000) \times 3$$
$$= 1000 \times 3$$
$$= 3000(F)$$

$$B = (8000 - 8400) \times 1.50$$
$$= (400) \times 1.50$$
$$= 600(A)$$

$$C = (16000 - 20000) \times 1$$
$$= (4000) \times 1$$
$$= 4000(A)$$

$$LEV = A + B + C$$
$$= 3000(F) + 600(A) + 4000(A)$$
$$= 1600(A)$$

$$LRV = (SR - AR) \times AH$$
$$A = (3 - 4) \times 9000$$
$$= (1) \times 9000$$
$$= 9000(A)$$
$$B = (1.50 - 1.50) \times 8400$$
$$= 0 \times 8400$$
$$= NIL$$
$$C = (1 - 0.90) \times 20000$$
$$= 0.10 \times 20000$$
$$= 2000(F)$$
$$LRV = A + B + C$$
$$= 9000(A) + NIL + 2000(F)$$
$$= 7000(A)$$

$$LYV = (SH - RH) \times SR$$
$$A = (10000 - 11000) \times 3$$
$$= (1000) \times 3$$
$$= 3000(A)$$
$$B = (8000 - 8800) \times 1.50$$
$$= (800) \times 1.50$$
$$= 1200(A)$$
$$C = (16000 - 17600) \times 1$$
$$= (1600) \times 1$$
$$= 1600(A)$$
$$LYV = A + B + C$$
$$= 3000(A) + 1200(A) + 1600(A)$$
$$= 5800(A)$$

$$LMV = (RH - AH) \times SR$$

$$A = (11000 - 9000) \times 3$$
$$= 2000 \times 3$$
$$= 6000(F)$$

$$B = (8800 - 8400) \times 1.50$$
$$= 400 \times 1.50$$
$$= 600(F)$$

$$C = (17600 - 20000) \times 1$$
$$= 2400(A) \times 1$$
$$= 2400(A)$$

$$LMV = A + B + C$$
$$= 6000(F) + 600(F) + 2400(A)$$
$$= 4200(F)$$

Verification :

$$LCV = LEV + LRV$$
$$8600(A) = 1600(A) + 7000(A)$$
$$8600(A) = 8600(A)$$
$$LEV = LYV + LMV$$
$$1600(A) = 5800(A) + 4200(F)$$
$$1600(A) = 1600(A)$$

Both Material & Labour Variances

Illustration No. 6 :

The Standard Cost of a product Material Cost 2Kg @ ₹2.50 each ₹5 per unit Wages : 2 hours @ ₹1.00 each ₹2.00 per unit. The actual which have emerged from business operations are as follows :

Production 8000 units
Material Consumed 16500 Kg @ ₹2.40 each ₹39,600.
Wages paid 18000 hours @ ₹1.20 each ₹21600.

You are required to compute material and labour Variances.

Solution :

Note : Standard is given for a product & the actual data is given for 8000 units. So the standard is also converted into 8000 units of production.

SQ = 2Kg per unit × 8000 = 16000 Kgs

SR / SP = 2Kgs ₹5 per unit : $\frac{5}{2} = 2.5$

AQ = 16500

AP = 2.40

SH = 2 hours per unit × 8000 = 16000 hours

$$SR = \frac{2\ hours}{2\ per\ unit} = 1$$

$$AH = 18000$$

$$AR = 1.20$$

$$\begin{aligned} MCV &= (SQ \times SP) - (AQ \times AP) \\ &= (16000 \times 2.5) - (16500 \times 2.40) \\ &= 40000 - 39600 \\ &= 400(F) \end{aligned}$$

$$\begin{aligned} MPV &= (SP - AP) \times AQ \\ &= (2.5 - 2.40) \times 16500 \\ &= 0.10 \times 16500 \\ &= 1650(F) \end{aligned}$$

$$\begin{aligned} MUV &= (SQ - AQ) \times SP \\ &= (16000 - 16500) \times 2.5 \\ &= (500) \times 2.5 \\ &= 1250(A) \end{aligned}$$

$$MCV = MPV + MUV$$

$$400(F) = 1650(F) + 1250(A)$$

$$400(F) = 400(F)$$

$$\begin{aligned} LCV &= (SH \times SR) - (AH \times AR) \\ &= (16000 \times 1) - (18000 \times 1.20) \\ &= 16000 - 21600 \\ &= 5600(A) \end{aligned}$$

