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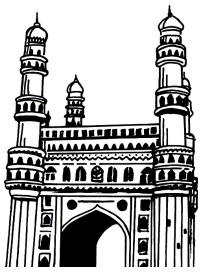

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UNIT I

Introduction to Management Accounting, Cost Analysis and Control: Management accounting Vs. Cost accounting vs. financial accounting, Role of accounting information in planning and control, Cost concepts and Managerial use of classification of costs. Cost analysis and control: Direct and Indirect expenses, allocation and apportionment of overheads, calculation of machine hour rate. An introduction to activity based costing.

1.1 ACCOUNTING

Accounting is an art of recording classifying, summarizing monetary transaction of a business concern in order to provide necessary information to various interested parties.

Accounting has three branches

1. Management Accounting
2. Cost Accounting
3. Financial Accounting

1.2 MANAGEMENT ACCOUNTING

Management accounting is one of the branches of accounting. It is the study of managerial aspects of accounting. It provides relevant information to management so that planning, organizing, directing, controlling and coordination of business operations can be done in an effective manner.

Definition

1. **According to, "The institute of chartered accountants of India**", management accounting is defined as "techniques and procedures by which accounting mainly seeks to aid the management collectively have came to known as management accounting".
2. **According to "American Accounting Association",** Management accounting includes the methods and concepts necessary for effective planning for choosing among alternative business actions and for control through the evolution and interpretation of performances".
3. **The national association of accountants (U.S.A),** in statement no.1 a (statement on management accounting, 1982), has defined management accounting as" the process of identification, measurement, accumulation, analysis,

preparation and communication of financial information used by management to plan, evaluate and control with in the organization and to assure appropriate use of accountability for its resources".

4. **The C.I.M.A (U.K) defines the term management as follows:** "Management accounting is an integral part of management concerned with identifying, presenting and interpreting information used for :

a) Formulating strategy

b) Planning and controlling activities

c) Decision making

d) Optimizing the use of resources

e) Disclosure to share holders and other external to the entity

f) Disclosure to employees

g) Safe guarding assets

1.2.1 Nature and Scope of management Accounting

The main functions of management accounting are to furnish accounting information to the management for taking decisions. Management accounting is always concerned with collections, analysis, and communication of accounting information. Like all other sciences management accounting is partly a science and partly an art. The scope of management accounting is very wide. It includes a variety of aspects of business operations.

The following areas of knowledge that falls with in the preview of management accounting are as follows :

a) Financial accounting

b) Cost accounting

c) Cost control procedures

d) Budgetary control

e) Internal audit

f) Inventory control

g) Office services

h) Tax accounting

i) Statistical methods and procedures

The scope of a management accounting is not limited to the presentation of information to the management. It covers the analysis and Interpretation of information presented to the management.

Cost accounting and management accounting both have the same objectives of helping the management in planning, control and decision-making. Both concepts use the common tools and techniques like standard costing, variable costing, budgetary control etc.

1.2.2 Objectives of Management Accounting

The main function of management accounting is to provide the relevant information to the management from time to time to help in achieving the organization goals i.e., maximizing the profits and minimizing the loss. The following are the important objectives of management accounting :

1. Formulating the Plans and Policies

Planning is one of the important functions of Management. Planning is essentially related to future. It includes forecasting, setting goals and deciding alternate course of actions and deciding on the programs of activities to be undertaken. Management Accounting, by providing past information based on results, helps in planning and forecasting of production, sales, cash inflows and outflows.

2. Helps in Organizing

The process of organizing involves dividing the whole enterprise into departments, divisions, units and entrusting the staff with their clear-cut operations. Management Accounting is concerned with the establishment of cost centers, budget centers, and profit centers with a view to control costs and responsibilities.

3. Helps in Interpretation of Financial Information

Management accounting presents the financial information to the management in such a way that it is easily understood. Even it helps in presenting the technical data in a simple language. If necessary it uses charts, diagrams, Index numbers etc.

4. Reporting

It helps the management in taking timely decisions. The management accountant informs the financial position to the management from time to time through reports.

5. Motivating the Employees

By fixing targets to be achieved and providing the incentives, the management accounting motivates the employees to put in their best.

6. Helpful in Decision Making

During the course of business, management has to take certain important decisions like replace of labour with machines or introduction of latest technology, expansion or diversification of production etc. Management Accountant prepares a report on the feasibility of various alternatives and makes assessment of their financial implications. This information helps the management in taking correct decision in correct time.

7. Helps in Controlling

Management accounting devices like standard costing and budgetary control are helpful in controlling performance. When actual performance is compared with predetermined objectives the management is able to find out the deviations and take necessary corrective measures.

8. Helpful in Coordination

Management accounting helps the management by providing various tools to coordinate various departments/ sections. This can be done through functional budgeting.

9. Helpful in Tax Administration

Management accounting helps in assessing various tax liabilities and depositing the correct amount of taxes with the authorities concerned.

1.2.3 Functions of Management Accounting.

The basic function of management accounting is to assist the management in performing its functions an orderly manner efficiently and effectively. The emphasis of Management Accounting is to redesign accounting in such a way that it is helpful to the management in decision making process.

The manner in which Management Accounting satisfies the various needs of management for arriving at appropriate business decision may be described as follows :

1. Modification of Data

Management accounting modifies the accounting data presented in financial data in such a way which is more suitable and highly useful to management. This modified data is highly useful to the management in planning various activities.

2. Financial Analysis and Interpretation

Management accounting helps in interpreting the financial data presented in the financial statements in simplified way and presents in nontechnical manner with comments and suggestions. The management accountant analyse the financial

data, and presents to the management with his suggestions, and comments on various alternatives. Then it is easy for the management to take decisions.

3. Planning and forecasting

Planning and forecasting are essential for achieving the desired business activities. Management accounting by providing necessary information assist the management in forecasting. Management accountant with the help of various statistical techniques such as probability, correlation and regression, marginal costing, funds flow statements etc., prepare plans and forecasting.

4. Communication

In business concern different levels of management needs different types of information. The management accountant by preparing various reports, establish communication with in the organisation and also with the outside world.

5. Managerial Control

Helps the management to assess the performance of every one in organization. All this is done with the help of standard costing and budgetary control which are a part and parcel of management accounting.

6. Use of Non-Monetary Information

Management accounting does not restrict itself merely to financial data for helping the management in decision making process, but also considers nonmonetary information. Such information may be collected from case studies, minutes of meeting, engineering records, surveys etc.

7. Strategic Decision Making

Very frequently, the management has to take strategic decision such as make or buy decisions, replacing the old machinery with latest one, temporary shut down of business, decision to enter in new market etc. Management accounting come to the rescue of management by providing financial, technical, and statistical data in detail to enable it to take a decisions.

8. Coordination

Management accountant by acting as coordinator among various departments through budgeting and financial reports, and work to achieve coordination.

9. Staff Education

Management accounting educates the staff working in the concern in respect of technique used, their purpose and their benefits.

1.2.4 Importance of Management Accounting

In the present highly competitive and complex industrial world, Management Accounting has become an integral part of management. It guides the management at every step and meets the information needs of various levels of management. Management Accounting improves the efficiency of management in all aspects. It may be summarized as follows:

1. Proper Planning

Management accounting helps the management to plan various business operations by providing accounting information. The management formulates policies, programs and strategies with the help of accounting information. It helps to develop effective internal control and audit system. Efficient planning and effective organisation brings systematic regularity in business activities.

2. Increase Efficiency

Management accounting encourages efficiency in business operations. The targets of different departments are fixed in advance and achievement of targets forms a yardstick for measuring their efficiency.

3. Measurement of Performance

The system of budgetary control and standard costing enable the measurement of performance. In standard costing, standards are determine in advanced and then the actual cost is compared with the standard cost. It helps the management to know the deviations if nay between standard cost and actual cost. The performance will be good if the actual cost does not exceed the standard cost.

4. Maximum Profitability

The use of management accounting may control or even eliminate various types of wastage, production defectives etc. The various management techniques are used to control cost of production. The reduction in cost of production increases the sales volume, thereby maximum profits the concern.

5. Maximum return on Capital Employed

Management accounting through the process of planning, control and coordination helps the management in getting maximum returns on capital employed.

6. Good industrial Relations

Unacceptable standards, or sub-standards which are often responsible for unhealthy and had relations between management and labour can be removed by the use of Management Accounting, Industrial relations can thus be improved. It creates a good climate for further investments in the business concerns.

7. Services to Customers

The cost control devices employed in management accounting enable the reduction of prices. All employees in the concern are made cost conscious. Since, quality of goods is determined in advance the quality of products becomes good and hence the customers are provided quality goods at reasonable prices.

8. Effective Management Control

The tools and techniques of management accounting are helpful to management in planning, controlling and coordination of the activities of the concern. The techniques of budgetary control, standard control, standard costing and departmental operating statements greatly help in performing the controlling function. Setting up of determined standards and comparing the actual performance with predetermined standards at regular intervals enables the management to have management by exception.

9. Helps in Communication

Management accounting helps in communicating up to date information to various parties interested in the successful working of a business organisation.

1.2.5 Limitations of Management Accounting

Management Accounting also suffers from some limitations. Unless these limitations are taken into account while using Management Accounting system, the so called Management Accounting advantages cannot be availed. The following are the limitations :

1. Based on Accounting records

Management accounting derives information from financial accounting, cost accounting and other record. The accuracy of data and conclusions drawn from them depend to a large extent on the accuracy of basic records such as financial and cost records. In other words the merits and demerits of management accounting depend upon the merits and demerits of the basic records.

2. Persistent Efforts

The conclusion and decisions are drawn by the management accountant are not executed automatically. He has to convince the authorities at all levels. Thus, there is need for continuous and coordinated efforts of each management level to execute these decisions.

3. Wide Scope

The scope of management accounting is very wide and broad based and this creates many difficulties in the implementation process. It considers both monetary as well as nonmonetary factors. This brings a degree of inexactness and subjectivity in the conclusions obtained through it.

4. Costly Installation

The installation of management accounting system is a costly affair. It needs an elaborate organisation system and number of rules and regulations. Its use is only limited to the large concerns which can afford it.

5. Evolutionary Stage

Comparatively management accounting is a new discipline and is still very much in a state of evolution. The techniques and tools used by this system give varying and differing results. The conclusions drawn from analysis and interpretation are not the same.

6. Personal Bias

The interpretation and analysis of financial information depends upon the capacity or ability of interpreter (Management Accountant). The data must be carefully analysed and interpreted without involving personal judgements. But here is every likelihood that the analysis and interpretations are influenced by personal bias. Personal prejudices and bias affect the objectivity of decisions.

7. Psychological Resistance from Staff

The installation of management accounting involves basic change in organisational setup. It calls for a rearrangement of personal as well as their activities. New rules and regulations are also required to be framed which affect a number of people. Hence, there is a possibility of resistance from one quarter or other.

8. Not a Substitute to Management

Management accounting is a tool for management. It is not a substitute for management or administration. Ultimate decisions and corrective steps or measures are being taken by management and not by management accountant. So, management accounting has a supplementary service function and has no final say neither in taking decisions nor in their implementation.

9. Lack of Knowledge

The use of management accounting requires the knowledge of a number of related subjects such as Accountancy, Statistics, Management Science, Econometrics and Engineering etc. Management should be conversant with all the subjects. Deficiency in knowledge of any of these subjects limits the use of management accounting.

10. Lack of well Established Conventions

Management accounting is of recent origin. It is still in developing stage. It does not have well established conventions as other branches of accounting.

1.3 Cost Accounting

Cost Accounting : This term is of utmost importance for the top management of any business. Cost Accounting is basically the next step to costing. Cost accounting involves analyzing relevant costing data, interpret it and present various management problems to management. The scope of cost accounting involves preparation of various budgets for an organization, determining standard costs based on technical estimates, finding and comparing with actual costs, ascertaining the reasons of by variance

Cost Accountancy: This term is over and above costing and cost accounting. It envisages application of costing and cost accounting in a business setup. Cost Accountancy facilitates management with cost control initiatives, ascertainment of profitability and informed decision making. It also includes determination of selling price for the products, division and unit wise profitability. Forecasting of expenses and future probable incomes is also a part of the practice of Cost Accountancy.

According to the Institute of Cost and Management Accountants, London, cost accountancy is the application of costing and cost accounting principles, methods, techniques etc., to the science, art and practice of cost control, cost audit and ascertainment of profitability.

1.3.1 Objectives of Cost Accounting

The basic objective of Cost Accounting systems is to reduce the cost of production and maximization of profits. Specifically, the objectives are as follows:

1. To ascertains cost per unit of the product or service.
2. To provide a reliable analysis of costs.
3. To identify the sources of wastage.
4. To provide relevant information or determining the price.
5. To ascertain the profitability of each product.
6. To exercise effective control on inventory.
7. To disclose the source of economy in material, labour and overheads.
8. To organize effective information system.
9. To advise the management on future expansion programmes, formulation and implementation of incentive plans.
10. To organize the internal audit system.
11. To undertake the cost reduction programmes.

1.3.2 Advantages / Importance of Cost Accounting

1. **Advantages to the management :** A good costing helps the management in classifying, controlling the costs, to take vital business policy decisions, to use standards in making estimates, to use the limited resources effectively for maximum output, to undertake cost audit and to fix remunerative selling price of various products.
2. **Advantages to workers :** It enables to examine the relative efficiency of workers which facilitates the introduction of suitable plans of wage payment.
3. **Advantages to Investors :** It enables the investors to judge the financial strength of the company for their investment. Thus, costing information avoids the risk for the investment.
4. **Advantages to Government :** It helps the Government in preparing national plans to economic development. For e.g. :- Assessment of excise duty, income tax, exports and imports policies etc.
5. **Advantages to Public Enterprises :** It measures the efficiency and profitability of the undertaking to justify its running in the public sector.
6. **Advantages to Consumers :** Since cost accounting aims at reducing the cost of production, the consumers can get the goods in the form of lower prices.

1.3.3 Limitations of Cost Accounting

1. **Lack of Uniform Procedure**

   As costing contains estimates, two cost accountants may arrive two different results from the same information. Hence cost accounting results can be taken as mere estimates.

2. **Very Expensive**

   As the installation cost of costing is very expensive only big business concerns use costing.

3. **Absence of a Ready Made System**

   There is no stereo typed costing system applicable to all industries and even firms in the same industry.

4. **Varied Cost Concepts**

   Since different costs are used for different purposes, no one cost is suitable for all purposes. For ex :- Actual costs are different from standard costs and both are different from estimated costs.

5. **Role of Management**

   The usefulness of cost accounting is restricted to the ability and willingness of management to take decisions based on information received.

1.3.4 Cost Accounting Vs Costing

Cost accounting is the process of accounting for costs, which begins with recording of income and expenditure or the bases on which they are calculated and ends with the preparation of statistical data. It is thus the formal mechanism by means of which costs of products or services are ascertained.

Costing is the technique and process of ascertaining costs. The technique consists of principles and rules which govern the procedure of ascertaining costs of products or services. The technique to be applied would depend upon the nature of industry, methods of production and the type of products.

Cost accounting should be distinguished from costing. Costing can be carried out by the process of arithmetic, by means of memorandum statements, or by the methods of integral accounts, but cost accounting denotes the formal mechanism by means of which costs are ascertained. Cost accounting embraces the accounting procedures relating to the recording of all income and expenditure in a given period. Cost accounting provides the basis and information for ascertainment of cost.

1.3.5 Types of Costing used in Industries

1. **Historical Costing :** The ascertainment of costs after they have been incurred.
2. **Standard Costing :** The ascertainment and use of standard costs and the measurement and analysis of variance between the standard costs and the actual costs incurred.
3. **Marginal Costing :** The ascertainment by differentiating between fixed costs and variable costs, if marginal costs and the effect on profit of changes in volume or type of output.
4. **Direct Costing :** The practice of charging all direct costs to operations, processes or products, leaving all indirect costs to be charged to profit and loss account of the period in which they arise.
5. **Absorption Costing :** The practice of charging all costs, both variable and fixed, to operations, processes or products.
6. **Uniform Costing :** The use by several undertakings of the same costing principles and practices.

1.4 FINANCIAL ACCOUNTING

Financial Accounting is that part of accounting in which we record the transactions and we make the financial statements. Through making the financial statement, it provide information of profitability and financial position to the interested parties.

1.4.1 Functions of Financial Accounting

The progress and reputation of any business big or small, as built upon sound financial footing. Financial Accounting provides information relating to the results of business operations. The following are the important functions of financial accounting:

1. Recording of Financial Information

Accounting is an art of recording financial transactions of a business concern. This is the basic function of accounting. Owing to limitations of human memory, it is not possible to remember all transactions in a business in the sequence of their dates. Accounting is necessary to supplement human memory. Accounting ensures that all business transactions of financial character are recorded in an orderly manner.

2. Classification of Data

Classification is concerned with systematic analysis of the recorded data with a view to group transactions of one nature at one place. This is done in the book called Ledger. In a ledger the entries relating to different items are brought to one place.

3. Making Summaries of Classified Data

Another important function of Financial Accounting is to make summaries of recorded and classified data. Classified data is used to prepare final accounts i.e. Profit and Loss Account and Balance Sheet. Profit and Loss Account is prepared with the items of revenue nature for a given period. Balance sheet is prepared with various assets and liabilities of a business concern. The final accounts help the internal as well as external users of accounting statements to find out the operational efficiency and financial strength of the business concern.

4. Dealing with financial transactions

Financial accounting records only financial transactions and events capable of measuring in terms of money. Transactions which are not of financial are not recorded in the books of account.

5. Interpretation of Financial information

Another important function of financial accounting is the interpretation of financial information which plays a very important role in decision making process of a business concern. This recorded financial data is interpreted in a manner that the end users such as Bankers, Investors, Creditors and shareholders can make a meaningful judgment about the over all financial condition and profitability of a business.

6. Communicating Results

Accounting is the language for communicating the financial aspects about an enterprise to those who have an interest in using and interpreting them. The profitability and financial position of the business concern are communicated through profit and loss account and balance sheet. The parties who are interested to know the results of the business can make their own conclusion by going through the financial statements.

7. Legal Requirements

In case of registered firms, auditing is compulsory. Auditing is not possible without accounting. Thus, accounting becomes compulsory to comply with legal requirements. With the help of accounting various documents are prepared and files with departments concerned from time to time.

8. Making Information more Reliable

The other important function of financial accounting is to make the financial information more useful and reliable. This is done by the use of internationally accepted accounting standard for preparing final accounts.

1.4.2 Limitation of Financial Accounting

Following limitations of financial accounting have led to the development of cost accounting :

1. No clear idea of operating efficiency

Financial accounting does not give a clear picture of operating efficiency when prices are rising or decreasing on account of inflation or trade depression. It is possible that profits may be more or less not because of efficiency or inefficiency but because of inflation or trade depression.

2. Weakness not spotted out by collective results

Financial accounting discloses only the net result of the collective activities of a business as a whole. It does not indicate profit or loss of each department, job, process or contract. It does not disclose the exact cause of inefficiency *i.e.,* it does not tell where the weakness is because it discloses the net profit of all the activities of a business as a whole. It can be compared with a reading on a thermometer. A reading of more than 98-4 or less than 98-4° discloses that something is wrong with human body but the exact disease is not disclosed. Similarly, loss or less profit disclosed by the profit and loss account is a signal of bad performance of the business but the exact cause of such performance is not known.

3. Not helpful in the price fixation

In financial accounting costs are not available as an aid in determining prices of the products, services, production order and lines of products.

4. No classification of expenses and accounts

In financial accounting there is no such system by which accounts are classified so as to give data regarding costs by departments, processes, products in the manufacturing divisions ; by units of product lines and sales territories ; by departments, services and functions in the administrative division. Further expenses are not classified as to direct and indirect items and are not assigned to the products at each stage of production to show the controllable and uncontrollable items of overhead costs.

5. No data for comparison and decision-making

It does not supply useful data to management for comparison with previous period and for taking various financial decisions as introduction of new products, replacement of labour by machines, price in normal or special circumstances, producing a part in the factory or buying it from outside market, production of a product to be continued or given up, priority accorded to different products, investment to be made in new products or not etc.

6. No control on cost

It does not provide for a proper control of materials and supplies, wages, labour and overheads.

7. No standards to assess the performance

In financial accounting there is no well developed system of standards to appraise the efficiency of the organisation in the use of materials, labour and overhead

costs by comparing the work of labourers, clerks, salesmen and executives which should have been accomplished in producing and selling a given number of products in an allotted period of time. It does not provide information to assess the performance of various persons and departments and to see that the costs do not exceed a reasonable limit for a given quantum of work of the requisite quality.

8. Provides only historical information

Financial accounting is mainly historical and tells about the cost already incurred. It does not provide day-to-day cost information to management for making effective plans for the coming year and the period after that as financial data are summarised at the end of the accounting period.

9. No analysis of losses

It does not provide complete analysis of losses due to defective material, idle time, idle plant and equipment. In other words, no distinction is made between avoidable and unavoidable wastage.

10. Inadequate information for reports

It does not provide adequate information for reports to outside agencies such as banks, government, insurance companies and trade associations.

11. No answer for certain questions.

Financial accounting will not help to answer such questions as :

(a) Should an attempt be made to sell more products or is the factory operating to capacity ?

(b) If an order or contract is accepted, is the price obtainable sufficient to show a profit ?

(c) If the manufacture or sale of product A were discontinued and efforts made to increase the sale of product B, what would be the effect on the net profit?

(d) Why the profit of last year is of such a small amount despite the fact that output was increased substantially ?

(e) If a machine is purchased to carry out a job, at present done by hand, what effect will this have on profits ?

(f) Wage rates having been increased by ? 5 per hour, should selling price be increased, and if so, by how much?

1.5 Cost Accounting Vs Management Accounting Vs Financial Accounting

	Point of Difference	Financial Accounting	Cost Accounting	Management Accounting
1.	Objective	Financial accounting records all the transactions relating to finance.	Cost accounting records by the firm in producing a product or service.	Management accounting helps the management in designing plans and policies.
2.	Periodicity	It is prepared at the end of the financial year.	It prepares its report weekly or monthly.	It provides information when ever it is required by the management.
3.	Importance	It is compulsory to prepare final accounts in every organization.	It is compulsory to prepare cost accounts only in some undertakings.	It is not compulsory. Principles and procedures are not followed in management accounting.
4.	Principles	It follows only some accounting principles and standards.	It is compulsory to follow all the principles and procedures in cost accounting.	
5.	Analysis or report	It discloses the financial position of the company as a whole.	It discloses the profits with regard to each process, product or service.	It prepares the budget and tax plans from the reports provided by financial and cost accounting.
6.	Nature	It mainly deals with the historical data.	It makes use of the historical data provided and outlines it.	It deals with the future plans and policies.
7.	Scope	In financial accounting, trading account, profit and loss account and balance sheet are prepared.	Cost accounting ascertaining the cost of a product or service.	It formulates policies for effective performance of management and covers cost and financial accounting.

1.6 Role of Accounting Information in Planning and Control

Accounting information plays a significant role in attaining different organizational purposes which contradicts to some extent. The firms in which the managerial activities are independent and the responsibilities are highly structured, do not need accounting information for planning, controlling or assessing the performance. But there is a great need for accounting information in the firms in which the responsibilities are not well structured. In these organizations, there is mutual interdependence and the operations are carried out in a non routine manner whose future condition is difficult to estimate.

It is very difficult to gather and interpret the accounting information. The management should make use of accounting information in a sophisticated manner due to the rapid changes in the technology and external environment of the firm which demands the need for the growth of complex commercial organizations. The assumptions

underlying the accounting information are also changing from traditional management accounting to modern accounting.

In accounting, the cost allocation and transfer pricing helps the firm in managing the interdependence between the different operational units. Transfer price is the value which is paid for transferring the goods from one department to other within the organization. The cost allocation and transfer prices helps the operational units to work as independent profit centres. The accounting statements may lose their importance if there are no reliable market prices and if a significant amount of trade is carried out internally.

There will be no change in the accounting statements if the operating units become a pseudo profit centre from a true profit centre. The performance reports of the units as a separate entity may create fictitious accounts of allocation or transfer of costs to each unit on an arbitrary basis. The pseudo profit centre is similar to a 'normal profit centre in all the aspects except in the meaning and economic aspects.

Role of Accounting Information in Controlling

For better control, it is necessary to create profit centre as it is very easy to control a true profit centre than a pseudo profit centre. The operations within the profit centre should be examined and there should be a balance between the costs and revenues for earning adequate profits.

The performance of each operating unit has to be assessed and compared with the targets or standards. This comparison may create pressure on" categorizing several units as profit centres and may require the allocation of large amount of costs to each unit. This may lead to the transformation of a profit centre into pseudo profit centre.

The management has to focus, more on controlling the costs instead of focussing on uncontrollable items or activities of the firm. Cost control is possible even in 'the firms which have interdependent operating units and must be used along with the cost budgets. The decentralized control is not possible through accounting information.

The managers are considering only the factors which are in their control. The other factors such as external and internal environmental factors which have a significant effect on organizational performance are 'not considered by the managers. The organizational management should estimate these factors and take immediate actions for reducing their adverse effects on the organizational performance. It is the duty of the manager to develop their own units in such a way that it responds as per the changing conditions.

The traditional view of responsibility accounting is, not applicable to the growing organizations. The firm should make sure that the managers are not responsible for the poor performance of their co-workers.

The accounting information does not play a complete role in controlling the whole organization and requires the support of the other information systems. The managers should make use of accounting information carefully as it helps them in gaining the knowledge about the organizational activities and acts as a language which provides an overall view of the performance of whole organization and its units.

1.7 Cost Concepts and Managerial use of Classification of Costs

A) Cost

The Institute of Cost and Management Accountants (ICMA) has defined cost as "the amount of expenditure, actual or notional, incurred on or attributable to a specified thing or activity". It is the amount of resources sacrificed to achieve a specific objective. A cost must be with reference to the purpose for which it is used and the conditions under which it is computed. To take decisions, managers wish to know the cost of something. This something is called a "cost unit".

B) Cost Unit

A cost unit is any thing for which a separate measurement of costs if desired. A product, service, department, project or an educational course can all be cost units. Cost units are chosen not for their own sake but to aid decision making. Thus a cost unit is a "quantitative unit or product or service in relation to which costs are ascertained". The cost unit to be used at any given situation is that which is most relevant to the purpose of cost ascertainment.

C) Cost Centre

According to ICMA London, cost center is "a location, person or items of equipment in respect of which costs may be ascertained and related to cost units for control purposes". It is simply a method by which costs are gathered together, according to their incidence, usually by means of cost center codes. It is the smallest element of an organization in respect of which costs are charged and ascertained. Maintenance department, a public relation office, a printing machine are all examples of cost centers.

The establishment of cost centers serves two important purposes. Firstly cost ascertainment is made possible by collecting and charging cost to each cost center.

Secondly, cost control is ensured as costs can be more closely looked at and more easily monitored by a responsible official. The setting up of a cost centers depends on numerous factors such as organization of factory, requirement of the costing system and management policy.

1.7.1 Classification of Cost

Costs may be classified in various ways to serve different purposes. Some of the important classifications are as under :

1. By elements.
2. As direct or indirect.
3. By functional divisions.
4. By departments.
5. By product.
6. As variable, semi-variable or fixed.
7. As expenditure being capital or revenue.

1. Classification by Elements

The important elements of cost are material, labour and expense. This classification reveals as how the cost of a product is made up and what is the importance of each element in the total cost of a product. This is also useful for valuation of stock of work-in-process. This classification will disclose the scope for economy which can be effected with regard to different elements constituting the cost of a product.

2. Classification as Direct and Indirect

Any expenditure that can be identified with a particular unit of cost is known as direct expenditure. Any other expenditure which cannot be so identified is indirect expenditure. The cloth in the manufacture of shirts is a direct item of cost but the rent paid by the tailor for tailoring shop is indirect as that expenditure cannot be directly charged to any particular shirt. The importance of this classification lies in the fact that direct costs of a product or activity can be accurately determined, while indirect costs have to be apportioned on certain assumptions as regards their incidence.

3. Classification by Functional Divisions

This means classification of costs according to the principal functional divisions such as production, administration, selling and distribution. This classification

facilitates the assessment of the efficiency and thus leads to better control over them. It enables the assessment of manufacturing profit as distinct from the trading profit.

4. Classification by Departments

Costs may be classified according to departments in a manufacturing concern. There may be a number of departments such as production departments in a manufacturing concern. Production departments engage directly in production while service department render some auxiliary service to the production departments. This classification enables the exercise of better control over them. It enables the application of different methods and rates for recovery of the different departmental overheads thus ensuring greater accuracy in costing.

5. Classification by Product

When a factory is producing different types of products, it becomes necessary to classify the costs according to the products. This classification will reveal the profitability of the different products and will enable the management to take steps to control the cost and fix prices.

6. Classification according to the cost behaviour variable

The behavior of costs in relation to the volumes of production or sales provides another basis of classification of costs. Costs which vary in direct proportion to changes in the volume of output or sales are known as variable costs.

7. Classification according to the expenditure being of a capital

Capital expenditure refers to the expenditure on those items which are not consumed in one use but lasts over several uses. The revenue expenditure means expenditure on items which are consumed in one use only.

1.8 Management Process and Accounting

The management process implies the four basic functions :

1. Planning
2. Organizing
3. Controlling
4. Decision-making

Managerial accounting plays a vital role in these managerial functions performed by managers.

1. Planning

Planning is formulating short term and long term plans and actions to achieve a particular expectation of the future during the next 3-5 years or some times even longer. Planning requires setting objectives and identifying methods to achieve those objectives. A budget is the financial planning showing how resources are to be acquired a specified time interval.

Managerial accounting helps the managers in planning by providing reports which estimates the effects of alternative actions on an enterprises ability to achieve desired goals.

2. Organizing

It is a process of establishing an organizational frame work and assigning responsibility to people working in an organization for achieving business goals and objectives. The type of organizational structure differs from one business enterprise to another. In some organizations there may be centralized structure and in others organizational structure may be decentralized. Organizing requires clarity about each manager responsibility and lines of authority.

Managerial accounting helps managers in organizing by providing reports and necessary information to regulate and adjust operations and activities in the light of changing conditions. Management accountant can provide sales report, production to the respective manager for taking suitable action about the sales and production position.

3. Controlling

It is the process of monitoring, measuring, evaluating and correcting actual results to ensure that a business enterprises goals and plans are achieved. Controlling is accomplished with the use of feedback. Feedback is information that can be used to evaluate or correct the steps being taken to implement a plan.

Managerial accounting helps in the control function by producing performance reports and control reports, which highlights variances between expected and actual performances. Such report has a basis for taking necessary corrective actions to control operations. The use of performance and control reports follows the principle management by exception.

Performance and control reports only provided feedback to help managers determine where attention should be required, they do not tell managers how to correct any problem that might exist.

4. Decision making

It is a process of choosing among competing alternatives. Decision-making, is inherent in each of three management functions i.e. planning, controlling and organizing. A manager can't plan without making decisions and has to choose among competing objectives and methods to carry of chosen objectives. In organizing, managers need to decide on an organization structure and on specific action to be taken on day-to-day operations. In control function managers have to decide whether variance are worth investigating.

Before knowing the role of management accountant in decision-making area, it is first, necessary to understand the decision-making process. The decision-making process includes the following steps :

a) Identifying a problem requiring managerial action.

b) Specifying the objective or goal to be achieved.

c) Listing the possible alternative courses of action.

d) Gathering the information about the consequence of each alternative.

e) Making a decision, by selecting one of the alternatives.

1.9 Cost Analysis

A cost analysis (also called cost-benefit analysis, or CBA) is a detailed outline of the potential risks and gains of a projected venture. Many factors are involved, including some abstract considerations, making the creation of a CBA more of an art than a science, though a quantitative mindset is still a must-have. A CBA is useful for making many types of business and personal decisions, especially ones with a potential for profit (though this need not be the case). Although conducting a CBA can be a complex task, you do not need to be a business major to learn how to do so. Anyone who's willing to brainstorm, research, and analyze data can make a top-quality CBA.

Cost-benefit analysis techniques are a common business activity owners and managers use to assess various projects. These techniques essentially compare the total capital investment for the project against its potential returns. Several techniques are available, with the most common being the payback period, net present value, and rate of return. Companies can use one or all of the cost-benefit analysis techniques. The assessment occurs after the company has all necessary information and prior to investing capital into one or more of the projects.

The payback period is generally the simplest of all cost-benefit analysis techniques. The method uses all the same information as the other techniques, except the calculation process is quite different. First, a company must compute all costs associated with a project. This includes investment in fixed assets, costs for employees, and lost production time for training or implementation. Second, the company divides the total for all these costs by the potential financial returns, resulting in the time it will take for the project to pay for itself.

1.10 Cost Control

Cost control has been defined as the guidance and regulation by execution action of the costs of operating and under taking. It is regarded as an important derivative of cost accounting is inseparably connected with cost control with the help of cost data.

Classification of Cost Control

1. Physical cost control – control over production and distribution.
2. Managerial cost control – the use of cost data for regulating current operations
3. Mechanics cost control – the accounting techniques which are involved in providing for cost control.

Steps in Cost Control

1. Target should be set up for expenses and performances.
2. The actual expenses and production performances should be measured periodically.
3. Actual should be compared with the targets with a view to find out the divisions.
4. Variations if any, should be analyzed by causes.
5. Corrective actions should be taken to eliminate the variations.

Costs control is essential for a manufacturing organization because, it aims at guiding the actual towards the line of targets regulates the actual if they deviate from targets. This guidance and regulation is done by a management action. A suitable cost control system helps in maintaining expected return on capital employed, increasing productivity of men, machines and other resources, fixing a reasonable price for customer and increasing the economic stability of the manufacturing organization.

1.11 Direct and Indirect Expenditure

Direct expenditure, also known as 'chargeable expenses' includes all such expenditure other than expenses on direct material and labour that can be directly identified with accost unit examples of direct expenses are architect or surveyors fees.

Cost of drawings and patterns, royalty, repairs and maintenance of plant obtained on hire, etc.

Indirect expenses are also called 'overhead'. They are also referred to as 'on cost'. They include material, indirect labour and other expenses, which cannot be directly changed to specific cost units. The overheads can be divided into three groups namely:

1. Factory overheads
2. Administrative overhead and
3. Selling and distribution overheads.

1. Factory Overheads

Factory overheads or Factory expenses includes all indirect expenses, which are connected with manufacture of a product. When they are allocated to different cost units they are referred to as factory 'on cost' or works 'on cost'. Examples of factory overheads are salary of factory managers, supervisors, rent, rates, & insurances etc.

2. Administrative overhead

Administrative overhead includes all indirect expenses relating to enter price. They are also called as office overheads or office on cost. They include expenses incurred towards formulation of policies, planning & controlling the functions & motivating the personnel of organization. Examples of administrative expenses are general office expenses such as salary , office rent & rates, telephone & telegram expenses, remuneration of managing directors, general managers, bank charges, legal expenses, etc.

3. Selling and distribution overheads

Selling and distribution overheads are indirect expenses connected with marketing and sales. Selling expenses are incurred in securing and retaining customers. They include advertising, salaries and commission of sales managers, salesmen training expenses, cost of samples, catalogues, price lists, exhibition and demonstration expenses, market research expenses and expenses incurred on entertaining customers. Distribution expenses are expenses incurred in ensuring that the products are available at all potential points of sale. They include expenses on handling the products from the time they are placed in the warehouse until they reach their destination.

Examples of distribution overheads are cost of warehousing, packing and loading charges, etc.

1.12 OVERHEAD

Cost pertaining to a cost centre or cost unit may be divided into two portions direct and indirect. The indirect portion of the total cost constitutes the overhead cost which is the aggregate of indirect material cost, indirect wages and indirect expenses.

CIMA defines indirect cost as "expenditure on labour, materials or services which cannot be conveniently identified with a specific saleable cost per unit". Indirect costs are those costs which are incurred for the benefit of a number of cost centres or costs units. Indirect cost, therefore, cannot be conveniently identified with a particular cost centre or cost unit but it can be apportioned to or absorbed by cost centres or cost units. Any expenditure over and above prime cost is known as overhead.

Overheads comprise all expenditure incurred for or in connection with the general organization of the whole or part of the undertaking i.e., the cost of operating supplies and services used by the undertaking including the maintenance of capital assets.

Importance of Overhead Costs

In various five-year plans, industrialization was given due importance. The result is that a large number of establishments have grown up both in the public and private sectors for mass production for which use of improved and costlier and special type of machines has become absolutely necessary. With the increasing trend towards plant automation, heavy expenditure is being incurred which cannot be charged directly to any particular unit and can be called as cost common to all units of production.

Overhead expenses being a significant proportion of the total cost have assumed an added importance and require analysis for purpose of cost ascertainment and control by function and for guidance in certain managerial decisions by the extent of the variability with production.

Overheads costs cannot be allocated but have to be suitably apportioned and then absorbed by suitable methods. The cost accountant is required to pay so much attention to the accounting of overhead cost as prudence choice of various bases used for apportionment and absorbing the overheads in the cost of products has to be made by him.

1.12.1 Classification of Overhead Costs

Cost classification is the process of grouping costs according to their common characteristics and establishing a series of special groups according to which costs are classified. Thus, it involves two steps :

1. The determination of the class or groups in which the overhead costs are subdivided,

2. The actual process of classification of the various items of expenses into one or the other of the groups.

The method to be adopted for the classification of overhead costs depends upon the type and size of the business, nature of the product or services rendered and policy of the management. The various classifications are :

1. Functional classification,
2. Classification with regard to behaviour of the expenditure,
3. Element-wise classification,
4. Classification according to nature of expenditure.

1.12.2 Allocation and Apportionment of Overheads

Indirect expenses or overheads cover all expenses that cannot be conveniently allocated to a particular job or product. They are incurred for the common benefit of all the work in a workshop or under taking.

The overheads have to be collected & classified under suitable account headings. Then they are to be allocated & apportioned among various departments. In manufacturing concern, there are three types of departments.

a) Manufacturing or producing departments

b) Service departments

c) Partly producing departments

Producing departments manufacture products, while service department help them in this process. Partly producing department are essentially service department but some times do some productive works.

Allocations of overhead expenses refer to the charging of expenses that can be identified wholly with a particular departments for example, over time wages paid to workers in a particular departments should be charged to that dept.

Apportionment of expenses is the process of splitting of overhead expenses and charging them to different cost centers on an equitable basis. This is done in the case of those overhead items that cannot be wholly allocated to a particular departments. General managers salary, rent of factory etc. are incurred for the factory as a whole, and therefore they will have to be apportioned over all departments both production and service.

There is no fast rule regarding the basis to be applied for apportionment of overheads. The various items of the factory overheads are first apportioned to all the

departments. Including service departments. This apportionment is called 'primary distribution'.

The basis is as follows :

Items	Basis of apportionment
Factory, rent, depreciation of factory, building (if owned).	According to the floor area occupied or capital value of the asset.
Canteen expenses, time keeping, general welfare expenses, E.S.I contribution of employer.	Number of employees or wages for each department.
Depreciation & insurance of machinery.	Value of machinery.
Electric light	Number of light points, floor area, hours used or no. of watts, if separate meters are available.
Supervision	Number of workers or amt of wages paid.
Audit fees	Sales or total cost
Stores service expenses	Value of materials consumed.

PROBLEMS ON OVERHEADS

1. The "Modern Company" is divided into four departments : P_1, P_2, P_3 are producing departments and S1 is a service department. The actual costs for a period are as follows :

	`		`
Rent	1,000	Supervision	1,500
Repairs to plant	600	Fire insurance in respect of stock	500
Depreciation of plant	450	Power	900
Employer's liability for insurance	150	Light	120

Following information is available in respect of the four departments :

	Dept. P_1	Dept. P_2	Dept. P_3	Dept. S_1
Area (sq. metres)	1,500	1,100	900	500
Number of Employees	20	15	10	5
Total Wages (`)	6,000	4,000	3,000	2,000
Value of plant (`)	24,000	18,000	12,000	6,000
Value of Stock (`)	15,000	9,000	6,000	
H.P. of Plant	24	18	12	6

Apportion the costs to the various departments on the most equitable basis.

Solution :

Overheads Distribution Summary

Item	Basis of Apportionment	Total Amount	Production Departments			Service Department
			P_1	P_2	P_3	S_1
		`	`	`	`	`
1. Rent	Floor area (25 paise per metre)	1,000	375	275	225	125
2. Repairs to Plant	Plant value (1 paisa per rupee)	600	240	180	120	60
3. Depreciation	Plant value (0.75 paisa per rupee)	450	180	135	90	45
4. Light	Floor area (3 paise per sq. metre)	120	45	33	27	15
5. Power	H.P. of plant (` 15 per H.P.)	900	360	270	180	90
6. Supervision	No. of employees (` 30 per employee)	1,500	600	450	300	150
7. Fire Insurance	Stock value (1/60 of value of stock)	500	250	150	100	–
8. Employer's Liability for Insurance	No. of employees (` 3 per employee)	150	60	45	30	15
	Total	5,220	2,110	1,538	1,072	500

Problem on Simultaneous Equation Method

2. A company has three production departments and two service departments, and for a period the departmental distribution summary has the following totals:

	`
Production Departments : P_1 – ` 800 ; $P_2$ – ` 700 and P_3 – ` 500	2,000
Service Departments : S_1 – ` 234 and $S_2$ – ` 300	534
	2,534

The expenses of the service departments are charged out on a percentage basis as follows:

	P_1	P_2	P_3	S_1	S_2
Service Department S_1	20%	40%	30%	–	10%
Service Department S_2	40%	20%	20%	20%	–

Prepare a statement showing the apportionment of two service departments expenses to production departments by Simultaneous Equation Method.

Solution :

Let x = Total overheads of department S_1

y = Total overheads of department S_2

Then,

x = `234 + 0.2y and y = ` 300 + 0.1x.

Rearranging and multiplying to eliminate decimals:

$10x - 2y = ` 2,340$ ... (1)

$-x + 10y = ` 3,000$ ... (2)

Multiplying equation (1) by 5, and add result to (2), we get

$49x = ` 14,700$

$\therefore \quad x = ` 300$

Substituting this value in equation (1), we get

y = ` 330

All that now remains to be done is to take these value x = 300 and y = 330 and apportion them on the basis of the agreed percentage to the three production departments; thus;

	Total `	P_1 `	P_2 `	P_3 `
Per distribution summary	2,000	800	700	500
Service department S_1 (90% of ` 300)	270	60	120	90
Service department S_2 (80% of ` 330)	264	132	66	66
	2,534	992	886	656

This method is recommended in more than two service departments if the data is processed with computers and in two service departments only where the data is processed manually.

3. XYZ manufactures household pumps which pass through three departments viz. Foundry, Machine Shop and Assembling. The manufacturing expenses are as follows:

	Foundry `	Machine Shop `	Assembling `	Total `
Direct Wages	10,000	50,000	10,000	70,000
Works Overhead	5,000	90,000	10,000	1,05,000

The factory cost of manufacturing a type 'C' pump was prepared by the company as follows:

Particulars		`
Materials		16
Direct Wages :	`	
Foundry	2	
Machinery Shop	4	
Assembling	2	8
Works overhead [150% of Direct Wages i.e., $\frac{`1,05,000}{`70,000} \times 100$]		12
	Total Cost	36

It seems that there is some fallacy. Try to correct it.

Solution :

The fallacy lies in the adoption of a blanket or single rate for all the departments even though the data is given to calculate the separate overhead rates for each department. Different overhead rates are calculated below for each department in order to correct the position.

$$\text{Foundary} = \frac{\text{Overhead}}{\text{Direct Wages}} \times 100$$

$$= \frac{`5,000}{`10,000} \times 100 = 50\%$$

$$\text{Machine Shop} = \frac{\text{Overhead}}{\text{Direct Wages}} \times 100$$

$$= \frac{`90,000}{`50,000} \times 100 = 180\%$$

$$\text{Assembling} = \frac{\text{Overhead}}{\text{Direct Wages}} \times 100$$

$$= \frac{`10,000}{`10,000} \times 100 = 100\%$$

The correct factory cost of 'C' pump is calculated after taking into consideration the different overhead rates for each department.

Factory Cost of "C" PUMP

Particulars			`
Material Cost			16.00
Direct Wages:	`		
Foundry	2.00		
Machine Shop	4.00		8.00
Assembling	2.00		
Works Overhead :		`	
Foundry (50% of Direct Wages)		1.00	
Machine Shop (180% of Direct Wages)		7.20	
Assembly (100% of Direct Wages)		2.00	10.20
Total Cost			**34.20**

Problem 4

E-books is an online book retailer. The Company has four departments. The two sales departments are Corporate Sales and Consumer Sales. The two support-departments are Administrative (Human resources, Accounting), and Information systems. Each of the sales departments conducts merchandising and marketing operations independently.