$$\begin{aligned} LEV &= (SH - AH) \times SR \\ &= (16000 - 18000) \times 1 \\ &= (2000) \times 1 \\ &= 2000(A) \end{aligned}$$

$$LRV = (SR - AR) \times AH$$
$$= (1 - 1.20) \times 18000$$
$$= (0.20) \times 18000$$
$$= 3600(A)$$

$$LCV = LEV + LRV$$
$$5600(A) = 2000(A) + 3600(A)$$
$$5600(A) = 5600(A)$$

Illustration No. 7 :

The following details relating to a product available to you.

Material 50Kg @ 40 per Kg
Labour 400 hours @ ₹1 per hour
Actual Cost
Material 4900 Kg @ 42 per Kg
Labour 39600 hours @ ₹1 per hour
Actual Production 100 units
Calculate all material and labour variances

Solution :

Standard is given for a product and actual is given for 100 units.

Material - SQ = 50 × 100 = 5000
SR = 40
AQ = 4900
AR = 42
Labour - SH = 400 × 100 = 40000
SR = 1
AH = 39600
AR = 1

$$MCV = (SQ \times SP) - (AQ \times AP)$$
$$= (5000 \times 40) - (4900 \times 42)$$
$$= 200000 - 205800$$
$$= 5800(A)$$

$$MPV = (SP - AP) \times AQ$$
$$= (40 - 42) \times 4900$$
$$= (2) \times 4900$$
$$= 9800(A)$$
$$MUV = (SQ - AQ) \times SP$$
$$= (5000 - 4900) \times 40$$
$$= 100 \times 40$$
$$= 4000(F)$$

$$MCV = MPV + MUV$$
$$5800(A) = 9800(A) + 4000(F)$$
$$5800(A) = 5800(A)$$

$$LCV = (SH \times SR) - (AH \times AR)$$
$$= (40000 \times 1) - (39600 \times 1)$$
$$= 40000 - 39600$$
$$= 400(F)$$
$$LEV = (SH - AH) \times SR$$
$$= (40000 - 39600) \times 1$$
$$= 400 \times 1$$
$$= 400(F)$$
$$LRV = (SR - AR) \times AH$$
$$= (1 - 1) \times 39600$$
$$= 0 \times 39600$$
$$= NIL$$

$$LCV = LEV + LRV$$
$$400(F) = 400(F) + NIL$$
$$400(F) = 400(F)$$

Illustration No. 8 :

XYZ Ltd. operates an standard costing system. The budgeted overheads for the current year were fixed at ₹520000 with a predetermined overheads recovery rate of ₹8 per direct labour hour. The actual direct labour hours for the year amounted to 72000 against which only 71500 hours should haves been spent for the production completed during the year. The actual overhead rate worked out at ₹7.75 per direct labour hour. You are required to compute all possible overheads variances.

Solution :

$$\text{Standard Overheads } (SO) = SH \times SR$$
$$= 71500 \times 8 = 572000$$

$$\text{Recovered Overheads } (RO) = AH \times SR$$
$$= 72000 \times 8 = 576000$$

$$\text{Budgeted Overheads } (BO) = \frac{₹\ 520000}{8} = 65000\ (BH)$$

$$\text{Actual Overheads } (AO) = AH \times AR$$
$$= 72000 \times 7.75$$
$$= 558000$$

$$TOV = SO - AO$$
$$= 572000 - 558000 = 14000\ (F)$$
$$TVV = SO - BO$$
$$= 572000 - 5,20,000$$
$$= 52000\ (F)$$
$$TEV = BO - AO$$
$$= 520000 - 558000$$
$$= 38000\ (A)$$
$$TEFV = SO - RO$$
$$= 572000 - 576000$$
$$= 4000\ (A)$$
$$TCV = RO - BO$$
$$= 576000 - 520000$$
$$= 56000\ (F)$$

Verification :

$$TOV = TVV + TEV$$
$$14000\ (F) = 52000\ (F) + 38000\ (A)$$
$$14000\ (F) = 14000\ (F)$$
$$TVV = TEFV + TCV$$
$$52000\ (F) = 4000\ (A) + 56000\ (F)$$
$$52000\ (F) = 52000\ (F)$$

Illustration No. 9

Fixed Overheads Variance

From the following information, compute fixed overhead cost, Expenditure and Volume Variance : Normal Capacity is 10000 hours, Budgeted Fixed Overhead Rate is ₹20 per Standard Hour.