Following data are available for October, 2010 :

Departments	**Revenues**	**Number of Employees**	**Processing Time Used (in minutes)**
Corporate Sales	` 16,67,750	42	2,400
Consumer Sales	` 8,33,875	28	2,000
Administrative	—	14	400
Information systems	—	21	1,400

Cost incurred in each of four departments for October, 2010 are as follows :

Corporate sales	` 12,97,750
Consumer sales	` 6,36,818
Administrative	` 94,510
Information systems	` 3,04,720

The company uses number of employees as a basis to allocate Administrative costs and processing time as a basis to allocate Information systems costs.

Required :

(i) Allocate the support department costs to the sales departments using the direct method.

(ii) Rank the support departments based on percentage of their services rendered to other support departments. Use this ranking to allocate support costs based on the step-down allocation method.

(iii) How could you have ranked the support departments differently ?

(iv) Allocate the support department costs to two sales departments using the reciprocal allocation method.

Solution :

(i) Allocation of support department costs to the sales departments using direct method

Particulars	Support Departments		Operating Departments	
	Admn. System `	Information Sales `	Corporate Sales `	Consumer `
Costs incurred	94,510	3,04,720	12,97,750	6,36,818
Allocation of Admn. (42 : 28)	(– 94,510)		56,706	37,804
Allocation of Information System (24: 20)		(– 3,04,720)	1,66,211	1,38,509
			15,20,667	8,13,131

(ii) Rank on percentage of services rendered to other support departments

Administration provides 23.077% of its services to information system

$$= \frac{21}{42+28+21} = \frac{21}{91} = 23.077\%$$

Information system provides 8.333% of its services to administrative departments

$$= \frac{400}{2,400 + 2,000 + 400} = \frac{400}{4,800} = 8.333\%$$

Thus, 23.077% of ` 94.510 of Admin Department Rs. 21.810

Thus, 8.333% of ` 3,04720 of Information System Dept. Cost = ` 25,392

Particulars	Support Departments		Operating Departments	
	Admn.	Information System	Corporate	Consumer
	`	`	`	`
Costs incurred	94,510	3,04,720	12,97,750	6,36,818
Allocation of Admn. (21 : 42 : 28)	(–94,510)	21,810	43,620	29,080
		3,26,530	1,78,107	
Allocation of Information System (24 : 20)		(–3,26,530)		1,48,423
			15,19,477	8,14,321

(iii) An alternative ranking is based on the rupee mount of services rendered to other service departments, using the number from requirement 2, this approach would use the following sequences:

(i) Allocation of information systems overheads first (` 25,392 provided to administrative).

(ii) Allocated administrative overheads second (` 21,810 provided to information system).

(iv) Allocation of support departments costs to sale departments using reciprocal allocation method.

Administrative (AD) = ` 94,510 + 0.08333 IS

Information Services (IS) = ` 3,04,720 + 0.23077 AD

AD = ` 94,510 + 0.08333 (` 3,04,720 + 0.23077 AD)

AD = ` 94,510 + 25,392.32 + 0.01923 AD

0.98077 AD = ` 1,19,902.32

AD = ` 1,22,253

IS = ` 3,04,720 + 0.23,077 × 1,22,253 = ` 3,32,932

	Support Departments		Operating Departments	
	Admn.	Information System	Corporate	Consumer
	`	`	`	`
Costs incurred	94,510	3,04,720	12,97,750	6,36,818
Allocation of Admn. (21 : 42 : 28)	(– 1,22,253)	28,212	56,424	37,616
		3,32,932		
Allocation of Information System (24 : 20)	(27,743)	(–3,32,932)	1,66,466	1,38,722
			15,20,640	8,13,156

1.12.3 Cost Allocation Vs Apportionment

The main difference between the cost allocation and apportionment lies in that allocation deals with whole items whereas, apportionment deals with proportion of items of cost. While some costs may be directly allocated whereas apportionment needs a suitable basis for subdivision of the cost by cost centres or cost units.

For example, factory rent may be allocated to the factory and can be apportioned to products, departments or machines. Further the same cost can be allocated up to a certain level but at further lower levels, if a closer division is necessary, it can be apportioned only.

The main distinctions between the two are :

Allocation	Apportionment
Allocation means the allotment of whole items of cost to cost centers or cost units.	Apportionment means allotment of proportion of items of cost to cost centers or cost units.
It deals with the whole items of cost.	It deals with only proportion of items of cost.
Cost is directly allocated to any cost centre or cost units.	It needs a suitable basis for sub-division of cost by cost centers or cost units. Thus, it is indirect process of allotment.
Cost is allocated when the cost centre uses whole of the benefits of the expenses.	Cost is apportioned when cost centers use only a proportion of the benefits of the whole expenses.

1.12.4 Direct Labour Hour Method

This rate is obtained by dividing the overhead expenses by the aggregate of the productive hours of direct workers. The formula is

$$\text{Overhead Rate} = \frac{\text{Production Overhead Expenses}}{\text{Direct Labour Hours}}$$

If in a particular period the overhead expenses are Rs. 50,000 and direct labour hours are 1,00,000 then overhead labour rate will be Re.0.50 (i.e., 50,000 ÷ 1,00,000).

This rate is suitable where :

1. Labour constitutes the major factor of production.
2. It is desired to take into consideration the time factor.
3. The rate may not be affected by the method of wage payment or the grade or the rate of workers.

But there are certain defects or limitations of this method which are given below :

1. This method does not take into consideration the factors of production other than labour and may lay lead to faulty distribution of overhead to product cost. For example, it is not correct in a machine shop or material handling and upkeep expenses to recover overhead expenses by this method.
2. Where piece rate system is in use the data required for calculation of this rate is not available as no record of time is kept. Moreover, if the information is to be collected, it will require more clerical work.
3. It fails to take into consideration the expenses which are not dependent on labour hours such as power, depreciation, fuel, insurance etc.

PROBLEMS ON LABOUR HOUR RATE

1. In a factory, there are three Production Departments P_1, P_2, P_3, and one service department S_1. The following figures are available for one month of 25 working days of 8 hours each day. All departments work all these days with full attendance:

Expenses	Total Rs.	Service Dept. S_1 Rs.	Prod. Dept. P_1 Rs.	Prod. Dept. P_2 Rs.	Prod. Dept. P_3 Rs.
Power and lighting	1,100	240	200	300	360
Supervisor's Salary	2,000	–	–	–	–
Rent	500	–	–	–	–
Welfare	600	–	–	–	–
Others	1,200	200	200	400	400
	5,400				
Supervisor's Salary		20%	30%	30%	20%
Number of Workers		10	30	40	20
Floor Area in Sq. Metres	500	600	800	600	
Service rendered by Service Dept. to Production Depts.	–	50%	30%	20%	

Calculate labour hour rate for each of the departments P_1, P_2, P_3.

Solution :

Overheads Distribution Summary

Items	Basis	Total Depts. Rs.	Service S1 Rs.	Production Depts. P1 Rs.	P2 Rs.	P3 Rs.
Power and lighting	Direct	1,100	240	200	300	360
Supervisor's Salary	Ratio given	2,000	400	600	600	400
Rent	Floor Area	500	100	120	160	120
Welfare	No. of workers	600	60	180	240	120
Others	As given direct	1,200	100	120	160	120
Total		5,400	900	1220	1460	1120
Allocation of service department	Ratio given 5 : 3 : 2		–1,000	500	300	200
Total Overheads (1)		5,400	–	1,800	2,000	1,600
Total Labour hours (2)	8 × 25 = 200 hours × No. of workers	6,000		8,000	4,000	
Labour Hour Rate	(1) ÷ (2)			30 P.	25 P.	40 P.

2. A factory has three production departments. The policy of the factory is to recover the production overheads of the entire factory by adopting a single blanket rate based on the percentage of total factory overheads to total factory wages. The relevant data for a month are given below :

Department	Direct Materials Rs.	Direct Wages Rs.	Factory Overheads Rs.	Direct Labour Hours Rs.	Machine Hours Rs.
Budget					
Machining	6,50,000	80,000	3,60,000	20,000	80,000
Assembly	1,70,000	3,50,000	1,40,000	1,00,000	10,000
Packing	1,00,000	70,000	1,25,000	50,000	–
Actuals					
Machining	7,80,000	96,000	3,90,000	24,000	96,000
Assembly	1,36,000	2,70,000	84,000	90,000	11,000
Packing	1,20,000	90,000	1,35,000	60,000	–

The details of one of the representative jobs produced during the month are as under :

Job No. CW 8074

Department	Direct Materials Rs.	Factory Wages Rs.	Direct Labour Hours	Machine Hours
Machining	1,200	240	60	180
Assembly	600	360	120	30
Packing	300	60	40	–

The factory adds 30% on the factory cost to cover administration and selling overheads and profit.

Required :

Solution :

i) Calculation of Overhead Absorption Rate (as per current policy of the company)

Department	Budgeted Factory Overheads Rs.	Budgeted Direct Wages Rs.
Machining	3,60,000	80,000
Assembly	1,40,000	3,50,000
Packing	1,25,000	70,000
	6,25,000	5,00,000

$$\text{Overhead Absorption Rate} = \frac{\text{Budgeted factory overheads}}{\text{Budgeted direct wages}} \times 100$$

$$= \frac{\text{Rs. } 6,25,000}{\text{Rs. } 5,00,000} \times 100 = 125\% \text{ of direct wages}$$

Selling Price Of The Job No. Cw 8074

Particulars	Rs.
Direct Materials (Rs. 1,200 + Rs. 600 + Rs. 300)	2,100.00
Direct Wages (Rs. 240 + Rs. 360 + Rs. 60)	660.00
Overheads (125% of Rs. 660)	825.00
Total Factory Cost	3,585.00
Add: Mark up (30% of Rs. 3,585)	1,075.50
Selling Price	4,660.50

i) Alternative methods of absorption of the factory overheads

a) Machine Department : In this department machine hour rate should be used to recover overheads as the use of machine time is predominant. Machine hour rate is calculated as under :

$$\text{Machine Hour Rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Machine Hours}} = \frac{\text{Rs. } 3,60,000}{80,000 \text{ hours}}$$

= Rs. 4.50 per hour.

b) Assembly Department : In this department direct labour is the main factor of production, hence labour hour rate method should be used. This rate is calculated as under :

$$\text{Labour Hour Rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Labour Hours}}$$

$$= \frac{\text{Rs. } 1,40,000}{1,00,000}$$

= Rs. 1.40 per hour.

c) Packing Department : Here too the labour is the most important factor of production, hence labour hour rate should be used. This is calculated as under :

$$\text{Labour Hour Rate} = \frac{\text{Budgeted Factory Overheads}}{\text{Budgeted Direct Labour Hours}}$$

$$= \frac{\text{Rs. } 1,25,000}{50,000 \text{ Hours}} = \text{Rs. } 2.50 \text{ per hour}$$

ii) Selling price of Job No. CW 8074

		Rs.
Direct Materials		2,100.00
Direct Wages		660.00
Overheads :		
	Rs.	
Machining 180 hours @ Rs. 4.50 per hour	810	
Assembly 120 hours @ Rs. 1.40 per hour	168	
Packing 40 hours @ Rs. 2.50 per hour	100	
		1,078.00
		3,838.00
Add : Mark up (30% of Rs. 3,838)		1,151.40
Selling Price		4,989.40

1.13 Machine Hour Rate

Machine hour rate is the cost of running a machine per hour. It is one of the methods of absorbing factory expenses to production. It is used in those industries or departments where machinery is predominant and there is little or practically no manual labour. In such industries or departments, overhead consists of indirect expenses in running and operating the machine. Therefore, it is desirable to calculate the machine hour rate for the entire factory but different rates may be calculated according to their make, type, size, capacity, wattage, horse power and other factors relating to each machine or group of machines as a cost centre.

Machine hour rate is obtained by dividing the total running expenses of a machine during a particular period by the number of hours the machine is estimated to work during that period.

1.13.1 Calculation of Machine Hour Rate

The information required for calculation of machine hour rate is cost of the machine; cost of installation of the machine; scrap value, if any; life of the machine in hours; standing charges like rent etc. allocated to the machine; repairs and maintenance of the machine; power consumption; set up time; cost of lubricants applied on the machine and insurance premium of the machine, if any.

The following steps are required to be taken for the calculation of machine hour rate :

1. Each machine or a group of machines should be treated as a cost centre so that all overheads relating to that machine or machines may be identified.
2. Overheads relating to a machine are divided into two parts i.e., fixed or standing charges and variable or machine expenses. Standing charges are those expenses which remain constant irrespective of the use or running of machine and examples of such expenses are rent and rates, lighting and heating, insurance, supervising labour etc. Machine expenses as power, fuel, depreciation, repairs etc. vary with the use of the machine.
3. Standing charges are estimated for a period for every machine and amount so estimated is divided by the total number of normal working hours of the machine during that period in order to calculate an hourly rate for fixed charges. For machine expenses an hourly rate is calculated for each item of expenses separately by dividing the expenses by the normal working hours. While calculating the normal working hours, the hours which are required for maintenance or for setting-up or setting-off are to be deducted.

4. Total of standing charges rate and the machine expenses rate will give the ordinary machine hour rate. If machine operator's wages are also added into the simple machine hour rate then it will be called comprehensive machine hour rate.

5. Sometime supplementary rate is used when the charge for all other overhead cost is not included in the machine hour rate i.e., only machine expenses are taken for the purpose of machine hour rate. It is also used for correcting any error in the determination of machine hour rate due to which there is heavy over- or under-absorption of overheads.

The bases which may be adopted for apportioning the different expenses for the purpose of calculation of machine hour rate are given below :

Expenses	Basis
Standing Charges	
1. Rent and rates	Floor area occupied by each machine including the surrounding space.
2. Heating and lighting	The number of points used plus cost of special lighting or heating for any individual machine, alternatively according to floor area occupied by each machine.
3. Supervision	Estimated time devoted by the supervisory staff to each machine.
4. Lubricating oil and consumable stores	On the basis of past experience.
5. Insurance	Insurable value of each machine.
6. Miscellaneous expenses	Equitable basis depending upon facts.
Machine Expenses	
1. Depreciation	Cost of machine (including cost of stand-by equipment such as spare motors, switch gears etc.) less residual value spread over its working life.
2. Power	Actual consumption as shown by meter readings or estimated consumption ascertained from past experience.
3. Repairs	Cost of repairs spread over its working life.

1.13.2 Advantages of Machine Hour Rate

1. It helps to compare the relative efficiencies and cost of operating different machines.
2. It brings to light the existence and extent of idle time of machines.
3. It enables the management to decide how far the use of machine work is preferable to manual work.
4. It is most scientific, practical and accurate method of recovery of manufacturing overheads.
5. Cost reports prepared with the help of such rate are dependable and can help the management in decision-making.
6. It provides useful data for estimating cost of production, setting standard and for fixing selling prices for quotations.
7. It provides ready method for measuring the cost of idle machines if separate rates for fixed and variable overhead rates are calculated. When hourly rate is fixed on the basis of anticipated running hours of the machine, there is under-absorption of fixed overhead expenses if actual running hours are less then the estimated.

1.13.3 Disadvantages of Machine Hour Rate

1. It involves additional work in assessing the working hours of machines and thus it is a costly method.
2. It does not take into account expenses that are not proportional to the working hours of machines.
3. It gives inaccurate results if manual labour is equally important.
4. It is difficult to estimate the machine hours especially when production programme is not available in advance.
5. Blanket rate cannot be used and it makes the method more costly.

PROBLEMS ON MACHINE HOUR RATE

1. From the following information compute a machine hour rate of charging over heads in respect of machine no : 620.

Cost Rs. 5,500

Estimated scrap value Rs. 340

Effective working life is 10,000 hrs.

Repairs estimated at Rs. 750 over whole life of machine.

Standing charges of shop Rs. 855 for four - weekly period.

Hours worked in four - weekly period 120.

No. of machines in shop each of which bears equal charges = 30.

Power used by each machine = 6 units per hour costing 5 paise per unit.

Solution :

Computation of machine - hour rate, machine No : 620

	Particulars	Amt (in Rs)	Amt (in Rs)
a)	**Standing charges** (fixed cost) shop		0.24
	Variable charges		
a)	Depreciation		0.52
b)	Repairs and maintenance		0.08
c)	Power		0.30
	Machine hour rate →		1.14

Working Notes :

a) Standing Charges of shop :

Rs. 855 for four-weekly period for the shop which has 30 machines.

for each machine = $\frac{855}{30} = 28.5$

working hour = 120 hrs.

for each hour = $\frac{28.50}{120} = 0.24$ Paisa

b) Depreciation :

Dep = $\frac{\text{Cost of the asset - scrap}}{\text{Estimated life (or) hrs}}$ = $\frac{5500 - 340}{10,000 \text{ hrs}} = \frac{5160}{10,000} = 0.52$

c) Repairs and Maintenance :

Given Rs. 750 for whole working life.

For hourly = $\frac{\text{Rs.}750}{10,000 \text{ hrs}} = 0.08.$

d) Power :

given 6 units per @ 0.5 paisa per unit

for 6 hrs = 6 × 0.05 = 0.30.

2. Work out in the appropriate form the machine hour rate of a saw mill with reference to the following items of information extracted from the account books of wood working shop.

Purchase price of saw mill Rs. 90,000

Railways fight, other incidental charges and installation charges = Rs. 10,000

Life of the saw mill is 10 yrs @ 2000 working hours per year

Repair charges 50% of depreciation

Consumption of electric power - 10 units per hour @ 7 paise per unit

Lubricating oil @ Rs. 2 per day of 8 hrs.

Consumable stores @ Rs. 10 per day of 8 hours.

Solution :

Computation of machine hour rate of saw mill.

Particulars	Amt	Amt
I Standing charges (fixed cost)		
Lubricating oil per day		2.00
Consumable stores per day		10.00
Total expenses per day of 8 hrs →		12.00
Expenses per hour $\frac{12}{8}$ hrs		1.50
II. Variable expenses		
* Depreciation		5.00
Repair 50% of Dep $\left(5\times\frac{50}{100}\right)$		2.50
power 10 units @ 7 paisa (10 × 0.07)		0.70
Machine hour rate →		9.70

Note :

$$\text{Dep} = \frac{\text{Cost of the asset - scrap + Installation}}{\text{Estimated life (or) hrs.}}$$

$$\frac{90{,}000 - 0 + 10{,}000}{20.00} = \frac{100{,}000}{20{,}000} = 5.$$

3. From the following details, compute hourly rate of a machine installed in a shop.

(a) Capital cost of the machine Rs. 10,000

Installation charges Rs. 1000

(b) The estimated scrap value after the expiry of its life = 3000 (10 yrs)

(c) General lighting of the shop per month Rs. 25

(d) Rent of the shop Rs, 125 per month.

(e) Shop supervisor's salary per month Rs. 240

(f) Insurance premium for the machine per year = 60

(g) Estimated repair and maintenance expenses for the

Machine per year = Rs. 100.

(h) Power consumption of machine = 2 units per hour.

rate of power per 100 units = Rs. 5.

(i) Estimated working hours of the machine per year = 2000

(j) The machine occupies $\frac{1}{5}^{th}$ of the total floor area of the shop.

The supervisors in the shop is expected to devote $\frac{1}{6}^{th}$ of his time for supervising the machine. Generally lighting expenses are to be apportioned on the basis of the floor area.

Solution :

Computation of machine hour - rate

Particulars	Amt (in Rs.)	Amt (in Rs.)
A. Standing charges per year		
Rent $\left(\frac{1}{5}^{th} \text{ floor Area}\right)$		300
General lighting $\left(\frac{1}{5}^{th} \text{ floor Area}\right)$		60
Supervision's salary $\left(\frac{1}{6}^{th} \text{ time}\right)$		480
Insurance premium		60
Total of standing charges p.a.		900
Working hour's of the machine per year 2000.	$\left(\frac{900}{2000 \text{ hrs}}\right)$	0.45
B. Variable charges :		
Depreciation (w. note)		0.40
Repairs and maintenance	$\left(\frac{100}{2000 \text{ hrs}}\right)$	0.05
Power 2 units per hour @ 5 paisa		0.10
Machine hrs Rate $\rightarrow$		1.00

Working notes :

$$\text{Calculation of Depreciation} = \frac{\text{Cost of the asset} - \text{scrap} + \text{Installation charges}}{\text{Estimated life (or) hrs.}}$$

$$= \frac{10,000 - 3000 + 1000}{20,000 \text{ hrs}} = \frac{8000}{20,000} = 0.40$$

Power = for 100 units – Rs. 5

$$= \left[\frac{1\times 5}{100} = 0.05 \text{ Paisa per unit}\right]$$

for 1 unit —— ?

Total 2 units per hour = 0.05 × 2

= 0.10

4. A machine is purchased for cash at ` 9,200. Its working life is estimated to be 18,000 hours after which its scrap value is estimated at ` 200. It is assumed from past experience that:

(i) The machine will work for 1,800 hours annually.

(ii) The repair charges will be ` 1,080 during the whole period of life of the machine.

(iii) The power consumption will be 5 units per hour at 6 paise per unit.

(iv) Other annual standing charges are estimated to be:

		`
(a)	Rent of department (machine occupies 1/5th of total space)	780
(b)	Light (12 points in the department - 2 points engaged in the machine)	288
(c)	Foreman's salary (1/4th of his time is occupied in the machine)	6,000
(d)	Insurance premium (fire) for machinery	36
(e)	Cotton waste	60

Find out the machine hour rate on the basis of the above data for allocation of the works expenses to all jobs for which the machine is used.

Solution :

Calculation of Machine Hour Rate

Particulars	Per Annum `	Per Hour `
Standing Charges:		
Rent [` 780 ÷ ` 5]	156	
Light $\left[\frac{2}{12} \times ` 288\right]$	48	
Insurance Charges	36	
Cotton Waste	60	
Foreman's Salary (`6,000÷4)	1,500	
Total Standing Charges	1,800	
Hourly rate of standing charges $\left(\frac{` 1,800}{1,800}\right)$		1,00
Machine Expenses:		
Depreciation $\left(\frac{` 9,200 - ` 200}{18,000}\right) = \left(\frac{` 9,000}{18,000}\right)$		0.50
Repairs and Maintenance $\left(\frac{` 1,080}{18,000}\right)$		0.06
Power (0.06 × 5)		0.30
Machine Hour Rate		1.86

5. From the details furnished below you are required to computer a comprehensive machine-hour rate:

Original purchase rice of the machine
(Subject to depreciation at 10% per annum on original cost) ` 3,24,000
Normal working hours for the month
(The machine works to only 75% of capacity) 200 hours
Wages of Machineman `125 per day (of 8 hours)
Wages for a Helper (Machine attendant) `75 per day (of 8 hours)
Power cost for the month for the time worked ` 15,000
Supervision charges apportioned for the machine centre for the month ` 3,000
Electricity and Lighting for month ` 7,500

Repairs and Maintenance (machine) including consumable stores per month `17,500
Insurance of Plant and Building (apportioned) for the year `16,250
Other general expenses per annum `27,500

The workers are paid a fixed dearness allowance of `1,575 per month. Production bonus payable to workers in terms of an ward is equal to 33.33% of basis wages and dearness allowance. Add 10% of the basic wage and dearness allowance against leave wages and holidays with pay to arrive at a comprehensive labour-wage for debit to production.