Actual level of capacity utilised is 8800 standard hours. Actual fixed overhead is ₹104000

Solution :

SH = 8800
Standard Overhead Rate (SR) = 20
Budgeted Hours (BH) = 10000
Actual Fixed Overhead (AFO) = 104000

$$FOV = (SH \times SR) - AFO$$
$$= (8800 \times 20) - 104000$$
$$= 176000 - 104000$$
$$= 72000(F)$$

Fixed Overheads Expenditure Variance

$$FDEV = (BH \times SR) - Actual\ FO$$
$$= (10000 \times 20) - 104000$$
$$= 200000 - 104000$$
$$= 96000(F)$$

Fixed Overheads Volume Variance (FVV)

$$= Standard\ FO - Budgeted\ FO$$
$$= (8800 \times 20) - (10000 \times 20)$$
$$= 176000 - 200000$$
$$= 24000(A)$$

Verification :

$$FOV = FOEV + FVV$$
$$72000(F) = 96000(F) + 24000(A)$$

Illustration No. 10
(Variable Overheads Variances)

The following data is given

Particulars	Budgeted	Actual
Production (in units)	4,000	3,600
Man hours to produce above	80,000	70,000
Variable Overheads (₹)	1,00,000	91,500

The standard time to produce one unit of the product is 200 hours.

Calculate variable overheads variances.

Solution :

$$SH = Standard\ Hours\ for\ Actual\ Production$$
$$= 200 \times 3600 = 72000$$
$$SR = \frac{Budgeted\ Overheads}{Budgeted\ Hours} = \frac{100000}{80000} = 1.25\ Per\ Hour$$
$$AR = \frac{Actual\ Overheads}{Actual\ Hours} = \frac{91,500}{70,000} = 1.307\ Per\ Hour$$
$$AH = 70000$$

Variable Overhead Variance (VOV)

$$= (SH \times SR) - (AH \times AR)$$
$$= (72000 \times 1.25) - (70000 \times 1.307)$$
$$= 90000 - 91500$$
$$= 1500\,(A)$$

Variable Overhead Efficiency Variance (VEFV)

$$= (SH - AH) \times SR$$
$$= (72000 - 70000) \times 1.25$$
$$= 2000 \times 1.25$$
$$= 2500\,(F)$$

Variable Overhead Expenditure Variance (VEXV)

$$= (SR - AR) \times AH$$
$$= (1.25 - 1.307) \times 70000$$
$$= (0.057) \times 70000$$
$$= 4000\,(A)$$

Verification

$VOV = VEFV + VEXV$

$1500(A) = 2500(F) + 4000(A)$

$1500(A) = 1500(A)$

8.5 ADVANTAGES OF STANDARD COSTING

The following are the advantages of Standard Costing -

1) Analysis of variance is useful for cost control, Cost reduction and increase of profitability.
2) The standard provide incentive and motivation to work, as every workman tries to achieve the standard set for him; which helps in the increase of efficiency and productivity.
3) Cost information is kept ready under this system. The promptness of cost information helps in various other fields of costing e.g. fixation of selling prices, valuation of work in progress, etc.
4) It helps in budgetary control and in decision making.
5) On account of valuation of opening and closing stock of the standard price, the profits are balanced and the Profit & Loss A/c can be prepared at easy intervals if required.

8.6 LIMITATION / DISADVANTAGES OF STANDARD COSTING

1) Setting up standard is a difficult task. Establishment of current standard is all more difficult something which is a standard for Mr. A may not be a standard for Mr. B.
2) Standard, once set are not changed for a considerable period. This make the standard rigid and un-realistic in certain industries which face fluctuations in product pricing due to frequent changes in the price of material and labour. Revision of standards is not easy and the revision costs high.
3) Standards set low are ridiculed at, and standards set high cause frustration and disbelief in the minds of workers.
4) This method of costing is hardly used by small manufactures who constitute a majority group among businessmen.
5) When production takes more than one accounting period. It is very difficult to apply this method.