Solution :

Calculation of Comprehensive Machine Hour Rate

(Effective hours 150) (1)

Particulars		Per Month	Per Hour
Fixed Costs			
Supervision Charges		3,000.00	
Electric and Lighting		7,500.00	
Insurance of Plant & Building $\left(`16,250 \times \frac{1}{12}\right)$		1,354.17	
Other General Expenses $\left(`27,500 \times \frac{1}{12}\right)$		2,291.67	
Depreciation $\left(`32,400 \times \frac{1}{12}\right)$		2,700.00	
$\left(\frac{16,84584}{150}\right)$		16,845.84	112.31
Variable Costs			
Repairs and Maintenance			116.67
Power			100.00
Wages of Machine Man	(2)		44.91
Wages of Helper	(2)		32.97
			406.86

Working Notes

1) Effective machine working hours per month = 200 hours × 75% = 150 hours

2) Wages per Machine Hour

Particulars	Machineman `	Helper `
Wages for 200 hours		
(`125×25 days)	3,125	
(`75×25 days)		1,875
Dearness Allowance	1,575	1,575
	4,700	3,450
Production Bonus (1/3 of Wages + DA)	1,567	1,150
	6,267	4,600
Leave Wages (10% of Wages + DA)	470	345
	6,737	4,945
Effective wage rate per machine hour		
(150 hour in all)	44.91	32.97

Note: Working days in a month = $\frac{200 \text{ hours}}{8 \text{ hours (Daily hrs.)}} = 25$

Problem No. 6

A machine shop of Avon Ltd. has six identical machines manned by 6 operators. The machines cannot be worked without an operator wholly engaged on it. The cost of all these 6 machines including installation charges works out to ` 12 lakhs and these machines are deemed to have a scrap value of 10% at the end of its effective life (9 years). These particulars are furnished for a six month period:

Normal available hours, per month	218
Absenteeism (without pay) hours	18
Leave (with pay) – hours	20
Stoppage for repairs and maintenance etc. – hours	20
Average rate of wages per day of 8 hours	` 80
Production bonus estimated	15% on wages
Value of power consumed	` 24,150
Supervision and indirect labour	` 9,900
Lighting and electricity	` 4,800

These particulars are for a year :

Repairs and maintenance including consumable	` 36,000
Insurance	` 60,000
Other sundry works expenses	` 36,000
General management expenses allocated	` 1,09,040

You are required to work out a comprehensive machine hour rate for the machine shop.

Solution :

Computation of Comprehensive Machine Hour Rate
(for the machine shop)

Particulars	For six months `
Operators' Wages (2)	72,000
Production Bonus (15% of Wages)	10,800
Power Consumed	24,150
Supervision and Indirect Labour	9,900
Lighting and Electricity	4,800
Repairs and Maintenance (` 36,000 ÷ 2)	18,000
Insurance (` 60,000 ÷ 2)	30,000
Other Sundry Expenses (` 36,000 ÷ 2)	18,000
General Management Expenses (` 1,09,040 ÷ 2)	54,520
Depreciation $\left(\frac{`12 \text{ lakhs} - ` 1.2 \text{ lakhs}}{9 \times 2}\right)$	
Total Overheads	60,000
Machine Hours Utilised (1) = 5,760	3,02,170

Comprehensive Machine Hour Rate = $\frac{`3,02,170}{5,760 \text{ hrs.}}$ = ` 52.46

Working Notes

1. Computation of Total Machine Hours Utilised

	Hours	Hours
Normal available hours per month		218
Less : Unutilised hours due to :		
Absenteeism	18	
Leave	20	
Stoppage for repairs and maintenance	20	
		58
Total hours utilised per month		160

Total hours utilised for six months for 6 operators = 6 × 6 × 160 = 5,760 hours

2. Total Wages payable to 6 operators for six months

Average rate of wages per hour = ` 80 ÷ 8 = ` 10

Normal hours for which wages are to be paid = 218 – 18 = 200 hours.

Wages for 6 months for 6 operators @ ` 10 = 200 × 6 × 6 × ` 10 = ` 72,000

Problem No. 7

A manufacturing unit has purchased and installed a new machine of ` 12,70,000 to its fleet of 7 existing machines. The machine has an estimated life of 12 years and it is expected to realise ` 70,000 as scrap at the end of its working life. Other relevant data are as follows :

(i) Budgeted working hours are 2,592 based on 8 hours per day for 324 days. This includes 300 hours for plant maintenance and 92 hours for setting up of plant.

(ii) Estimated cost of maintenance of the machine is ` 25,000 (p.a.)

(iii) The machine requires a special chemical solution, which is replaced at the end of each week (6 days in a week) at a cost of ` 400 each time.

(iv) Four operators control operation of 8 machines and the average wages per person amount to ` 420 for week plus 15% fringe benefits.

(v) Electricity used by the machine during the production is 16 units per hour at a cost of `3 per unit. No current is taken during maintenance and setting up.

(vi) Departmental and general works overhead allocated to the operation during last year was ` 50,000. During the current year it is estimated to increase 10% of this amount.

Calculate machine hour rate, if (a) setting up time is unproductive; (b) setting up time is productive.

Solution :

COMPUTATION OF MACHINE HOUR RATE

Particulars	Per year `	Per hour (unproductive) `	Per hour (Productive) `
Standing Charges :			
Operators' Wages – 4 × ` 420 x 52	87,360		
Add : Fringe Benefits 15% (87360 × 15/100)	13,104		
	1,00,464		
Department and general overhead			
(` 50,000 + ` 5,000)	55,000		
Total Standing Charges for 8 machines	1,55,464		
Cost per machine ` 1,55,464/8	19,433		
Cost per machine hour ` 19,433 – ` 2,200 (A)		8.83	
Cost per machine hour ` 19,433 – ` 2,292 (B)			8.48
Machine Expenses :			
Depreciation $\left(\frac{`12,70,000 - `70,000}{12 \times 2,200}\right)$		45.45	
Depreciation $\left(\frac{`12,70,000 - `70,000}{12 \times 2,292}\right)$			43.63
Electricity (16 x ` 3)		48.00	
Electricity (16 x ` 3 x 2,200) ÷ 2,292			46.07
Special Chemical Solution $\frac{`400 \times 52}{2,200}$		9.45	
Special Chemical Solution $\frac{`400 \times 52}{2,200}$			9.08
Maintenance ` 25,000 ÷ 2,200		11.36	
Maintenance ` 25,000 ÷ 2,292			10.91
Machine Hours		123.09	118.17
Machine hours :			
Setting time unproductive (2,592 – 300 – 92)	2,200		
Setting time productive (2,592 – 300)	2,292		

Working Note

Calculation of Machine hours

(A) For pen productivity

(B) For productivity

8. Prepare a machine - hour rate computation for the month of Jan - 2005 to cover the over head expenses indicated below relating to a particular machine.

Rent of the department

$\left(\begin{array}{c}\text{Space occupied by the machine} \\ \text{being } \frac{1}{5}^{\text{th}} \text{ of the dept}\end{array}\right)$ Rs. 780

Lighting (No. of men in the dept. 12- two men engaged on this machine) Rs. 288

Insurance etc. Rs. 36

Cotton waste, oil etc Rs. 60

salary of foremen ($\frac{1}{4}^{\text{th}}$ of his time is occupied by this machine and the remainder equally upon the other two machines) Rs. 6,000

The cost of machine is Rs. 9,200 and it has an estimated scrap value of Rs. 200. It is assumed from past experience

(a) that the machine will work 1800 hours per annum.

(b) that the cost of repairs and maintenance over the life of machine will be Rs. 1125.

(c) that is consumer 5 unit of power per hour at the cost of 6 paisa per unit and

(d) that the working life of the machine will be 18000 hrs.

Solution :

Working Notes :

1. Dep = $\frac{\text{Cost of the asset} - \text{scrap value}}{\text{Estimated hours p.a.}}$

$$\frac{9200-200}{18000} = \frac{9000}{18000} = 0.50 \text{ per hour.}$$

2. Repairs and maintenance :

$$\frac{\text{Repair expenses p.a}}{\text{No. of hrs p.a}} = \frac{1125}{1800} = 0.06,$$

3. Power = 5 units per hour @ 6 paisa per unit $5 \times 0.06 = 0.30$ p.

Sol :

Computation of Machine Hour Rate

Particulars	Amt (Rs)	Amt (Rs)
A. Standing charges		
Rent $\left(\frac{1}{5}^{th} \text{ of dept}\right)\left(780\times\frac{1}{5}\right)$	156.00	
lighting (for 2 men) $\left(\frac{288}{12}\times 2\right)$	48.00	
cotton waste, oil	60.00	
Insurance.	36.00	
Foremen salary ($\frac{1}{4}^{th}$ of his time occupied by his machine)	1500.00	
Annual standing charges →	1800.00	
Hourly rate = $\left(\frac{1800}{1800}\right)$		1.00
B. Variable charges		
Depreciation (working notes)		0.50
Repairs and maintenance (working notes)		0.06
Power (5 × 0.06)		0.30
Machine hour rate →		1.86

9. The following expenses have been incurred in respect of a shop having 5 identical machines.

Rent and Rate Rs. 4000

Power consumed by the shop @ $6\frac{1}{4}$p. per unit Rs. 3750

Repairs and maintenance for the machine Rs. 1000

Lighting charges for the lighting of the shop Rs. 500

Attendant's salary there are two attendants and

(each is paid Rs. 50 per month)

Supervision's salary :

- There is one supervisor for the 5 machines his monthly salary is Rs. 300/-
- Lubricants and cotton waste for the shop Rs. 100
- Hire purchase installment for the machine Rs. 2300

(including Rs. 300 for Interest)

- Each machines consumes 10 units of power per hour
- Depreciation on each machine Rs. 600.

Compute the machine hour rate.

Solution :

Working Notes

1. Annual working hours are not given in the problem. Power consumed has been given for the purpose of calculating working hours.

Total power consumed = Rs. 3,750

Rate of power = Rs. 0.0625 per unit consumed by 5 machines.

$$= \frac{3750}{0.0625} = 60,000 \text{ units}$$

60,000 units consumed for the shop having 5 machines.

for each machine = $\frac{60,000}{5} = 12000$ units p.a

The machine consumes 10 units of power per hour.

Therefore, each machine has worked for $\frac{12000}{10} = 1200$ hrs p.a.

2. Machine have been purchase on hire - purchase system. While comparing machine hour rate, only interest paid on installments will be taken into consideration.
3. Lubricants and cotton wastes and repairs and maintenance charges are given for the shop, having 5 identical machines.

Computation of Machine - Hour Rate for a Machine

Particulars	Amt	Amt
A. Standing charges		
Rent and Rates $\frac{4000 \text{ p.a}}{5 \text{ machines}}$	800	
Lighting charges $\frac{500 \text{ p.a}}{5 \text{ machines}}$	100	
Attendant's salary Yearly salary = 50 × 2 × 12 = 1200		
for 1 machine = $\frac{1200}{5 \text{ machine}}$	240	
Supervisor's salary		
yearly = 300 × 12 = 3600		
for 1 machine = $\frac{3600}{5}$	720	
Lubricants and cotton waste $\frac{100 \text{ p.a}}{5 \text{ machine}}$	20	
Interest on hire purchase for 1 machine = $\frac{300}{5}$	60	
Total standing charges p.a	1940	
Per hour = $\frac{\text{Total Amt p.a}}{\text{Total hours p.a}} = \left(\frac{1940}{1200}\right)$		1.62
B. Variable charges		
Depreciation = $\frac{600 \text{ p.a}}{1200 \text{ hrs}}$		0.50
Repairs and maintenance		
for one machine = $\frac{1000}{5} = 200$		0.17
$= \frac{200 \text{ p.a}}{1200 \text{ hrs}}$		
Power		
Per hrs 10 units @ 0.0625		0.63
Machine hour rate →		2.92

10. A machine costs Rs. 90,000 and is deemed to have a scrap value of 5% at the end of its effective life (19 years), ordinary, the machine is expected to run for 2,400 hours per annum but it is estimated that 150 hours will be lost for normal repairs and maintenance and further 750 hours will be lost due to staggering. The other details in respect of the machine shop are :

(a) Wages, bonus and provident fund contribution of each of two operators (each operator is in charge of two machines) = 6000 per year

(b) Rent and Rates of the shop (each operator is in charge of two machines) = 3000 p.a

(c) General lighting of the shop (each operator is in charge of two machines) = 250 p.m

(d) Insurance premium for the machine (each operator is incharge of two machines) = 200 per quarter

(e) Cost of repairs and maintenance per machine (each operator is in charge of two machines) = 250. p.m

(f) Shop supervisor's salary (each operator is incharge of two machines) = 500 p.m

(g) power consumption of the machine per hour 20 units, rat of power per 100 units Rs. 10.

(h) Other factory over head attributable to the shop Rs. 4000 p.a

There are four identical machines in the shop. The supervisor is expected to devote one-fifth of his time for supervising machine. Compute a comprehensive machine hour rate from the above details.

Solution :

Working Notes

1. It is presumed that 750 hours are lost due to normal staggering. Hence the normal working hours are 1500 i.e., [2400 – (150 + 750)]

2. If staggering is not considered to be a normal feature, normal working hours should be taken as 2,250.

Sol :

Computation of Machine Hour Rate

Particulars		Amt (Rs.)	Amt (Rs.)
A.	**Standing charges per annum**		
	Rent and Rates	750	
	General lighting	750	
	Insurance	800	
	Supervision's salary	200	
	Allocated overheads	1000	
	Total standing charges	4500	
	Standing charges per hour	$\left(\frac{4500}{1500 \text{ hrs}}\right)$	3.00
B.	**Variable charges**		
	Wages etc		2.00
	power		2.00
	Repairs and maintenance		2.00
	Depreciation		3.00
	Machine hour rate →		12.00

11. A Machine shop contains four newly purchased machines, each occupying practically equal amount of space and costing respectively A $\rightarrow$ Rs. 20, 000, B $\rightarrow$ Rs. 25000, C $\rightarrow$ Rs. 30,000 and D $\rightarrow$ Rs. 40,000.

Rent Rs. 10,000

Rates and water Rs. 4, 250 Power C 12000

Light and heat Rs. 3150 Power D 14500

Power A $\rightarrow$ 5100 Administrative 9500

Power B $\rightarrow$ 5000 Running expenses, repairs etc 20,000

The following are the expenses per annum of the machine shop calculate a machine - hour rate for each machine assuming 45 hours weeks, 50 weeks per year, 80% utilization and the life of machine being 10 years with out any scrap value.

Machine hours = $\frac{45 \times 50 \times 80}{100} = 1800$

Computation of machine hour rate

Particulars	Total	M- A	M - B	M - C	M- 'D'
A. Standing charges					
Rent (equal)	10,000	2,500	2,500	2,500	2,500
Rates & water (equal)	4,250	1062.5	1062.5	1062.5	1062.5
Light & heat (equal)	3,150	787.5	787.5	787.5	787.5
Administrative (equal)	9,500	2,375	2,375	2,375	2,375
	26,900	6,725	6,725	6,725	6,725
Hourly Rate	1800 hrs	3.74	3.74	3.74	3.74
$\left(\frac{6725}{1800} = 3.74\right)$					

B. Variable expenses					
Depreciation					
$A=\frac{20,000}{18,000};B=\frac{25,000}{18,000}$		1.11	1.39	1.67	2.22
$C=\frac{30,000}{18,000};B=\frac{40,000}{18,000}$					
Power					
$A=\frac{5100}{1800};B=\frac{5000}{1800}$		2.83	2.78	6.67	8.06
$C=\frac{12000}{1800};D=\frac{14000}{1800}$					
Running expenses		1.93	2.42	2.90	3.86
Machine - hour Rate		9.61	10.33	14.98	17.88

Note : Running expenses have been apportioned on the basis of capital value of the machine.

12. A machine costing Rs. 10,000 is expected to run for 10 years at the end of which period the scrap value is likely to be Rs. 900. Repairs during the whole life of the machine are expected to be Rs. 1800 and the machine is expected to run 4380 hours per year on an average. Its electricity consumption is 15 units per hour, the rate per unit being 5 paise.

The machine occupies one fourth of the area of the department and has two points over of a total of ten for lighting the foreman has to denote about one sixth of his time to the machine. The monthly rent of the department is Rs. 300 and the lighting charges amount to Rs. 80 per month.

The foreman is paid a monthly salary of Rs. 960. Insurance os 1% per annum of the machine value. Consumable stores Rs. 9/- per month. Compute machine hour rate.

Particulars	Amt (in Rs.)	Amt (in Rs.)
I. Standing charges		
Rent (300 × 1/4)	75.00	
Lighting $\left(80 \times \frac{2}{10}\right)$	16.00	
Foreman's salary $\left(960 \times \frac{1}{6}\right)$	160.00	
Consumable stores	9.00	
Insurance $\left(10,000 \times \frac{1}{12} \times \frac{1}{100}\right)$	8.33	
Total standing charges →	268.33	
Hourly standing charges $\frac{268.33}{365 \text{ hrs}}$		0.735
II. Variable (or) Machine expenses		
Deprecation $\frac{10,000-900}{10} = \frac{9100}{10}$ = 910		
Hrlyrate = $\left(\frac{910}{4380}\right)$		0.208
Repairs $\frac{1800}{10 \times 4380}$		0.041
electricity consumption		0.750
15 × 0.5 P		
Machine hour rate		1.734
Calculation of no of hours works for 1 month		
$\frac{4380}{12} = 365 \text{ hrs p.m}$		

13. In a machine shop, the machine hour rate is worked out at the beginning of a year on the basis of a 13 weeks period which is equal to three calendar months. The following estimates for operating a machine are relevant :

Total working hours available per week	48 hours
Maintenance time included in the above	2 hours
Setting up time included in the above	2 hours

Cost details

operators wages (per month)	Rs. 650
Supervisors salary (per month)	Rs. 1500
	(common supervisor for 3 machines)

W.D.V. of machine (Depreciation at 10% plus 2% on average for extra shift allowance) Rs. 180,000

Repairs and maintenance (per annum) Rs. 16,000

Consumable stores (p.a) Rs 30,000

Rent, Rates & taxes (for the quarter apportioned) Rs. 5,000

Power consumed is @ 15 units per hour @ 40 paise per unit. Power is required for productive hour's only. Setting up time is part of productive time but no power is required for setting up jobs.

The operator and supervisor are permanent. Repairs and maintenance and consumable stores are variable.

You are required to work out the machine hour rate.

Solution :

Note :

1) Depreciation has been treated as a variable expresses.

2) Deprecation per annum is Rs. 21, 600 @ 12% on Rs. 180,000

3) Effective hours (46 × 13) = 598 hours.

Computation of machine hour rate

	Particular	Amt (in Rs.)	Amt (in Rs.)
A.	**Standing charges**		
	Rent, Rates and taxes	5000	
	Supervision	5400	
	Operators wages	1950	
	Total standing charges →	12,350	
	Standing charge per hour		
	standing charges per hour = $\frac{12350}{598}$		20.65
B.	**Variable cost**		
	Power $\left(\frac{15\times 44\times 0.40}{46}\right)$		5.74
	Repairs and maintenance $\left(\frac{4000}{598}\right)$		6.69
	Consumable stores $\left(\frac{7500}{598}\right)$		12.54
	Depreciation $\left[\begin{array}{l} 21,600\times\frac{13}{52}=5400 \\ 5,400/598=903 \end{array}\right]$		9.03
	Machine hour Rate		54.65

14. Compute machine hour rate from the following information.

a) Cost of the machine : Rs. 10,000; estimated scrap value, after expiry of its life 10 years, 1,000; estimated working hours of the machine 50 weeks of 44 hours per annum, of which maintenance is expected to take up 200 hours. No other loss of working time is expected. The setting up time is estimated at 5% of the total productive time. No power is necessary for maintenance and set up.

b) Power consumption of the machine is 10 units per hour @ 10 paisa per unit.

c) The machine requires a chemical solution that is replaced at the end of each week at a cost of Rs. 20.

d) Estimated cost of maintenance is Rs. 1200 p.a

e) Two attendants control the machine together with 5 other identical machines in the shop, each getting wages of Rs. 60 per week.

f) Insurance of the machine is 1% p.a.

g) Rent and rates of the shop per annum is Rs. 1200.

h) Departmental overhead apportioned to this machine amounts, to Rs. 1250 p.a.

i) Repairs of the machine are estimates at 50% of deprecation.

Solution :

Computation of Machine Hour Rate

Particulars		Amt (Rs.)	Amt (Rs.)
A.	**Standing charges**		
	Depreciation	900	
	Rent	200	
	Chemical solution	1000	
	Maintenance	1200	
	Insurance	100	
	Attendant $\left(\frac{2\times 50\times 60}{6}\right)$	1000	
	Over heads	1250	
	Repairs	450	
	Total standing charges $\rightarrow$	6100	
	Standing charges per hour $\left(\frac{6100}{1900 \text{ hrs}}\right)$		3.2105
B.	**Variable expenses**		
	Power		1.00
	Machine hour rate per hour $\rightarrow$		4.2105

Note :

Total Hours : 44 hrs × 50 weeks	=	2200 hrs
Less : Maintenance	=	200 hrs
		2000 hrs.
Less : set up 5% effective hours		100 hrs
$\left(2000 \times \frac{5}{100}\right)$ = 100		
Total hrs →		1900 hrs

1.14 ACTIVITY-BASED COSTING

Activity-Based Costing (ABC) is a method for estimating the resources required to operate an organization's business processes, produce its products and serve its customers.

In a business organization, the ABC methodology assigns an organization's resource costs through activities to the products and services provided to its customers. It is generally used as a tool for understanding product and customer cost and profitability. As such, ABC has predominantly been used to support strategic decisions such as pricing, outsourcing and identification and measurement of process improvement initiatives.

Activity-based Costing (ABC) is an alternative to the traditional way of accounting. ABC is a costing model that identifies the cost pools, or activity centers, in an organization. It assigns costs to products and services (cost drivers), based on the number of events or transactions that are taking place in the process of providing a product or service. As a result, Activity-based Management can support managers to see how shareholder value can be maximized and how corporate performance can be improved.

Characteristics of ABC

- Simple traditional distinction made between fixed and variable cost is not enough guide to provide quality information to design a cost system/
- The more appropriate distinction between cost behaviour patterns are volume related, diversity related, events related and time related.
- Cost drivers need to be identified.

Benefits of Activity-Based Costing

- Identify the most profitable customers, products and channels.
- Identify the least profitable customers, products and channels.
- Determine the true contributors to- and detractors from- financial performance.
- Accurately predict costs, profits and resources requirements associated with changes in production volumes, organizational structure and costs of resources.
- Easily identify the root causes of poor financial performance.
- Track costs of activities and work processes.
- Equip managers with cost intelligence to stimulate improvements.
- Facilitate a better Marketing Mix
- Enhance the bargaining power with the customer.
- Achieve better Positioning of products

Limitations of Activity – based Costing

The following are the limitations of ABC :

a) Allocation : Not all costs have appropriate or unambiguous activity or resource consumption cost drivers. Some costs require allocations to department and pre-cuts based on arbitrary volume measures because finding the activity that causes the cost is impractical. Ex : facility-sustaining costs such as cost of the information systems, factory manager's salary, factory insurance etc.

b) Omission of Costs : Product or service costs identified by an ABC system are likely to not include all costs associated with the product or service. Product or service costs typically do not include costs for such activities as marketing, advertising, research and development, and product engineering even though some of these costs can be traced to individual products or services. Product costs do not include these costs because generally accepted accounting principles (GAAP) for financial reporting require them to be treated as period costs.

c) Expense and Time : An ABC system is not cost free and is time-consuming to develop and implement. For firms or organizations that have been using a traditional volume-based costing system, installing a new ABC system is likely to be very expensive. Furthermore, like most innovative management or accounting systems, ABC usually requires a year or longer for successful development and implementation.

1.14.1 Activity-Based Cost System

Activity-based costing emphasizes the need to obtain a better understanding of the behaviour of overhead costs and thus it seeks to ascertain

i) what causes costs and

ii) how they relate to product or services.

ABC recognizes that in the long run most costs are not fixed and seeks to understand the forces that cause overhead costs to change over time. Activity-based costing is a system that focuses on activities, as the activities cause costs, Activity-based costing systems assume that cash outflows are incurred to acquire a supply of resources, which are consumed by activities. A link is made between activities and products by assigning costs to products based on individual product's consumption or demand for each activity.

Stages in Activity-Based Costing System

The major stages in the development of an Activity-based costing system are :

a) Identifying major activities that take place in an organization

b) Creating a cost pool/cost centre for each activity or costing activities

c) Determining costs driver for each major activity

d) Assigning cost of activities to products based on product's consumption or demand for activities

a) Identifying Activities : The first stage is to identify the major activities in the organization. The activities include machine-related activities, direct labour-related activities and various support activities such as ordering, receiving, material handling, parts administration, production scheduling, packing and dispatching. This step required the management accountant to acquire a familiarity with what is happening in the indirect areas of the organization. This has to be done systematically and involves examining physical plans of the work place and payroll listings. This examination normally has to be supplemented by the observation of work and by a series of interviews with staff involved.

A number of criteria underlie the choice of activities. The activities should be at a reasonable level of aggregation. To break down activities into actions and tasks is usually too detailed for product costing. Such actions and tasks are normally combined into large purpose-oriented activities. Final choice of activities will be judgmental in any organization.

b) Creating a Cost Pool / Cost Centre : The second stage requires that a cost centre be created for each activity. The total cost of all setups might constitute one cost centre for all set-up related costs. After establishing the activity structure for the system, it is necessary to identify the resources consumed by each individual activity during the relevant period. This provides the basis for identifying level of costs in each pool. Both allocation and apportionment will be involved at this stage. In the absence of time records, labour and equipment usage will have to b identified in broad terms by observation and interviews.

For other costs, such as occupancy, the most appropriate available measures of resource consumption. Thus some amount of approximation and estimation is inherent in even Activity-based costing systems. The activity cost information generated on this pattern is very useful. It represents novel profiling of overhead cost for management rather than analyzing the cost in terms of inputs. It indicates how resources have been applied in the business.

c) Determining the Cost Drivers for each Activity : The next step is to identify the factors that influence the cost of a particular activity. The cost drivers are very significant determinants of the cost of activities. If production scheduling cost is generated by the number of production runs, that each production generates, then number of set-ups would represent the cost driver for production scheduling.

A cost driver is a variable, which determines the work volume or work load of a particular activity. It will provide the justification for amount of resources consumed by an activity and hence its cost. Due to this causal relationship it will be a significant measure of activity cost variation. To permit its practical application in an Activity-based costing system it must be conveniently measurable and readily attributable to individual products. Most cost drivers will reflect the transactions, which underlie the activity under consideration.

d) Assigning Cost of activities to Products : The last step involves tracing the cost of activities to products according to product's demand for these activities during the production process. A product demand for the activities is measured by a number of transactions it generates for the cost driver. The best way to complete the final step is to apply cost driven rate to individual products.

If the cost driver rate is to be practical the variable chosen must be measurable in a way which permits its identification with individual products. For example, the number of parts associated with each product must be known, if products are to be individually costed. The requirement may represent one of the significant costs of ABC, especially where a new system has to be established to collect the cost driver information, both in total and for each product.

Factors Affecting the Development of Activity-Based Costing System

- Growing overhead costs because of increasingly automated production.
- Decreasing costs of information processing because of continual improvements and increasing application of information technology.
- Increasing market competition, which necessitated more accurate product costs.
- Increasing product diversity to secure economies of scope and increased market share.

1.14.2 Main Activities and its Cost Drivers

Main Activities	Cost Drivers
Customer order processing	Order value Order source (new /old customer) Order source (customer location)
Material planning /acquisition	Number of material transactions
Inspection	Volume of material receipts Volume of material orders Inspection plans Number of problem suppliers Gauge usage Lack of good quality
Production control	Engineering changes Supplies performance Number of parts operational Make versus buy policy Number of machine changes Order board changes
Production	Number to be supervised Shift patterns Industrial relations issues Flow of product from assembly Volume of service parts/kit packing
Maintenance	Number of machine breakdown Maintenance schedule Capital expenditure Activity levels

Systems	Number of systems operational Number of systems devices Adequacy of times accounts produced
Control quality Financial accounting	Inspection plans Number of accounting transactions Number of times accounts produced Volume of activity Coordinated shipping process
Management accounting	Accuracy of feeder systems Management requirements Corporate requirements
Personnel	Activity levels Recruitment activity Industrial relations climate Training requirements

Functional Areas	Activities Involved	Cost driver
Material Management	1. Issuing tenders	No. of tenders issued
	2. Receiving of indents	No. of indents
	3. Analysis of offers from suppliers	No. of purchase orders
	4. Issue of purchase orders	No. of purchase orders
	5. Inspection of materials	No. of purchase orders
	6. Information to stores for receiving the materials	No. of purchase orders
Stores Management	1. Storing the materials	Value of materials stored
	2. Servicing of requisitions	No. of requisitons
	3. Inspection and verification	No. of times inspected
	4. Taking perpetual stock taking	Value of stock handled

Quality Control	1. Receipt of Samples	
Management	2. Testing the samples	No. of batches produced
	3. Issue of Test Certificates	
Personnel	1. Recruitment	No. of employees recruited
	2. Maintenance of records of attendance, leave, increment, etc.	No. of employees
	3. Training	No. of employees
	4. Industrial relations	No. of employees
	5. Settlement of industrial disputes	No. of employees
	6. Labour turnover	No. of employees replaced
Marketing	1. Demand creation	%age increase in sales
	2. Advertising effort	%age increase in sales
	3. Analysis of feedback from sales	Time spent with distributors, customers
	4. Preparation of Sales Forecasts	Time spent

1.14.3 Implementation of Activity-Based Costing System

The following are the standard implementation steps for Activity-based costing system :

a) Obtain high-level support : An ABC project involves the procurement of funding and dealing with multiple departments. To make these chores easier, it is necessary that there should be a high-level supporter of the project on the management team, who can give enough push through the corporate bureaucracy to ensure that project is completed in time.

b) Obtain a project schedule and budget : The project team leader should work with the high-level project sponsor to obtain a project schedule and funding that is sufficient for completion of the project.

c) **Assemble the ABC team :** In view of the wide array of knowledge required to formulate an ABC systems, it should include employees from the engineering, marketing, materials management, computer services and production departments.

d) **Train the team :** An in-house expert or a consultant can be brought in to conduct an intensive review session with the team.

e) **Gather information :** The project team requires collecting data to identify activities, costs, relationships between activities and costs and types of cost drivers. The best information is usually obtained through interview,. Additional sources of information are the general ledger, financial statements and a detailed review of all costs. The project team can also obtain general operational information by observing operations in action.

f) **Conduct modeling and analysis :** With all information in hand, the team should use flow charting to determine how activities occur and flow through departments. It is at this point that resource drivers, cost pools and activities are identified and documented.

g) **Select and purchase a software package :** It may be necessary to purchase a third-party ABC software package, which typically makes it easier to conduct analysis and ad hoc enquires. It also makes it easier to control the systems since all ABC –related files are kept in one place.

h) **Create a software linkage :** It may be possible to create automated linkages between ABC system and other systems such as general ledger that allows one to save time by streamlining the flow of information into the ABC system. The interfaces should be carefully tested to ensure dependability.

i) **Test the software :** An ABC system usually requires an entirely new set of reports. These may be constructed with ABC package's report writer or customerised or written with the aid of a third party's software package. The team should create sample reports with test transactions to be certain that reports function as planned.

j) **Design reports :** An ABC system usually requires an entirely new set of reports. These may be constructed with Activity-based costing package's report writer or customerised or written with the aid of a third party's software package the team should create sample reports with test transactions to be certain that reports function as planned.

1.14.4 Uses of Implementing Activity-based Costing

The following are the uses of ABC :

a) **Cost Management and Downsizing :** ABC helps to reduce costs by providing meaningful information on the opportunities available for reducing costs. If the company's financial performance is not satisfactory, it may have to resort to extreme measures like layoffs. ABC helps in making the right decisions. Thus one can focus on value adding activities and eliminating the non-value adding activities.

b) **Determination of Products Service Costs :** Now-a-days, non-manufacturing costs can no longer be neglected as they constitute a substantial portion of the total cost. Manufacturing costs constitute a very small proportion of the total cost. These non-manufacturing costs can be allocated easily using ABC because of the relationship between costs and its causes is better understood.

c) **Improvement in Performance :** ABC involves preparing the statement of expenditure activity-wise and comparing it with the corresponding value addition to know the activities which are to be eliminated or need improvement for better performance of the organization. ABC provides accurate cost information which is essential for most of the recent productivity improvements approaches like Total Quality Management, Business Process Reengineering.

d) **Product / Service Pricing :** ABC enables the management to fix the product/service prices by formulating an effective pricing policy. ABC helps in price fixation by providing information about the product/service cost.

e) **Make or Buy Decision :** ABC enables the managers to decide whether he should get the activity done within the firm or subcontract the same to an outside agency. Subcontracting may be done if the firm is incurring higher overhead cost as compared to the subcontractor. If the cost is not going to decrease or the resources fed by sub-contracting cannot be economically diverted elsewhere, the company should get the activity done internally.

f) **Transfer Pricing :** ABC helps to determine the cost of each activity. ABC provides accurate cost information to evaluate the performance of the transferor and transferee departments.

1.14.5 Cost Drivers

A cost driver is a structural determinant of cost related activity. The logic behind is that the cost behaviour pattern must be understood so that behaviour pattern is dictated by cost drivers. In tracing overhead cost to product, a cost behaviour pattern must be understood so that appropriate cost driver could be identified. A Cost Driver is any activity that causes a cost to be incurred.

The Activity-based Costing (ABC) approach relates indirect cost to the activities that drive them to be incurred. In traditional costing the cost driver to allocate indirect cost to cost objects was volume of output. With the change in business structures, technology and thereby cost structures it was found that the volume of output was not the only cost driver.

1.14.6 Types of Cost Drivers

Cost drivers are classified as :

a) Pure Volume Cost Drivers : Pure volume cost drivers are most common and represent a reasonable homogeneous measure of the output of the activity concerned. Number of customers or number of inspections or number of callouts are pure volume cost drivers.

b) Weighted Volume Cost Drivers : These cost drivers are used, where the output of activity is clearly non-homogeneous. If purchasing were an activity pool and purchase orders were made both domestically and overseas, the overseas orders may involve considerable more administrative work. In this situation it may b advantageous to weigh the over sea orders vis-a-vis the home orders. Based on the assessment of work undertaken to make respective orders, it may be decided that each overseas order be weighted by 1.5 before determining the total weighted volume of cost driver to be used in calculating the appropriate rate.

c) Situational Cost Drivers : Sometimes a situational characteristics of the activity can be important in determining its work load and thus hold credence as its cost driver. The number of suppliers pertaining to a particular purchasing activity could be used as the cost driver.

d) Motivational Cost Drivers : These cost drivers are used when the intention is to motivate cost-conscious behaviour rather than produce product cost information in the most accurate manner. This type of cost driver may lack some of the qualities that are mentioned in other cost drivers but its selection may give prominence to one particular aspect of operations and influence managerial behaviour in a desired manner.

To carry out a value chain analysis, ABC is a necessary tool. To carry out ABC, it is necessary that cost drivers are established for different cost pools.

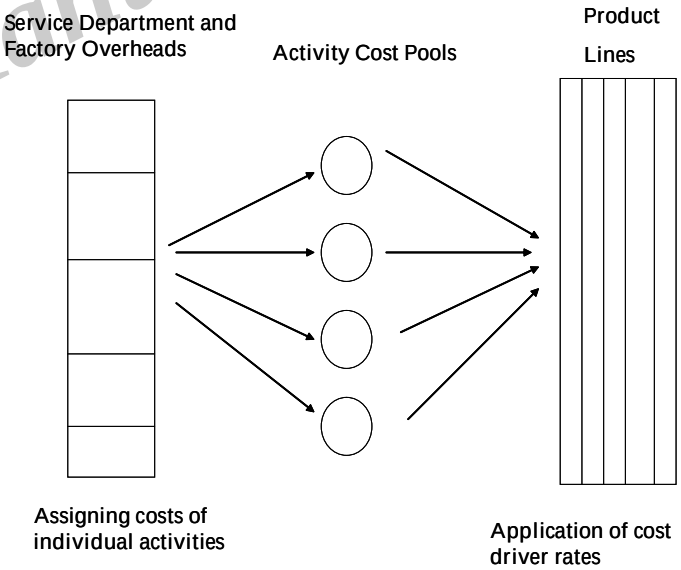
1.14.7 Cost Pools

Costs are grouped into pools according to the activities which drive them. For example, A cost pool may be of procurement of goods. In this, all the costs associated with procurement would be included in this cost pool and cost driver identified. The procurement cost per requisitions is then calculated and this provides a means of tracing the cost of procurement to product. The technique of ABC lays importance on different costs for different purposes and the identification of just those costs which are relevant to a particular decision.

1.14.8 Allocation of Overhead under ABC System

The short-term variable costs should be identified to products using volume related cost drivers such as direct labour hour, direct material cost, machine hours etc. Kalpan and Cooper claimed that volume related cost drivers are inappropriate for tracing most long-term variable costs to produce because they are driven by complexity and variety and not be volume and the key to understanding what causes overhead costs in the transactions undertaken by support departments. The allocation of service departments costs and factory overheads to product lines under ABC systems is shown in the below figure :

Allocation of Overhead Costs under ABC



1.14.9 Activity-based Costing Vs. Traditional Based Costing

Activity-based Costing	Traditional Based Costing
Often use direct labor hours, machine hours, or other unit-level allocation bases to assign the portion of overhead costs that move in tandem with the volume of production. However, unlike traditional systems, ABC also uses additional allocation bases that are not related to the volume of production to assign overhead costs that are not correlated with volume.	Relying exclusively on volume measures such as direct labour hours or machine hours to assign overhead costs to products.
Assigns both manufacturing and non-manufacturing costs to products. For example, ABC systems can assign sales commissions, shipping costs, and warranty repair costs to specific products	Assign only manufacturing costs to products.
Do not assign all manufacturing costs to products. ABC only assigns a cost to a product if decisions. Concerning that product will cause changes in the cost.	Assign all manufacturing costs to products.
Uses more cost pools. ABC cost pools are created to correspond to the activities performed in an organization that cause the consumption of overhead resources. The total number of ABC cost pools will definitely exceed one (as in the plant-wide approach) and it is likely to exceed the number of departments within a company (as in the departmental approach) since more than one activity is often performed within each department.	Often use a single plant-wide overhead pool or just one overhead pool per department. Rely solely on volume as the base for allocating overhead costs. The most common allocation bases in traditional cost systems are direct labour hours and machine hours. These bases work correctly when changes in the quantity of the base are correlated with changes in the overhead costs being assigned using the base.

1.14.10 Criticism of Activity-based Costing

Activity-based costing provides better information than traditional overhead allocation process. Still it is not the presence for all managerial problems. Following criticism has been leveled against ABC system.

1. ABC system implementation requires significant amount of time and cost to implement.
2. An environment of change must b created for implementation of ABC system. It requires overcoming a variety of individuals, organizational and environmental barriers as follows :
   a) Fear of unknown and shift in status quo.
   b) Potential loss of status.
   c) A necessity to learn new skill.

   To overcome these barriers, a firm must recognize that these barriers exist. The causes of the barriers should be investigated. Then organization should communicate information about what, why and how of ABC to all concerned parties. It presents limitations of ABC system.
3. Top management must be involved and support the implementation process. Lack of commitment or involvement of top management will make any meaningful progress slow and difficult.
4. Employees and managers must be educated in some non-traditional techniques that include new terminology, concepts and performance measurements.
5. Additional time will be required to analyze the activities taking place in the activity centres, trace cost to those activities and determining the cost drivers.
6. it does not conform to Generally Accepted Accounting Principle (GAAP). ABC would suggest that some non-product cost be allocated to products whereas certain traditionally designated product cost may not be allocated to products.

Therefore, most companies have used ABC for internal reporting while continuing to maintain their general and subsidiary ledger accounts and prepare their external financial statements on the basis of traditional system.

7. ABC does not promote Total Quality Management (TQM) and continuous improvements. Activity-based prescriptions for improved competitiveness usually entails steps that lead to selling more or doing less what should not have been done in the first place. It does not make company a long-tern global competitor.

1.14.11 Activity Cost Drivers

Applying overhead costs to each product or service based on the extent to which that product or service causes overhead cost to be incurred is the primary objective of accounting for overhead costs. In many production processes, when overhead is applied to products using a single pre-determined overhead rate based on a single activity measure. With Activity-Based Costing (ABC), multiple activities are identified in the production process that is associated with costs. The events within these activities that cause work (costs) are called cost drivers.

Examples of overhead cost drivers are machine setups, material-handling operations, and the number of steps in a manufacturing process. Examples of costs drivers in non-manufacturing organizations are hospital beds occupied, the number of take-offs and lending for an airline, and the number of rooms occupied in a hotel. The cost drivers are used to apply overhead to products and services when using ABC.

The following five steps are used to apply costs to products under an ABC system:

1. Choose appropriate activities
2. Trace costs to activities
3. Determine cost drivers for each activity
4. Estimate the application rate for each cost driver
5. Apply costs to products.

These steps are discussed in more detail above.

a) Choose Appropriate Activities : Involve producing a product or providing a service. The various activities within an organization. The first step of ABC is to choose the activities that will be the intermediate cost objectives of overhead costs. These activities do not necessarily coincide

with existing departments but rather represent a group of transactions that support the production process. Typical activities used in ABC are designing, ordering, scheduling, moving materials, controlling inventory, and controlling quality. Each of these activities is composed 'of transactions that result in costs. More than one cost pool can be established for each activity. A cost pool is an account to record the costs of an activity with a specific cost driver.

b) Trace Costs to Activities : Once the activities have been chosen, costs must be traced to the cost pools for different activities. To facilitate this tracing, cost drivers are chosen to act as vehicles for distributing costs. These cost drivers are often called resource drivers. A pre-determined rate is estimated for each resource driver. Consumption of the resource driver in combination with the pre-determined rate determines the distribution of the resource costs to the activities.

c) Determine Cost Drivers for Activities : Cost drivers for activities are sometimes called activity drivers. Activity drivers represent the event that causes costs within an activity. For example, activity drivers for the purchasing activity include negotiations with vendors, ordering materials, scheduling' their arrival, and perhaps inspection. Each of these activity drivers represents costly procedures that are performed in the purchasing activity. An activity driver is chosen for each cost pool. If two cost pools use the same cost driver, then the cost pools could be combined for product-costing purposes.

Cooper has developed several criteria for choosing activity drivers. First, the data on the cost driver must be easy to obtain. Second, the consumption of the activity implied by the activity driver should be highly correlated with the actual consumption of the activity. The third criterion to consider is the behavioral effects induced by the choice of the activity driver. Activity drivers determine the application of costs, which in turn can affect individual performance measures.

The judicious use of more activity drivers increases the accuracy of product costs. Ostrenga concludes that there is a preferred sequence for accurate product costs. Direct costs are the most accurate in applying costs to

products. The application of overhead costs through cost drivers is the next most accurate process. Any remaining overhead costs must be allocated in a somewhat arbitrary manner, which is less accurate.

d) Estimate Application Rates for each Activity Driver : An application rate must be estimated for each activity driver. A pre-determined rate is estimated by dividing the cost pool by the estimated level of activity of the activity driver. Alternatively, an actual rate is determined by dividing the actual costs of the cost pool by the actual level of activity of the activity driver. Standard costs, could also be used to calculate a pre-determined rate.

e) Applying Costs to Products : The application of costs to products is calculated by multiplying the application rate times the usage of the activity driver in manufacturing a product or providing a service.

Problem No. 1

XYZ manufactures four products, namely A, B, C and D using the same plant and process. Following information relates to a production period :

Product	Volume	Material Cost per unit	Direct Labour per unit	Machine Time per unit	Labour Cost per unit
					`
A	500	5	1/2 hour	1/4 hour	3
B	5,000	5	1/2 hour	1/4 hour	3
C	600	16	2 hours	1 hour	12
D	7,000	7	$1\frac{1}{2}$ hours	$1\frac{1}{2}$ hours	9

Total production overhead recovered by the cost accounting system is analysed under the following headings:

	`
Factory overhead applicable to machine-oriented activity	37,425
Set-up costs	4,355
Cost of ordering materials	1,920
Handling materials	7,580
Administration for spare parts	8,600

These overhead costs are absorbed by products on a machine hour rate of ` 4.80 per hour giving an overhead cost per product of

A = ` 1.20; B = ` 1.20; C = ` 4.80; D = ` 7.20

However, investigation into the production overhead activities for the period reveals the following totals:

Product	Number of set-ups	Number of material orders	Number of times material was handled	Number of spare parts
A	1	1	2	2
B	6	4	10	5
C	2	1	3	1
D	8	4	12	4
	17	10	27	12

Your are required:

(i) To compute an overhead cost per product using activity based costing, tracing overheads to production units by means of cost drivers; and

(ii) To comment briefly on the difference disclosed between overheads traced by the present system and those traced by activity based costing.