8.7 DISTINGUISH BETWEEN STANDARD COSTING & BUDGETARY CONTROL :

	Standard Costing	Budgetary Control
1.	It involves estimation of costs of products and services. Its scope is limited to costs only.	It is concerned with all functional areas of the business and it also includes estimation of revenue as well as income. It covers all the areas or activities such as production, sales, purchases, research & development and so on.
2.	Control is exercised by comparing actual costs with standard costs of actual output	Control is exercised by comparing Actual with budgeted figures.
3.	It is more intensive in nature with its focus on costs.	It is more extensive in nature with its focus on entire business
4.	Standard costing is a projection of cost accounts	It is a projection of financial accounts.
5.	It requires standardization of production	It does not involve standardization of products.
6.	In standard costing both positive and negative variances are considered	Budgets concentrate only on negative variances, i.e. when actual costs are more than budgeted.

I) Theory Question :

1) Distinguish between Standard Costing & Budgetary Control.
2) What are the advantages and disadvantages of Standard Costing?
3) What is standard costing? Explain in short importance of standard costing.
4) Explain in detail material variances.
5) Write short note on material cost variances.
6) Write a note on Labour variances.
7) What is Standard Costing? Explain in details the types of standards.
8) Write a note on Standard hours.

9) What are the limitations of Standard Costing?

10) Explain in details overheads variances.

11) What is the difference between variable overheads variances and fixed overheads variances?

II) Multiple Choice Questions :

1) The Standard which can be attained under the most favourable conditions possible ----------.
   a) Ideal Standard b) Expected Standard
   c) Current Standard d) Normal Standard

2) A Standard which is established for use unaltered for an indefinite period is called ----------
   a) Current Standard b) Ideal Standard
   c) Basic Standard d) Expected Standards

3) The cost of product as determined under Standard Cost System is ----------.
   a) Fixed Cost b) Historical Cost
   c) Direct Cost d) Predetermined Cost

4) The amount of work achievable in an hour, at standard efficiency levels is ----------
   a) an ideal standard
   b) The direct labour usage per hour
   c) A standard hour
   d) The direct labour efficiency variance

5) While calculating variances from standards costs, the difference between the actual and the standard price multiplied by the actual quantity yields a ----------.
   a) Yield variance b) Volume variance
   c) Mix Variance d) Price variance

6) While evaluating deviations of actual cost from standard cost, the technique used is, ----------.
   a) Regression analysis b) Variance analysis
   c) Linear Progression d) Trend analysis

7) The labour cost variances may be expressed as ----------.
   a) Budgeted labour cost - Actual labour cost
   b) (Standard wage rate × Output achieved) - Actual wage cost
   c) (Standard hours - Actual hours) × Actual wage rate
   d) (Standard hours - Actual hours) × Standard wage rate

8) When the variance is due to the difference between actual overhead and applied overhead it is called ----------.
   a) Volume variance b) Total Overhead variance
   c) Spending Variance d) Efficiency variance

9) If the number of standard allowed hours equal the planned activity level of hours, then the fixed overheads volume variance is ----------.
   a) Zero
   b) Favrourable
   c) Unfavourable
   d) Equal to fixed overhead expenditure variance

10) The difference between budgeted fixed overhead costs and applied fixed overhead costs is known as
   a) Fixed overhead costs variances
   b) Fixed overheads expenditure variance
   c) Fixed overhead volume variance
   d) Fixed overhead efficiency variance

Ans. 1-a, 2-c, 3-d, 4-c, 5-d, 6-b, 7-b, 8-b, 9-a, 10-c.

III) State whether the following statements are True or False.

1) A basic standard is the standard which is "established for use over a short period of time."
2) A basic standard is the standard "which can be attained under the most favourbale conditions possible."
3) Material yield variance is equal to (Standard Quantity - Actual Quantity) × Standard Price
4) Material yield variance is further divided into a) material usage variance and b) material mix variance.
5) Revised Standard Quantity for each input is required to be computed for calculating material yield variance.
6) Labour cost variance is further divided into a) Labour yield variance and b) Labour Rate Variance.
7) Overhead variance is nothing but the variation in absorption or recovery of overheads.