Solution :

(i) Factory overhead applicable to machine-oriented activity = ` 37,425. According to activity based costing cost driver according to which these overheads are to be applied is machine hours.

Total machine hours = Volume × Machine hours required for each product

$$= 500 \times \frac{1}{4} + 5{,}000 \times \frac{1}{4} + 600 \times 1 + 7{,}000 \times 1\frac{1}{2} \text{ hours} = 12{,}475 \text{ hours}$$

Machine hour rate for machine overhead charges

$$= \frac{`37{,}425}{12{,}475 \text{ hours}} = ` 3 \text{ per hour}$$

Set-up costs to be applied on the basis of number of set-ups

$$= \frac{\text{`}4{,}355 \text{ (Set-up costs)}}{17 \text{ (Total number of set-ups)}}$$

= ` 256. kg per set up

Material ordering cost to be absorbed on the basis of number of material orders

$$= \text{`} \frac{1920 \text{ (Ordering cost)}}{10 \text{ (Ttoal No. of orders)}} = 192$$

(Cost driver is number of times material is ordered)

Overhead Items	A `	B `	C `	D `
Machine Overhead	0.75 (1/4 hour @ ` 3 per machine hour)	0.75 (For 1/4 hour @ ` 3 per machine hour)	3.00 (For 1 hour @ ` 3)	4.50 (For 11/2 hours @ ` 3)
Set-up cost	0.51 $\left(\frac{1 \times \text{`}256.18}{500 \text{(Volume)}}\right)$	0.31 $\left(\frac{6 \times \text{`}256.18}{500 \text{ (Volume)}}\right)$	0.85 $\left(\frac{2 \times \text{`}256.18}{600}\right)$	0.29 $\left(\frac{8 \times \text{`}256.18}{7{,}000}\right)$
Material handling cost	1.12 $\left(\frac{2 \times \text{`}280.74}{500}\right)$	0.56 $\left(\frac{10 \times \text{`}280.74}{5{,}000}\right)$	1.40 $\left(\frac{3 \times \text{`}280.74}{600}\right)$	0.48 $\left(\frac{12 \times \text{`}280.74}{7{,}000}\right)$
Material ordering cost	0.38 $\left(\frac{1 \times \text{`}192}{500}\right)$	0.15 $\left(\frac{4 \times \text{`}192}{5{,}000}\right)$	0.32 $\left(\frac{1 \times \text{`}192}{600}\right)$	0.11 $\left(\frac{4 \times \text{`}192}{7{,}000}\right)$
Administration for spare parts	2.87 $\left(\frac{2 \times \text{`}716.67}{500}\right)$	0.72 $\left(\frac{5 \times \text{`}716.67}{5{,}000}\right)$	1.19 $\left(\frac{1 \times \text{`}716.67}{600}\right)$	0.41 $\left(\frac{4 \times \text{`}716.67}{7{,}000}\right)$
Total overhead cost per unit according to activity based costing	5.63	2.49	6.76	5.79

$$\text{Material handling cost} = \frac{\text{`7,580 (Handling cost)}}{\text{27 (No. of time material handled)}}$$

= 280.74 per time material handled

(Cost driver is number of times material handled)

$$\text{Administration for spare parts} = \frac{\text{`8,600}}{\text{12 (Number of spare parts)}} = \text{` } 716.67$$

(ii) Overhead Cost Based on Two Systems and Their Difference

Products	Overhead cost per unit based on ABC system `	Overhead cost based on the present system of machine hour rate of ` 4.80 per hour `	Difference `
A	5.63	1.20 (For 1/4 hour @ ` 4.80 per hour)	+ 4.43
B	2.49	1.20 (For 1/4 hour @ ` 4.80 per hour)	+ 1.29
C	6.76	4.80 (For 1 hour @ ` 4.80)	+ 1.96
D	5.79	7.20 (For 1½ hour @ ` 4.80 per hour)	– 1.41

Problem No. 2

MNP suits is a ready-to-wear suit manufacturer. It has four customers : twm wholesale-channel customers and two retail-channel customers.

MNP suits has developed the following activity-based costing system :

Activity	Cost driver	Rate in 2010
Order processing	Number of purchase orders	` 1,225 per order
Sales visits	Number of customer visits	` 7,150 per visit
Delivery-regular	Number of regular deliveries	` 1,500 per delivery
Delivery-rushed	Number of rushed deliveries	` 4,250 per delivery

List selling price per suit is ` 1,000 and average cost per suit is ` 550. The CEO of MNP suits wants to evaluate the profitability of each of the four customers in 2009 to explore opportunities for increasing profitability of his company in 2010. Following data are available for 2009 :

Item	Whole sale Customers		Retail Customers	
	W	H	R	T
Total number of orders	44	62	212	250
Total number of sales visits	8	12	22	20
Regular deliveries	41	48	166	190
Rush deliveries	3	14	46	60
Average number of suits per order	400	200	30	25
Average selling price per suit	` 700	` 800	` 850	` 900

Required

(i) Calculate the customer-level operating income in 2009.

(ii) What do you recommend to CEO of MNP suits to do to increase the Company's operating income in 2010 `

(iii) Assume MNP suits' distribution channel costs are ` 17,50,000 for its wholesale customers and ` 10,50,000 for the retail customers. Also, assume that its Corporate sustaining costs are ` 12,50,000. Prepare Income Statement of MNP suits for 2009.

Solution :

(a) Statement showing Customer-level operating income in 2009

Particulars	**W** `	**H** `	**R** `	**T** `
Revenue at List Prices				
44 × 400 × ` 1,000	1,76,00,000			
62 × 200 × ` 1,000		1,24,00,000		
212 × 30 × ` 1,000			63,60,000	
250 × 25 × ` 1,000				62,50,000
Less : Discount				
17,600 (1,000 - 700)	52,80,000			
12,400 (1,000 - 800)		24,80,000		
6,360 (1,000 - 850)			9,54,000	
6,250 (1,000 - 900)				6,25,000

Revenue as per Actual Price	1,23,20,000	99,20,000	54,06,000	56,25,000
Less: Cost of Goods Sold @				
` 550 on Units Sold	96,80,000	68,20,000	34,98,000	34,37,500
Gross Margin (A)	**26,40,000**	**31,00,000**	**19,08,000**	**21,87,500**
Less : Customer Level Operating Cost:				
Order Processing (No. of Orders x	53,900	75,950	2,59,700	3,06,250
`1,225)				
Sales Visits				
(No. of Sales Visits × ` 7,150)	57,200	85,800	1,57,300	1,43,000
Delivery – Regular				
(No. of Regular Deliveries × ` 1,500)	61,500	72,000	2,49,000	2,85,000
Delivery - Rush				
(No. of Rush Deliveries × 7 4,250)	12,750	59,500	1,95,500	2,55,000
Total Operating Cost (B)	1,85,350	2,93,250	8,61,500	9,89,250
Customer Level Operating Income				
(A-B)	**24,54,650**	**28,06,750**	**10,46,500**	**11,98,250**
Customer Level Operating Income as				
% of on Revenue at Actual Prices	19.92	28.29	19.36	21.30

(ii) Key Challenges facing CEO are :

(a) Reduce level of price discounting especially by W

(b) Reduce level of customer level costs especially by R & T.

The ABC system highlights areas where R and T accounts are troublesome they have -

(i) A high number of orders

(ii) A high number of customer visits

(iii) A high number of rush deliveries.

The CEO needs to consider whether this high level of activity can be reduced without reducing customer revenues.

(iii) Income Statement of MNP Suits for 2009

	Wholesale Customers Total (`) (of W & H)	Retail Customers Total (`) (of R & T)	Total (`)
Customer Level Operating Income	52,61,400	22,44,750	75,06,150
Less: Distribution Channel Cost	17,50,000	10,50,000	28,00,000
Distribution Channel Level Operating Income	36,11,400	11,94,750	47,06,150
Less : Corporate Sustaining Costs			12,50,000
Operating Income			34,56,150

Working Notes

1. Calculation of Revenue at list prices

   A = 44 × 400 × 1,000 = 1,76,00,000

   B = 62 × 200 × 1,000 = 1,24,00,000

   C = 612 × 30 × 1,000 = 63,60,000

   D = 250 × 25 × 1,000 = 62,50,000

2. Calculation of Discount

   a = 17,600 (1,000 – 700) = 52,80,000

   b = 12,400 (1,000 – 800) = 24,80,000

   c = 6,360 (1,000 – 850) = 9,54,000

   d = 6,250 (1,000 – 900) = 6,25,000

Problem No. 3

Image Furnishing Ltd. manufacturers a variety of premium board room chairs. Its job-costing system is designed using an activity-based approach. There are two direct cost categories consisting of direct materials and direct manufacturing labour and three indirect costs pools representing three activity areas at the plant :

Manufacturing activity area	*Budgeted costs*	*Cost driver used as allocation base*	*Cost allocation rate*
Material handling	Rs. 2,00,000	Parts	Rs. 0.25
Cutting	21,60,000	Parts	2.50
Assembly	20,00,000	Direct manufacturing labour hours	25.00

Two styles of chairs were produced in March : executive chair and chairman chair. Their quantities, direct material costs and other data for Match are as follows :

Type of chair	*Units produced*	*Direct material costs*	*Number of parts*	*Direct manufacturing labour-hours*
Executive	5,000	Rs. 6,00,000	1,00,000	7,500
Chairman	100	25,000	3,500	500

To direct manufacturing labour rate is Rs. 20 per hour. Assuming no beginning / ending inventory, compute the total manufacturing costs and units costs of the two types of chairs.

Solution :

Manufacturing costs with Activity-based Costing

Particulars	**Executive chair**	**Chairman chair**
Direct manufacturing costs :		
Direct material costs	Rs. 6,00,000	Rs. 25,000
Direct manufacturing labour [(Executive chair 7,500 labour-hours, chairman chair, 500 labour-hours) × Rs. 20]	1,50,000	10,000
	(A) 7,50,000	35,000
Indirect manufacturing costs :		
Material handing [(Executive chair, 1,00,000 parts; Chairman chair, 3,500 parts) × Rs. 0.25]	25,000	875
Cutting [(Executive chair, 1,00,000 parts; Chairman chair, 3,500 parts) × Rs. 2.50]	2,50,000	8,750
Assembly [(Executive chair, direct manufacturing labour-hours, 7,500; Chairman chair, direct manufacturing labour-hours, 500) × Rs. 25]	1,87,500	12,500
	(B) 4,62,500	22,125
Total manufacturing costs (A + B)	12,12,500	57,125

Problem No. 4

The Aeronautical Ltd. has production facility specialising in jobs for the aircraft components market. The traditional costing system has two direct-cost categories, namely, direct materials and direct manufacturing labour and a single direct cost pool, that is, manufacturing overhead allocated on the basis of direct labour-hours. The indirect cost allocation rate would have been Rs. 115 direct manufacturing labour-hour.

The company has now decided to replace the single indirect cost pool with five indirect cost pools, representing five activity areas each with its own supervising and budget responsibility. The relevant data are as follows :

Activity area	*Cost drive used as an allocation base*	*Cost allocation rate*
Material handling	Parts	Rs. 0.40
Lathe work	Turns	0.20
Milling	Machine-hours	20.00
Grinding	Parts	0.80
Testing	Units tested	15.00

Two representative jobs processed under the system of the facility at the most recent period had the following features :

Particulars	*Job 101*	*Job 102*
Direct material costs per job	Rs. 9,700	Rs. 59,900
Direct manufacturing labour cost per job	750	11,250
Direct manufacturing labour-hours per job	25	375
Parts per job	500	2,000
Turns per job	20,000	60,000
Machine-hours per job	150	1,050
Units per job	10	200

Required :

(a) Compute the per unit manufacturing costs of each job under the traditional job-cutting system.

(b) Compute the per unit manufacturing cost of each job under the activity-based costing system.

Solution :

(a) Manufacturing Costs with Traditional Job Costing System

Particulars	Job 101	Job 102
Direct manufacturing costs per job :		
Direct materials per job	Rs. 9,700	Rs. 59,900
Direct manufacturing labour per job	750	11,250
	10,450	71,150
Indirect manufacturing costs per job :		
(Job 101, 25 labour-hours; job 102, 375 labour-hours) × Rs. 115	2,875	43,125
Total manufacturing costs per job	13,325	1,14,275

(b) Manufacturing Costs with Activity-based Costing System

Particulars	Job 101	Job 102
Direct manufacturing costs per job :		
Direct materials per job	Rs. 9,700	Rs. 59,900
Direct manufacturing labour per job	750	11,250
(A)	10,450	71,150
Indirect manufacturing costs :		
Materials handling [(Job 101, 500 parts; Job 102, 2,000 parts) × Rs. 0.40]	200	800
Lathe work [(Job 101, 20,000 units; Job 102, 60,000 turns) × Rs. 0.20]	4,000	12,000
Milling [(Job 101, 150 machine-hours; Job 102, 1,050 machine-hours) × Rs. 20]	3,000	21,000
Grinding [(Job 101, 500 parts, Job 102, 2,000 parts) × Rs.0.80]	400	1,600
Testing [(Job 101, 10 units; Job 102 200 units) × Rs. 15]	150	3,000
(B)	7,750	38,400
Total manufacturing costs (A + B)	18,200	1,09,550

Problem No. 5

Family Store wants information about the profitability of individual product lines: soft drinks, fresh produce and packaged food. The store provides the following data for the current year for each product line :

	Soft Drinks	*Fresh Produce*	*Packaged Food*
Revenues	Rs. 7,93,500	Rs. 21,00,600	Rs. 12,09,000
Cost of goods sold	6,00,000	15,00,000	9,00,000
Cost of bottles returned	12,000	0	0
Number of purchase orders placed	360	840	360
Number of deliveries received	300	2,190	660
Hours of shelf-stocking time	540	5,400	2,700
Items sold	1,26,000	11,04,000	3,06,000

Family store also provides the following information for the current year :

Activity	**Description of activity**	**Total cost**	**Cost-allocation base**
Bottle returns	Returning of empty bottles	Rs. 12,000	Direct tracing of soft drink line
Ordering	Placing of orders for purchases	1,56,000	1,560 purchase orders
Delivery	Physical delivery and receipt of goods	2,52,000	3,150 deliveries
Shelf-stocking	Stocking of goods on store shelves and on-going restocking	1,72,800	8,640 hours of shelf-stocking time
Customer-support	Assistance provided to customers including checkout	3,07,200	15,36,000 items sold

Required :

(i) Family store currently allocates support cost (all costs other than cost of goods sold) to product lines on the basis of cost of goods sold of each product line. Calculate the operating income and operating income as a % of revenues for each product line.

(ii) If Family store allocates support costs (other than cost of goods sold) to product lines using an activity-based costing system, calculate the operating income and operating income as a % of revenues for each product line.

(iii) Comment on your answers in requirements (i) and (ii).

Solution :

(i) Statement showing Operating Income and Operating Income as a percentage of Revenues for 3 Products of Family Store

Particulars		Soft Drinks	Fresh Produce	Packaged Food	Total
Revenues	(A)	Rs. 7,93,000	Rs. 21,00,600	Rs. 12,09,000	Rs. 41,04,000
Cost of goods sold (COGS)		6,00,000	15,00,000	9,00,000	30,00,000
Support cost (30% of COGS)		1,80,000	4,50,000	2,70,000	9,00,000
Total cost	(B)	7,80,000	19,50,000	11,70,000	39,00,000
Operating Income	(A – B)	13,500	1,50,600	39,900	2,04,000
Operating Income as a % of revenue		1.70	7.17	3.30	4.47

Working Notes

1. Total Support Cost :

Bottle returns	Rs. 12,000
Ordering	1,56,000
Delivery	2,52,000
Shelf-stocking	1,72,800
Customer support	3,07,200
Total Support Cost	9,00,000

2. Percentage of Support Cost of Goods Sold (COGS)

= (Rs. 9,00,000 / 30,00,000) $\times$ 100 = 30%

(ii) Statement showing Operating Income and Operating Income as a percentage of Revenues for 3 Products of Family Store

Particulars		Soft Drinks	Fresh Produce	Packaged Food	Total
Revenues	(A)	Rs. 7,93,500	Rs. 21,06,000	Rs. 12,09,900	Rs. 41,04,000
Cost of goods sold		6,00,000	15,00,000	9,00,000	30,00,000
Cost of bottles returned		12,000	–	–	12,000
Ordering cost					
[360 : 840 : 360]		36,000	84,000	36,000	1,56,000
Delivery cost					
[300 : 2190 : 660]		24,000	1,75,200	52,800	2,52,000
Shelf-stocking cost					
[540 : 5,400 : 2,700]		10,800	1,08,000	54,000	1,72,800
Customer support cost					
[1,26,000 : 11, 04,000 : 3,06,000]		25,200	2,20,800	61,200	3,07,200
Total cost	(B)	7,08,000	20,88,000	11,04,000	39,00,000
Operating income (A – B)		85,500	12,600	1,05,900	2,04,000
Operating income as % of revenues		10.78	0.60	8.75	4.97

Working Notes :

Computation of Cost for each Cost Activity :

Activity	Total cost	Cost allocation base	Cost activity are
Ordering	Rs. 1,56,000	1,560 Purchase orders	Rs. 100 per purchase order
Delivery	2,52,000	3,150 Deliveries	80 per delivery
Shelf-stocking	1,72,800	8,640 hours	20 per stocking hours
Customer support	3,07,200	15,36,000 Items sold	0.20 per items sold

(iii) *Comment :* The operating income margins are more credible and authentic under the ABC costing system *visa-vis* the traditional costing system. The reason is that the ABC method provides more equitable basis of allocation of costs among user units.

Short Question and Answers

Q1. Accounting

Ans :

Accounting is an art of recording classifying, summarizing monetary transaction of a business concern in order to provide necessary information to various interested parties.

Accounting has three branches

1. Management Accounting
2. Cost Accounting
3. Financial Accounting.

Q2. Cost Accounting

Ans :

This term is of utmost importance for the top management of any business. Cost Accounting is basically the next step to costing. Cost accounting involves analyzing relevant costing data, interpret it and present various management problems to management. The scope of cost accounting involves preparation of various budgets for an organization, determining standard costs based on technical estimates, finding and comparing with actual costs, ascertaining the reasons of by variance

Q3. Cost Accountancy

Ans :

This term is over and above costing and cost accounting. It envisages application of costing and cost accounting in a business setup. Cost Accountancy facilitates management with cost control initiatives, ascertainment of profitability and informed decision making. It also includes determination of selling price for the products, division and unit wise profitability. Forecasting of expenses and future probable incomes is also a part of the practice of Cost Accountancy.

According to the Institute of Cost and Management Accountants, London, cost accountancy is the application of costing and cost accounting principles, methods, techniques etc., to the science, art and practice of cost control, cost audit and ascertainment of profitability.

Q4. Cost Accounting Vs Costing

Ans :

Cost accounting is the process of accounting for costs, which begins with recording of income and expenditure or the bases on which they are calculated and ends with the preparation of statistical data. It is thus the formal mechanism by means of which costs of products or services are ascertained.

Costing is the technique and process of ascertaining costs. The technique consists of principles and rules which govern the procedure of ascertaining costs of products or services. The technique to be applied would depend upon the nature of industry, methods of production and the type of products.

Q5. Cost Unit

Ans :

A cost unit is any thing for which a separate measurement of costs if desired. A product, service, department, project or an educational course can all be cost units. Cost units are chosen not for their own sake but to aid decision making. Thus a cost unit is a "quantitative unit or product or service in relation to which costs are ascertained". The cost unit to be used at any given situation is that which is most relevant to the purpose of cost ascertainment.

Q6. Cost Centre

Ans :

According to ICMA London, cost center is "a location, person or items of equipment in respect of which costs may be ascertained and related to cost units for control purposes". It is simply a method by which costs are gathered together, according to their incidence, usually by means of cost center codes. It is the smallest element of an organization in respect of which costs are charged and ascertained. Maintenance department, a public relation office, a printing machine are all examples of cost centers.

Q7. Cost Analysis

Ans :

A cost analysis (also called cost-benefit analysis, or CBA) is a detailed outline of the potential risks and gains of a projected venture. Many factors are involved, including some abstract considerations, making the creation of a CBA more of an art than a

science, though a quantitative mindset is still a must-have. A CBA is useful for making many types of business and personal decisions, especially ones with a potential for profit (though this need not be the case). Although conducting a CBA can be a complex task, you do not need to be a business major to learn how to do so. Anyone who's willing to brainstorm, research, and analyze data can make a top-quality CBA.

Q8. Cost Control

Ans :

Cost control has been defined as the guidance and regulation by execution action of the costs of operating and under taking. It is regarded as an important derivative of cost accounting is inseparably connected with cost control with the help of cost data.

Classification of Cost Control

1. Physical cost control – control over production and distribution.
2. Managerial cost control – the use of cost data for regulating current operations
3. Mechanics cost control – the accounting techniques which are involved in providing for cost control.

Q9. Machine Hour Rate

Ans :

Machine hour rate is the cost of running a machine per hour. It is one of the methods of absorbing factory expenses to production. It is used in those industries or departments where machinery is predominant and there is little or practically no manual labour. In such industries or departments, overhead consists of indirect expenses in running and operating the machine. Therefore, it is desirable to calculate the machine hour rate for the entire factory but different rates may be calculated according to their make, type, size, capacity, wattage, horse power and other factors relating to each machine or group of machines as a cost centre.

Machine hour rate is obtained by dividing the total running expenses of a machine during a particular period by the number of hours the machine is estimated to work during that period.

Q10. Activity-Based Costing

Ans :

Activity-Based Costing (ABC) is a method for estimating the resources required to operate an organization's business processes, produce its products and serve its customers.

In a business organization, the ABC methodology assigns an organization's resource costs through activities to the products and services provided to its customers. It is generally used as a tool for understanding product and customer cost and profitability. As such, ABC has predominantly been used to support strategic decisions such as pricing, outsourcing and identification and measurement of process improvement initiatives.

Activity-based Costing (ABC) is an alternative to the traditional way of accounting. ABC is a costing model that identifies the cost pools, or activity centers, in an organization. It assigns costs to products and services (cost drivers), based on the number of events or transactions that are taking place in the process of providing a product or service. As a result, Activity-based Management can support managers to see how shareholder value can be maximized and how corporate performance can be improved.

Q11. Cost Drivers

Ans :

A cost driver is a structural determinant of cost related activity. The logic behind is that the cost behaviour pattern must be understood so that behaviour pattern is dictated by cost drivers. In tracing overhead cost to product, a cost behaviour pattern must be understood so that appropriate cost driver could be identified. A Cost Driver is any activity that causes a cost to be incurred.

The Activity-based Costing (ABC) approach relates indirect cost to the activities that drive them to be incurred. In traditional costing the cost driver to allocate indirect cost to cost objects was volume of output. With the change in business structures, technology and thereby cost structures it was found that the volume of output was not the only cost driver.

UNIT II

Costing for Specific Industries: Unit costing, Job Costing, Cost Sheet and tender and process costing and their variants, treatment of normal losses and abnormal losses, inter-process profits, costing for byproducts and equivalent production.

2.1 UNIT COSTING

Unit costing is a method of cost ascertainment which is used in those industries which have the following features :

i) Production consists of a single product or a few varieties of the same product with variations in size, shape, quality, etc., and

ii) Production is uniform and on continuous basis. Unit costing is also known as output costing and single costing.

Examples of industries in which this method is commonly used are cement, steel, sugar, paper, brick works, quarries, breweries, dairies,, etc. Cost units in these industries are a tonne of cement or steel or sugar, 1,000 bricks, a barrel of beer a gallon of milk, etc.

In order to ascertain cost of products, a statement known as 'Cost Sheet' is prepared periodically. As the production is uniform and cost units are identical, the cost per unit is the average cost. It is ascertained by dividing the total cost by the number of units produced. The cost sheet is designed to show the total cost as well as cost per unit of output for the given period.

2.2 JOB COSTING

Job costing is a costing method applied to determine the cost of specific jobs or lots of production generally manufactured according to customers' specifications. A dictionary for accountants defines job order costing, "as a method of cost accounting whereby costs are complied for a specific quantity of products, equipment, repairs or other services that move through the production process, as a continuously identifiable unit".

The main feature of the job order costing system is that no two orders are necessarily alike and all orders do not pass through the same manufacturing process. Furthermore, the basic objective of the job order cost system is to properly associate direct materials, direct labour and manufacturing overhead with each job order. Job costing is known by different names such as specific order or production order.

Generally, the job order system is used by manufacturing concerns where an order is produced to a customer's specifications, such as building, contracting, machine tool manufacturing, furniture, foundries, job printing and general engineering. In these industries the product is manufactured to the customers' requirements. Also, job costing can be used by manufacturing as well as non-manufacturing organisations.

A job may be a product, unit, batch, sales order, project, contract, service, specific programme or any other cost objective that is clearly distinguishable and unique in terms of materials and other services used. The 'job' in a job costing system may consist of a single unit (e.g., turbine or a house) or it may consist of all units of identical or similar products covered by a single job or production order (e.g., ten desks or two dozen style 652 blouses).

Jobs may be started and completed at random throughout the accounting period. Therefore, it is necessary that cost information must be accumulated for each order or job to make possible a proper matching of costs and revenues and to help management in planning and decision-making. In addition, units produced in one batch can, and do differ, with respect to styles, finish, and other characteristics from the units produced in another batch.

Under the job order cost systems, direct material and direct labour costs are identified with and charged to specific jobs on which they are incurred; indirect manufacturing costs which cannot be traced to specific jobs are apportioned among the jobs worked on during the period through a predetermined overhead rate. Each job or order carries its own cost charged in part from direct measurement (in case of direct material and direct labour) and in part from apportionment (in case of factory overhead). Unit cost is computed by dividing total manufacturing costs per job order by the number of good units produced. In this costing method, a job order, or a unit, lot or batch of a product may be taken as a cost unit.

Advantages of Job Costing

Job costing has the following advantages :

1. More accurate costing is possible because all costs are compiled and specifically identifiable with a specific order or product.
2. It is simple as the recording of direct materials, and direct labour hours is done by product or job.
3. Job cost sheets can be used to control efficiency and estimate future work.
4. It provides a basis for comparing one job cost to another or for comparing a job cost sheet to a cost estimate.

Disadvantages of Job Costing

Job costing has the following disadvantages :

1. It requires detailed record-keeping for different jobs.
2. The record-keeping for different jobs may prove complicated.
3. A job may be charged for inefficiencies (downtime) although it has not caused it.

2.2.1 Accounting Treatment for Job Cost Sheet

From the following particulars relating to four jobs of a manufacturer, ascertain the total cost of each job by preparing a Job Cost Sheet:

	Job 1	Job 2	Job 3	Job 4
	Rs	Rs	Rs	Rs
Direct materials	800	1,000	1,200	1,400
Direct wages	400	500	600	700
Direct expenses	80	100	120	140

Works overhead is 45% of prime cost and office overhead is 15% on works cost.

Job Cost Sheet

		Job 1	Job 2	Job 3	Job 4
		Rs.	Rs.	Rs.	Rs.
Direct materials		800	1,000	1,200	1,400
Direct wages		400	500	600	700
Direct expenses		80	100	120	140
	Prime Cost	1,280	1,600	1,920	2,240
Works overhead (45% on prime cost)		576	720	864	1008
	Works Cost	1,856	2,320	2,784	3,248
Office overhead (15% of works cost)		278.40	348	417.60	487.20
	Total cost	2,134.40	2,668	3,201.60	3735.20

The following direct costs were incurred on Job No. 239 of XYL Co. Ltd.

Materials Rs. 6,010

Dept. A - 60 hours@ Rs. 30 per hr.

B - 40 hours@ Rs. 20 per hr.

C - 20 hours@ Rs. 50 per hr.

Overhead for these three departments were estimated as follows:

Variable overheads :

Dept. A - Rs. 15,000 for 1,500 labour hours

B - Rs. 4,000 for 200 labour hours

C - Rs. 12,000 for 300 labour hours

Fixed overheads : Estimated at Rs. 40,000 for 2,000 normal working hours.

You are required to calculate the cost of Job No. 239 and calculate the price to give profit of 25% on selling price

Job Cost Sheet

Job No. 239

Direct materials			6010
Wages Dept	A - 60 hrs. × Rs. 30	1800	
	B - 40 hrs. × Rs. 20	800	
	C - 20 hrs . × Rs. 50	1000	3600
* Variable Overheads			
Dept	A - 60 hrs. @ Rs. 10	600	
	B - 40 hrs. @ Rs. 20	800	
	C - 20 hrs. @ Rs. 40	800	2,200
* Fixed Overheads : 120 hrs. @ Rs. 20 per hour.			2,400
	Total Cost		14,210
Profit (25% of sales of 33-1/2 total cost)			4,737
	Selling Price		18,947

*** Working Notes :** Overhead rates per hour are calculated as under :

Variable overhead :

Deptt. A Rs. 15,000 ÷ 15,00 hrs. = Rs. 10 per hour

B Rs. 4,000 ÷ 200 hrs. = Rs. 20 per hour

C Rs. 12,000 ÷ 300 hrs. = Rs. 40 per hour

Fixed overhead : Rs. 40,000 ÷ 2000 hrs. = Rs. 20 per hour

Total hours worked on the job = 60+40+20= 120 hours

2.3 COST SHEET

Cost sheet is a cost statement which is prepared periodically for showing the detailed cost structure of a cost centre or cost unit. Cost sheet consists of different cost elements in the production of goods which includes prime cost, factory cost, production cost and total cost.

The cost sheet is prepared periodically at regular intervals i.e., weekly, monthly, quarterly, yearly etc. The cost sheet also shows the relative comparison of the present cost structure with that of previous years and helps in analyzing the firm's performance.

Purpose

The following are the purposes served by the cost sheet,

- Cost sheet is prepared mainly to ascertain the total cost and cost per unit of the goods which are produced.
- It provides information about the disintegration of total cost into different elements of costs.
- It helps in making a comparative study of the current cost structure of the firm with that of the previous period.
- It directs the management in price fixing and tender quotations.

Proforma of Cost Sheet

Particulars		Amt (in Rs)	Amt (in Rs)
Opening stock of material			xxx
Add :	Purchase of Raw material		xx
Add :	Carriage inwards		xx
		xxx	
Less :	Closing stock of material		xx
	Material consumed		xxx
Add :	Direct wages	xxx	
	Direct Expenses	xxx	xxx
	Prime cost [Direct cost]		xxx
Add :	**Works Over head (or) factory over head**		
	indirect material	xxx	
	oil, steam, water and gas	xxx	
	wages of foreman	xxx	
	power		xxx

	factory heating expenses	xxx	
	factory lighting expenses	xxx	
	factory rent and insurance	xxx	
	consumable stores	xxx	
	Depreciation on plant and Machinery	xxx	
	indirect wages	xxx	
	Salary of factory manager	xxx	
Less :	Scrap		xxx
			xxx
	Gross works cost	xxx	
	(or)		
	Factory cost		xxx
Add :	Opening stock of work in progress		xx
			xxx
Less :	Closing stock of work in progress		xx
	Net works cost		xxx
ADD :	**OFFICE OVER HEADS OR ADMINISTRATIVE OVER HEADS.**		
	Office staff salary	xxx	
	office printing charges	xxx	
	stationery	xxx	
	Postage and Telegram	xxx	
	Telephone charges	xxx	
	Telegram charges	xxx	
	office Rent and taxes	xxx	
	Director fees	xxx	
	Manager salary	xxx	
	Depreciation on office assets	xxx	
	sundry expenses		xxx
			xxx
	office cost		xxx
Add :	Opening stock of finished goods		xxx
			xxx
Less :	Closing stock of finished goods		xx
	cost of goods sold		xxx
Add :	Selling and distribution expenses		
	Advertising	xxx	

	Rent of sales show room	xxx	
	Travellers commission	xxx	
	Sales men salary	xxx	
	ware housing charges	xxx	
	carriage out wards	xxx	
	Sales Depot expenses	xxx	
	packing expenses	xxx	
	Depreciation on sales van	xxx	xxx
	cost of sales (or) Total cost		xxx
ADD :	Profit / loss		xx
	Sales		xxx

PROBLEMS ON UNIT OR OUTPUT COSTING

1. Find out prime cost from the following.

Opening stock of materials R, 10,000

Purchases R. 500, 000, purchase returns R. 5,000

Closing stock of materials R. 25,000 ; salaries R. 100,000

Wages R. 200,000, indirect expenses R. 150,000

Direct expenses R. 50,000

Solution :

Cost Sheet for the year ended.

Particular			Amt	Amt
Opening stock of Raw material			10,000	
Add :	Purchase	500,000		
Less :	Purchase return	5,000	4,95,000	
			5,05,000	
Less :	Closing stock of Raw material		25,000	
	Material consumed ⟶			4,80,000
Add :				
	wages		200,000	
	Direct expenses		50,000	
				250,000
	Prime cost ⟶			7,30,000

2. From the following find prime cost.

Opening stocks of Raw material R. 25,000

Purchases 1,05,000, Carriage inwards Rs. 10,000

Closing stock of Raw material Rs. 15,000

Direct wages Rs. 10,000 ; Direct expenses Rs. 25,000

Purchase returns R. 5,000.

Salaries Rs. 10,000. factory expenses Rs. 5000

Solution :

Salaries and factory expenses are comes under factory over heads.

Cost sheet for the year ended

	Particular		Amt	Amt
Opening stock of Raw material			25,000	
	purchase	105,000		
Less :	purchase return	5,000		
			100,000	
	Carriage inwards			
			10,000	
			135,000	
Less :	Closing stock of Raw material		15,000	
	Material consumed			120,000
Add :				
	Direct wages		10,000	
	Direct Expenses		25,000	35000
	Prime cost ⟶			155,000

3. From the following data find works cost/ factory cost. Opening stock of Raw material Rs. 30,000; carriage inwards Rs. 10,000 closing stock of Raw material Rs 18,000; purchases Rs. 128,000 Indirect material Rs. 10,000; power Rs.2,000; consumable stores Rs. 5,000, factory heating expenses R. 6,000 Depreciation an plant & machinery Rs. 8,000 Indirect wages Rs. 5,000; Direct wages Rs. 10,000; Factory manager salary Rs. 10,000; direct expenses Rs. 10,000

Solution :

Cost sheet for the year ended.....

Particular		Amt	Amt
Opening stock of raw material		30,000	
	purchase	128,000	
	Carriage inwards	10,000	
		168,000	
Less :	Closing stock of raw material	18,000	
Material Consumed ⟶			150,000
ADD :			
	Direct expenses	10,000	
	Direct wages	10,000	20,000
	Prime cost ⟶		170,000
ADD :	Factory over head		
	Indirect material	10,000	
	Power	2,000	
	Consumable stores	5,000	
	Factory heating expenses	6,000	
	Depreciations on plant & machinery	8,000	
	Indirect wages	5,000	
	Factory manager salary	10,000	
			46,000
	Works Cost (or) Factory cost ⟶		2,16,000

Problem 4

Ascertain the prime cost, works cost, cost of production, total cost and profit from the undermentioned figures:

Direct Materials ` 5,000 ; Direct Labour ` 3,500 ; Factory Expenses ` 1,500 ; Administration Expenses ` 800 ; Selling Expenses ` 700 and Sales ` 15,000.

Solution :

Prime Cost = Direct Materials + Direct Labour = ` 5,000 + ` 3,500 ; = ` 8,500.

Works Cost = Prime Cost + Factory Expenses = ` 8,500 + ` 1,500 = ` 10,000

Cost of Production = Works Cost + Administration Expenses = ` 10,000 + ` 800 = ` 10,800.

Total Cost or Cost of Sales = Cost of Production + Selling Expenses = ` 10,800; + ` 700 = ` 11,500.

Profit = Sales – Total Cost = ` 15,000 – ` 11,500 = ` 3,500.

Problem 5

Calculate Prime Cost, Factory Cost, Cost of Production, Cost of Sales and Profit from the following particulars:

Particulars	`	Particulars	`
Direct materials	1,00,000	Depreciation :	
Direct wages	30,000	Factory Plant	500
Wages of foreman	2,500	Office Premises	1,250
Electric power	500	Consumable stores	2,500
Lighting : Factory	1,500	Manager's salary	5,000
Office	500	Directors' fees	1,250
Storekeeper's wages	1,000	Office stationery	500
Oil and water	500	Telephone charges	125
Rent : Factory	5,000	Postage and Telegrams	250
Office	2,500	Salesmen's salaries	1,250
Repairs and Renewals :		Travelling expenses	500
Factory Plant	3,500	Advertising	1,250
Office Premises	500	Warehouse charges	500
Transfer to Reserves	1,000	Sales	1,89,500
Discount on shares written off	500	Carriage outward	375
Dividend	2,000	Income-tax	10,000

Solution :

Statement of Cost and Profit

Particulars	`	`
Direct Materials		1,00,000
Direct Wages		30,000
Prime Cost		1,30,000
Add: Factory Overheads :		
Wages of foreman	2,500	
Electric power	500	
Storekeeper's wages	1,000	
Oil and water	500	
Factory rent	5,000	
Repairs and reiewals—factory plant	3.500	
Factory lighting	1,500	
Depreciation—factory plant	500	
Consumable stores	2,500	
		17,500
Factory Cost		1,47,500
Add: Administration Overheads :		
Office rent	2,500	
Repairs and renewals—office premises	500	
Office lighting	500	
Depreciation : office premises	1,250	
Manager's salary	5,000	
Directors' fees	1,250	
Office stationery	500	
Telephone charges	125	
Postage and telegrams	250	
		11,875
Cost of Production		1,59,375
Add: Selling and Distribution Overheads :		
Carriage outward	375	
Salesmen's salaries	1,250	
Travelling expenses	500	
Advertising	1,250	
Warehouse charges	500	
		3,875
Cost of Sales		1,63,250
Add : Profit		26,250
Sales		1,89,500

Notes :

(1) Transfer to reserves, income-tax and dividend are excluded from cost accounts being items of appropriation of profit, so these items have not been included in cost.

(2) Discount on shares written off being an item of non-operating nature is excluded from cost.

Problem No. 6

The accounts of Pleasant Company Ltd. show for 2010 :
Materials `3,50,000; Labour `2,70,000 ; Factory Overheads `81,000 and Administration Overheads ` 56,080.

What price should the company quote for a refrigerator ` It is estimated that `1,000 in material and ` 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 $12\frac{1}{2}$% selling price is required.

Solution :

STATEMENT OF COST

Particulars	`
Materials	3,50,000
Labour	2,70,000
Prime Cost	6,20,000
Factory Overheads	81,000
Works Cost	7,01,000
Administration Overheads	56,080
Total Cost of Production	7,57,080
Percentage of Factory Overheads to Labour $= \frac{\text{Factory Overheads}}{\text{Labour}} \times 100 = \frac{` 81,000}{` 2,70,00} \times 100 = 30\%$	
Percentage of Administration Overheads to Works Cost $= \frac{\text{Administration Overheads}}{\text{Works Cost}} \times 100 = \frac{` 56,080}{` 7,01,000} \times 100 = 8\%$	

Statement of the Selling Price of a Refrigerator

Particulars	`
Materials	1,000.00
Labour	700.00
Prime Cost	1,700.00
Add : Factory Overheads (30% on Labour)	210.00
Works Cost	1,910.00
Add : Administration Overheads (8% of Works Cost)	152.80
Total Cost of Production	2,062.80
Add : Profit (1/8 on Sales or 1/7 of Cost)	294.69
Selling Price	2,357.49

Problem No. 7

From the following data prepare a cost and profit statement of Popular Stoves Manufacturing Company for the year 2009:

Particulars	`	Particulars	`
Stock of materials on 1-1-2009	35,000	Establishment expenses	10,000
Stock of materials on 31-12-2009	4,900	Completed stock in hand on 1-1-2009	Nil
Purchase of materials	52,500	Completed stock in hand on 31-12-2009	35,000
Direct wages	95,000	Sales	1,89,000
Factory expenses	17,500		

The number of stoves manufactured during the year 2009 was 4,000.

The company wants to quote for a contract for the supply of 1,000 Electric Stoves during the year 2010. The Stoves to be quoted are of uniform quality and make and similar to those manufactured in the previous year ; but cost of materials has increased by 15% and cost of factory labour by 10%.

Prepare a statement showing the price to be quoted to give the same percentage of net profit on turnover as was realised during the year 2009, assuming that the cost per unit of overheads will be the same as in the previous year.

Solution :

Cost and Profit Statement of Stoves for the year 2009

(Output 4,000 Stoves)

Particulars	`	Amount Total `	Amount per unit `
Opening stock of materials	35,000		
Purchase of materials	52,500		
	87,500		
Less : Closing stock of materials	4,900		
Value of Materials Consumed		82,600	20.65
Direct wages		95,000	23.75
Prime Cost		1,77,600	44.40
Factory expenses		17,500	4.37
Works Cost		1,95,100	48.77
Establishment expenses		10,000	2.50
Cost of Production		2,05,100	51.27
Opening completed stock		Nil	
Cost of production during the period		2,05,100	2,05,100
Less : Closing completed stock		35,000	
Cost of Sales		1,70,100	
Profit (10% on sales)		18,900	
Selling Price		1,89,000	

Statement Showing Quotation Price for 1,000 Stoves

Particulars	Amount `	Amount `
Materials consumed (@ ` 20.65 per stove)	20,650	
Add : 15% Increase	3,098	
		23,748
Factory wages (@ ` 23.75 per stove)	23,750	
Add : 10% Increase	2,375	
		26,125
Prime Cost		49,873
Factory expenses (@ ` 4.375 per stove)		4,375
Works Cost		54,248
Establishment expenses (@ ` 2.50 per stove)		2,500
Total Cost		56,748
Profit (10% on selling price or 1/9 of cost)		6,305
Selling Price		63,053

Problem No. 8

Following are the particulars for the production of 2,000 sewing machines of Nath Engineering Co. Ltd., for the year 2009 :

Cost of Materials ` 1,60,000 ; Wages ` 2,40,000 ; Manufacturing Expenses ` 1,00,000 ; Salaries ` 1,20,000 ; Rent, Rates and Insurance ` 20,000; Selling Expenses ` 60,000 ; General Expenses ` 40,000 and Sales ` 8,00,000.

The company plans to manufacture 3,000 sewing machines during 2010. You are required to submit a statement showing the price at which machines would be sold so as to show a profit of 10% on selling price. Following additional information is supplied to you :

(a) Price of material is expected to rise by 20% (b) Wages rates are expected to show an increase of 5%. (c) Manufacturing expenses will rise in proportion to the combined cost of materials and wages (d) Selling expenses per unit will remain the same, (e) Other expenses will remain. unaffected by the rise in output.

Solution

Statement of Cost and Profit for the Manufacture of 2,000 sewing machines for the year ended 31st December, 2009

Particulars	Total Cost `	Cost per Machine `
Materials	1,60,000	80.00
Direct Wages	2,40,000	120.00
Prime Cost	4,00,000	200.00
Manufacturing Expenses (25% of Prime Cost)	1,00,000	50.00
Works Cost	5,00,000	250.00
Administration Expenses :		
Salaries	1,20,000	60.00
Rent, Rates and Insurance	20,000	10.00
General Expenses	40,000	20.00
Cost of Production	6,80,000	340.00
Selling Expenses	60,000	30.00
Cost of Sales	7,40,000	370.00
Profit	60,000	30.00
Selling Price	8,00,000	400.00

Estimate for the Manufacture of 3,000 Sewing Machines During 2010

Particulars	`	Cost per Machine `	Total Cost `
Materials	80		
Add 20% increase $\left(\frac{20}{100} \times ` 80\right)$	16	96.00	2,88,000
Direct Wages	120		
Add 5% increase $\left(\frac{5}{100} \times ` 120\right)$	6	126.00	3,78,000
Prime Cost		222.00	6,66,000
Manufacturing Expenses (25% on Prime Cost)		55.50	1,66,500
Works Cost		277.50	8,32,500
Administration Expenses :			
Salaries		40.00	1,20,000
Rent, Rates and Insurance		6.67	20,000
General Expenses (unaffected by rise in output)		13.33	40,000
Cost of Production		337.50	10,12,500
Selling Expenses (per unit remain unchanged)		30.00	90,000
Cost of Sales		367.50	11,02,500
Profit (10% on sales or 1/9 of cost)		40.83	1,22,500
Selling Price		408.33	12,25,000

Probelm No. 9

A factory's normal capacity is 1,20,000 units per annum. The estimated costs of production are as under :

Direct Materials ` 3 per unit ; Direct Labour ` 2 per unit (subject to a minimum of ` 12,000 p.m.).

Overheads Fixed ` 1,60,000 per annum ; variable ` 2 per unit ; semi-variable ` 60,000 p.a. upto 50% capacity and an additional ` 20,000 for every 20% increase in capacity or part thereof. Each unit of raw material yields scrap which is sold at the rate of 20 paise. In 2010 the factory worked at 50% capacity for the first three months but it was expected that it would work @ 80% capacity for the remaining 9 months.