Ans. True - 7
False - 1,2,3,4,5,6

Practical Problem :

1) Standard material for 100 Kg Chemical x is given below :

90 Kgs of material A at ₹8 per Kgs	₹720
80 Kgs of material B at ₹16 per Kgs	₹1280
50 Kgs of material C at ₹24 per Kgs.	₹1200
220	
(-) 20 Standard Loss	-
200	₹3200

Actual Production is 4000 units of Chemical x and actual material usage is as follows :

2000 Kgs of material A at ₹7.60 per Kgs	₹15200

1700 Kgs of material B at ₹16.80 per Kgs	₹28560
900 Kgs of material C at ₹26 per Kgs.	₹23400
	67160

Calculate all material variances.

2) A manufacturing company uses the following standard mix of their compound in one batch of 200 Kgs of its production line :

100 Kgs of material x at standard price of	₹2
60 Kgs of material y at standard price of	₹3
40 Kgs of material z at standard price of	₹4

The actual mix for a batch of 240 Kgs was as follows :

120 Kgs of material x at the price of	₹3
80 Kgs of material y at the price of	₹2.5
20 Kgs of material z at the price of	₹3

Calculate the different material variances.

3) The standard material required to manufacture one unit of product A is 5 Kgs and the standard price per kgs of material is ₹3.00. The cost accounts, records, however, reveal that 16000 Kgs, of material costing ₹52000 were used for producing 3000 units of product A. Calculate the material variances.

4) Using the following information, calculate labour variances.
Gross direct wages ₹3000
Standard hours produced 1600
Standard rate per hour - ₹1.50
Actual hours paid 1500 hours out of which hours not worked. (Abnormal idle time) are 50.

5) From the following records of the SS Manufacturing Company you are required to compute material and labour variances.
Input - 200 Kg of material yields a standard output of 20000 unit standard price per Kg of Material ₹20
Actual quantity of material issued & used by production department 20000 Kg
Actual price per kg of material ₹21
Actual output 18,00,000 units
Number of Employees 400
Standard wage rate per employee per day ₹4
Standard daily output per employee per day 200 units
Total number of Days worked 50 days
Idle time paid for and included in above half day.
Actual wage rate per day ₹4.50

6) The following details relating to a product are made available to you :

Standard cost per unit
Material 100 kg @ ₹20 per kg
Labour 800 hours @ ₹2 per hour
Actual Cost

Material 9800 Kgs @ ₹21 per kg
Labour 79200 hours @ ₹2 per hour
Actual production 200 units
You are required to calculate :

i) Material cost variance
ii) Material Price variance
iii) Material Usage variance
iv) Labour cost variance
v) Labour Rate Variance
vi) Labour Efficiency Variance

7) The following standards have been set to manufacture a product :

Direct Material
4 units of A at ₹4 per unit
6 units of B at ₹3 per unit
30 units of C at ₹1 per unit

Direct labour 3 hours @ ₹8 per hour.
Total standard Prime Cost.
Manisha Ltd. manufactured and sold 12000 units of the product during the year.
Direct material cost were as follows :
25000 units of A at ₹4.40 per unit
36000 units of B at ₹2.80 per unit
177000 units of C at ₹1.20 per unit

The company worked 17500 direct labour hours during the year. For 2500 of these hours, the company paid ₹12 per hour while for the remaining the wages were paid at the standard rate. Calculate all possible variances of material and labour.

8) Koran Chemical Co. gives you the following standard and actual data of Chemical Gem Co.

Standard Data

4500 Kg of Material A @ ₹2 per kg		- 9000
3600 Kg of Material B @ ₹1 per kg		- 3600
8100		12600
24000 skilled hours @ ₹2.10	50400	
12000 unskilled hours @ ₹1.2	14400	64800
900 Normal loss		
7200		77400

Actual Data

4500 Kgs of Material A @ ₹1.90 per Kgs.	8550
3600 Kgs of Material B @ ₹1.1 per Kgs	3960
8100	12510

24000 skilled hours @ ₹2.2	52800	
12000 unskilled hours @ ₹1.25	15000	67800
500 Actual Loss		
7600		80310

You are required to calculate :

i) Material cost variance
ii) Material price variance
iii) Material yield variance
iv) Material usage variance
v) Material mix variance
vi) Labour cost variance
viii)Labour rate variance
viii)Labour mix variance