During the first three months, the selling price per unit was `12. What should be the price in the remaining nine months to produce a total profit of `2,18,000 ?

Solution :

COST SHEET
for the year 2010

Particulars	First three months Output = 15,000 units		Remaining nine months Output = 72,000 units	
	Per unit `	Total `	Per unit `	Total `
Direct Materials	3.00	45,000	3.00	2,16,000
Less: Sale of scrap	0.20	3,000	0.20	14,400
	2.80	42,000	2.80	2,01,600
Direct Labour (Minimum charge p.m. in cost of first three months)	2.40	36,000	2.00	1,44,000
Prime Cost	5.20	78,000	4.80	3,45,600
Overheads :				
Variable	2.00	30,000	2.00	1,44,000
Semi- variable				
$\left(` 60,000 \times \frac{3}{12}\right) = 15,000$	1.00	15,000		
$\left(` 1,00,000 \times \frac{9}{12}\right) = 75,000$			1,04	75,000
Fixed ` 1,60,000 to be apportioned on the basis of time (1:3)	2.67	40,000	1.67	1,20,000
Total Cost	**10.87**	**1,63,000**	**9.51**	**6,84,600**
Profit	1.13	17,000	2.79	2,01,000
Sales	**12.00**	**1,80,000**	**12.30**	**8.85,600**

Note :

Profit for remaining 9 months shall be (` 2,18,000 - ` 17,000) = ` 2,01,000. Thus, sales could be ` 8,85,600 and the sale price per unit will be = $\frac{` 8,85,600}{72,000}$ i.e., `12.30.

Treatment of Scrap

Scrap is the incidental residue from certain types of manufacture generally of small amount and low value, recoverable without further processes. Scrap may be of two kinds :

(i) Material Scrap. This must be adjusted with the value of materials.

(ii) Factory Scrap. It must be adjusted with the factory cost.

Problem No. 10

From the following particulars of Rosa Ram Ltd. for three months ending 31st March, 2010 prepare :

(a) Cost sheet for the period giving various costs, and

(b) Profit and Loss Account for the quarter showing profit per barrel.

Wages ` 12,000, Coal and Oil ` 11,200, Cooperage, Corks and Shives ` 4,000, Malt ` 40,000, Hops ` 10,800, Beer Duty ` 2,80,000, Water ` 1,000, Rent and Taxes ` 6,000, By product ` 3,600, Sugar ` 14,000, Preservatives ` 1,600, Other Materials ` 1,200, Repairs ` 1,800, Depreciation ` 1,200, Administration Expenses ` 24,000, Selling and Distribution Expenses ` 30,000.

Opening stock of beer ` 40,500 (300 barrels), Closing stock of beer ` 67,500 (500 barrels)" Beer Sales 4,98,000 (2,800 barrels). Beer brewed during the period 3,000 barrels.

Solution :

COST SHEET
For the Quarter Ending 31st March, 2010
(**Output:** Beer Brewed 3,000 Barrels)

Particulars	Total Cost	Cost Per Barrel
Materials Consumed :	`	`
Malts	40,000	13.33
Hops	10,800	3.60
Sugar	14,000	4.67
Preservatives	1,600	0.53
Other materials	1,200	0.40
Water	1,000	0.33
	68,600	22.86
Beer Duty	2,80,000	93.33
	3,48,600	116.19
Less: Proceeds from sale of by-product	3,600	1.19
	3,45,000	115.00
Wages	12,000	4.00
Prime Cost	3,57,000	119.00
Factory Overheads :		
Coal and Oil	11,200	3.73
Cooperage, Corks and Shives	4,000	1.33
Rent and Taxes	6,000	2.00
Repairs	1,800	0.60
Depreciation	1,200	0.40
Factory Cost	3,81,200	127.06
Administration Expenses	24,000	8.00
Cost of Production	4,05,200	135.06

Profit and Loss Account for the quarter ending 31st March, 2010

	Barrels	Total `	Per Barrel `		Barrels	Total `	Per Barrel `
To Opening Stock	300	40,500		By Sales	2,800	4,98,000	177.85
To Cost of Production	3,000	4,05,200	135.06	By Stock (at cost)	500	67,500	
To Selling and Distribution Expenses		30,000	10.72				
To Net Profit		89,800	32.07				
	3,300	**5,65,500**	**177.85**		**3,300**	**5,65,500**	**177.85**

2.4 TENDERS (OR) QUOTATIONS

Cost accounts help a great deal in preparation of estimates for the tender. Generally, expenses incurred in the pervious year are made on the basis for submission of tenders or quotations.

Direct materials required, direct wages and direct expenses are identifiable with the product. Thus, they can be easily ascertained.

Number of units as basis

If information is provided on number of units produced and sold in the previous year and the number of units for which quotation or estimate is required to be made, then all the over-heads must be absorbed at the cost per unit for each of such over-heads in the previous period. Any increase or decrease in any of the expenses needs to be added or deducted after the total cost for the particular item of expense is arrived at on the basis of number of units being produced.

For Example :

Let, factory over-heads in case of a company in the previous production period amounted to Rs. 10,000 for producing 10,000 units. The company plans to produce 15000 units in the current period. It is estimated that factory over-heads will increase by 20% in the current period over the previous period. In such a case, first ascertain the cost of factory over-head per unit in the previous period. The per unit cost of factory over-heads works out to Rs.. 10. Thus, the total cost of producing 15000 units in the current period would be 15000 units x Rs. 10 per unit = Rs. 150000. However, there is a 20% increase in factory overheads in the current period. Thus, the estimate for factory overhead will be Rs. 150000 + 20% x Rs. 150000 = Rs. 180000.

Percentage of Some other Expenses

If the information is not provided for number of units, factory over heads are estimated and charged on the basis of its percentage to direct wages in the previous year, similarly, Administration, selling and distribution over heads are charged on the basis of percentage to works cost in the previous year.

1. Calculate of works over head percentage on the basis of Direct Wages.

$$\frac{\text{works over head in the previous year}}{\text{Direct wages Amount in the previous year}} \times 100$$

2. Calculation of Administration over head percentage on the basis of works costs.

$$\frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{units of abnormal loss}$$

3. Calculation of selling & distribution over head on the basis of works cost.

$$\frac{\text{Selling and Distribution over head}}{\text{works cost}} \times 100$$

Problem No. 1

The following information is extracted from the manufacturing account of a factory for the year ending 31st Dec 2006. Material consumed Rs. 600,000; Direct wages Rs. 400,000 factor expenses Rs. 240,000 ; office and administrative expenses Rs. 155,000.

During the year 2007, the factory received a request from customer for quotation for the manufacturer and supply of a machine for which the estimated cost of material was Rs. 40,000 and Rs. 30,000 in wages. What should be the quotation if the factory desires to make a profit of 25% on the selling price.

Solution :

Calculation of cost sheet for the year ended 31-Dec-2006

	Particulars	Amt	Amt
	Material consumed		600,000
Add :	Direct wages		400,000
	Prime cost	→	10,00,000
Add :	Factory over head		
	Factory expenses		240,000
	works cost	→	12,40,000
Add :	Office and Administrative over head		
	office exp		155,000
	Total cost	→	13,95,000

Working Notes

i) Calculation of factory over head percentage on the basis of Direct wages.

for Rs.400,000 — Rs. 240,000

for 100% — ?

$\frac{100 \times 240,000}{400,000}$ = 60%

ii) Calculation of office and Administrative over head percentage on the basis of works cost.

for 12,40,000 — 155,000

for 100% — ?

= 12.5

Calculation of tender Quotation for the year 2007.

Particulars		Amt	Amt
	Material consumed		40,000
Add :	wages		30,000
	prime cost ⟶		70,000
Add : factory over head			
	$\left(30,000 \times \frac{60}{100}\right)$		18,000
	works cost ⟶		88,000
Add Administrative over need			
	on working cost $\left(88000 \times \frac{12.5}{100}\right)$		11,000
	Total costs ⟶		99,000
Add :	profit $\left(\frac{99000 \times 25}{75}\right)$		33,000
	selling price	⟶	132,000

Problem No. 2

A Television manufacturing company finds that in 1980, the cost to manufacture 200 television sets was Rs. 616,000 which it sold at Rs. 4000 each. Cost was made up of materials Rs. 200,000, direct wages Rs. 300,000, factory over head expenses Rs. 60,000, office expenses Rs. 56,000.

For 1981 season, it estimates.

1) That each television will require materials to the value of Rs. 1000 and wages of Rs. 1500
2) That the factory over head Expenses will bear the same relation to direct wages as in the previous year.
3) The percentage of office overhead Expenses on factory cost be the same as in the previous year.

Prepare a statement showing the profit it should make per unit if it enhances the price of television by Rs. 80.

Solution :

Cost sheet for the year ended 1980 of manufacture for 200 units.

Particulars		Amt	Amt
		Per unit	**Cost**
	Material	1000	200,000
	Direct wages	1500	300,000
	Prime cost ⟶	2,500	500,000
Add :	Factory over head		
	factory exp	300	60,000
	works cost ⟶	2,800	560,000
Add :	Office and Administrative over head		
	office exp	280	56000
	Total cost ⟶	3080	6,16,000
Add :	profit (B/F)	920	184,000
	Sales (400 × 200) ⟶	4,000	800,000

Working Notes

1. Calculation of factory over head percentage on the basis of Direct wages

   300,000 — 60,000

   100 % — ?

   $\frac{100 \times 60,000}{300,000}$ = 20%

2. Calculation of office and Administrative over head percentage on the basis of works cost.

   560,000 — 56,000

   for 100% — ?

   $\frac{100 \times 56000}{560,000}$ = 10 %

Estimation for one television tender quotation

Particulars		Amt	Amt
	Raw material		1,000
	Direct wages		1500
	prime cost ⟶		2,500
Add :	Factory over head		
	20 % on wages $\left(1500 \times \frac{20}{100}\right)$		300
	works cost ⟶		2,800
Add :	office and administrative over head		280
	10% on works cost $\left(2800 \times \frac{10}{100}\right)$		
	Total cost ⟶		3080
	profit (Bal. fig)		1000
	Sales (4000 + 80)		4080

Problem No. 3

Following are the particulars for production of 2000 machines of 'x' Engineering CO Ltd for the year 2005.

Cost of materials	Rs.	160,000
Wages	Rs.	240,000
Manufacturing Expenses	Rs.	100,000
Depreciation of plant	Rs.	120,000
Rent, Rates and insurance - factory	Rs.	20,000
Selling expenses	Rs.	60,000
General Expenses	Rs.	40,000
Sales	Rs.	800,000

The company plans to manufacture 3000 machines during 2006. You are required to submit a statement showing the price at which machines would be sold so as to show a profit of 10% on selling price. The following additional information is supplied to you.

1) Price of materials is expected to rise by 20%
2) Wage rates are expected to show an increase of 5 %
3) There is no changes in other aspects.

Solution :

Cost sheet for the year ended 2005 of a manufacturer (2000 machines)

Particulars	Cost per unit	Total
Direct material consumed	80.00	160,000
Add : wages	120.00	240,000
prime cost →	200.00	400,000
Add : Factory over head		
Manufactures Exp	50.00	100,000
Depreciation of plant	60.00	120,000
Rent, Rates & Insurance	10.00	20,000
Works cost →	320.00	640,000
Add : Office over head		
General Exp	20.00	40,000
Cost of production →	340.00	680,000
Add : Selling & distribution over need		
Selling Exp	30.00	60,000
Total cost →	370.00	740,000
profit (B/C)	30.00	60,000
Sales	400.00	800,000

Working Notes

Calculation of Raw material for the year 2006.

Unit price in the year ⟶ 80 – 00

Add : 20% Increase ⟶ 16 – 00

$\left(80 \times \frac{20}{100}\right)$

96 – 00

Calculation of wages for the year 2006.

wages per unit 120 – 00

Add : 5% Increase 6 – 00

$\left(120 \times \frac{5}{100}\right)$

126 – 00

Calculation of Equation price for 3000 units.

Particulars		Cost per unit	Total
Material		96.00	288,000
Wages		126.00	378,000
	prime cost	222.00	6,66,000
Add : Factory over head			
	25% of prime cost	55.50	1,66,500
	Works cost	277.50	832,500
Add : Office over head			
Depreciation, rent etc		60.00	180,000
	Cost of production	337.50	10,12,500
Add : Selling and distribution over head			
	(30 × 3000 units)	30.00	90,000
	Total cost	367.50	11,02,500
Add : 10% profit		40.83	122,500
$\left(11,02,500 \times \frac{10}{90}\right)$		408.30	12,25,000

Problem No. 4

The accounts of a manufacturing company should the following details for the year 2005.

Materials consumed	Rs. 500,000	Factory Expenses	Rs. 150,000
Direct wages	Rs. 300,000	Office and Administrative Expenses	Rs. 190,000

During the year 2005, the factory received a request from a customer for manufacture and supply of a machine for which the estimated cost of materials was Rs. 25,000 and labour Rs. 17000. What should be the quotation if the factory desires to make a profit of 25% on cost.

Solution :

Cost sheet for 2005

Particulars	Amount
Direct materials consumed	500,000
Direct wages	300,000
Prime cost	800,000
Add : Factory over head cost, works over heads	
Factory expenses	150,000
works cost	950,000
Add : Administrative overhead	
Office and Administrative expenses	190,000
Total Cost	11,40,000

i) Calculation of works cost on the basic of Direct wages.

for 300,000— 150,000

for 100 % — ?

$$\frac{100 \times 150,000}{300,000} = 50\%$$

ii) Calculation of office and Administrative over head percentage on the basic of works cost.

for 950,000— 190,000

for 100 % — ?

$$\frac{100 \times 190,000}{950,000} = 20\%$$

Statement of Quotation.

	Particulars	Amount
	Direct Material	25,000
	Direct wages	17,000
	prime cost	42,000
Add :	Factory cost, works over head On the basis of Direct wages $\left(17,000 \times \frac{50}{100}\right)$	8,500
	Factory cost	50,500
Add :	Office & Administrative over head on the basis of works cost $\left(50,500 \times \frac{20}{100}\right)$	10,100
	Total cost	60,600
Add :	Profit $\left(60,600 \times \frac{25}{100}\right)$	15,150
	quotation price	75,750

Probelm No. 5

RST Ltd. produces machine parts on a job order basis. Most of the business is obtained through bidding. Most of the firms competing with RST Ltd. bid full cost plus a 20% mark-up. Recently, with the expectation of gaining more sales, RST Ltd. reduced its mark-up from 25% to 20%. The company operates two service departments and two producing departments. The budgeted costs and the normal levels of activity for each department are given below :

Particulars	Service Department		Production Department	
	A	B	C	D
Overhead costs	` 5,00,000	`10,00,000	` 5,00,000	`2,50,000
Number of employees	40	35	150	150
Maintenance hours	10,000	1,000	32,000	8,000
Machine hours	—	—	50,000	5,000
Labour hours		—	5,000	50,000

The direct costs of Department A are allocated on the basis of employees; those of Department B are allocated on the basis of maintenance hours. Department overhead rates are used to assign costs to products. Department C uses machine hours, and Department D uses labour hours. The firm is preparing to bid on a job (Job Z) that requires three machine hours per unit produced in Department C and no time in Department D. The expected prime cost per unit is 7 85. Required :

(i) Allocate the service costs to the Production departments using the direct method.

(ii) What will be the bid for Job Z, if the direct method of allocation is used ?

Solution :

(i) Statement Showing Allocation of Service Cost to Production Departments (Direct Method)

	Production Departments		Service Departments	
	C `	D `	A `	B `
Direct Cost	5,00,000	2,50,000	5,00,000	10,00,000
Apportionment of A Service Deptt. Cost to C & D Deptts. in 1: 1	2,50,000	2,50,000	(5,00,000)	
Apportionment of B Service Deptt. Cost in 4 : 1	8,00,000	2,00,000	(10,00,000)	
Total	**15,50,000**	**7,00,000**		

(ii) Department C Overhead Rate = $\frac{`15,50,000}{50,000 \text{ (Machine Hours)}}$ 31 per machine hour

Product Cost and Bid Price for Job Z	`
Prime Cost	85
Overheads (3 hours @ ` 31 per hour)	93
Total Unit Cost	178

Bid Price = (` 178 × 1.20) @ 20% mark up = ` 213.60

2.5 PROCESS COSTING

Process costing is that form of operation costing which is used to ascertain the cost of the product at each process or stage of manufacture.

Features of Process Costing

Process Costing is a method of ascertaining the average cost of each process, department or operation. When the output of one department becomes, in whole or in part, the raw material of another department, the cost accounts are generally known as process account (Northcott and Forsyth). It is generally applicable to continuous or mass production industries.

The following are the special features of process centres :

a) Each plant is divided into distinct process centres.

b) Both direct and indirect costs are accumulated by processes or departments at regular intervals.

c) The total cost of each process is divided by the total production for the process to obtain an average cost per unit for the period.

d) The cost of one process or department is transferred to the next process and charged as an initial cost.

e) On completion, the finished product is transferred to the finished product.

f) The products and processes are standardised.

g) When there is work in process at the end of a period, the stage of completion of the incomplete work is determined, and the computation of inventory is made in terms of complete units.

h) If units are lost or spoiled in a department, the loss is borne by the units completed and remaining within the department, thus increasing the average cost par unit.

Process Costing Method is Generally Applied in the Following Types of Industries

i) **Manufacturing industries :** Iron and Steel, cement and lime factories; paper and rubber; automobile plants; food canning industries; ice and paint factories etc.

ii) **Chemical industries :** chemicals, pharmaceuticals, perfumery etc.

iii) **Mining concerns :** Oil, sulphur, gold etc.

iv) **Public Utilities :** Electricity generation and distribution, water supply, gas supply etc.

Application of Process Costing

The industries in which process costs may be used are many. In fact a process costing system can usually be devised in all industries except where job, batch or unit operation costing is necessary.

Examples of industries, where process costing is applied are :

1. Chemical works - Textile, weaving, spinning, etc.
2. Paper mills - Paint, Ink and varnishing, etc.

Fundamental Principles of Process Costing

The following are the fundamental principles of process costing

1. Cost of materials, wages and overhead expenses are collected for each process of operation in a period,
2. Adequate records in respect of output and scrap of each processor operation during the period are kept.
3. The cost per finished output of each process is obtained by deviating the total cost incurred during a period by the number of units produced during the period after taking into consideration the losses and amount realized from sale of scrap.
4. The finished product along with its cost is transferred from one process to the next process just like raw materials of that process.

Elements of Production Costing

The following are the main elements of production cost in process costing :

1. **Materials :** Generally in process costing, all the material required for production is issued to the first process, where after processing it is passed to the next process and soon. Some operation on the material is performed in each process which has been passed from the first process.
2. **Labour :** Generally, the cost of direct labour is very small part of the cost of production in industries adopting process costing. The direct labour element becomes smaller and smaller while the overhead element increases with the introduction of more and more automatic machinery.
3. **Production overhead :** The overhead element of total cost is generally very high in process costing great care is required to ensure that each process is charged with a reasonable share of production overhead. The actual overheads are debited to each process account.

Advantages of Process Costing

The following are the main advantages of process costing :

1. It is possible to determine process costs periodically at short intervals. Unit cost can be computed weekly or even daily if overhead rates are used on predetermined basis.
2. It is simple and less expensive to find out process cost.
3. It is possible to have managerial control by evaluating the performance of each process.
4. It is easy to allocate the expenses to processes in order to have accurate cost.
5. It is easy to quote the prices with standardization of process. Standard costing can be established easily in process type of manufacture.

Disadvantages Process Costing

The following are some of the disadvantages of process costing :

i) As costs are obtained at the end of the period , they are not of much use for effective control.

ii) The ascertainment of work in progress is difficult and introduces some inaccuracies.

iii) When more than one type of product is manufactured, a division of the cost elements is necessary and the computation of average cost is more different.

iv) Average costs are not always accurate and there is some times wide scope for errors.

Preparation of Process Cost Account

Process Costing is used to ascertain the cost of a product at each process, operation or stage of manufacture. Process cost accounts require few forms and few details, but a close analysis of operations becomes highly essential.

The factory is divided into departments or process, which are limited to a certain operation e.g., in an oil refinery, one department will separate the crude oil by distillation into a number of primary products; another departments will convert low-quality oils into high-quality oils. The process may consist of a certain operations or operations, each of which completes a special stage in the production cycle.

An account is kept for each process or operation. Materials, labour, and production overheads are debited, and by-products and scrap are credited, while the material as modified at the operation concerned is passed on to the next process.

The finished product of the first process becomes the 'raw material' of the next one, and so on, until the final products are completed. Therefore, the balance of process No. 1 Account is transferred to the Process No.2 Account; the balance of process No.2 Account to Process No.3 Account; and so on. The balance of the last process A/C represents the cost of the finished product turned out by the factory; and is, therefore, transferred to finished stock A/C.

Any normal loss suffered in a process is borne by the good production, thus increasing the average cost per unit. Any abnormal loss is valued at the ordinary rate and the amount transferred to an Abnormal Loss A/C which reveals to Management the cost of losses due to inefficiency, accidents etc.

2.5.1 Job costing Vs Process Costing

Process Costing may be defined as a method of ascertaining the average cost of each process, department or operation. Job costing is used in businesses which perform work on specific jobs, orders or contracts that can be identified through out the various stages of production.

The following are the important difference between job costing and process costing:

1. In the case job costing, production is made by specific orders; whereas in the case of process costing, production is uniform and continuous.
2. In job costing jobs may be independent of each other. In process costing, products may e interdependence and lose their individuality.
3. Job cost is calculated when the job is completed whereas process costs are calculated at the end of the cost period.
4. In job costing, costs are collected in respect of each job separately; whereas in process costing, total expenses incurred during the period are collected together and divided by the number of units manufactured.

5. In job costing, there is generally no transfer from one job to another. In process costing, costs are transferred from one process to another process.

6. In the case of job costing, managerial attention is needed more as production is no continuous. In the case of process costing, managerial attention and control is comparatively easier as production is continuous and can be standardised.

2.5.2 Aspects of Process Costing

1. Process losses
2. Inter process profits
3. Work-in-progress and effective or equivalent production.
4. Joint and by-products.

2.5.2.1 Normal Process Loss

If the loss is unavoidable on account of inherent nature of production processes. Such loss can be estimated in advance on the basis of past experience or data. The normal process loss is recorded only in items of quantity and the cost per unit of usable production is increased accordingly, where scrap possesses some value as a waste product or a raw material for an earlier process, the value thereof is credited to the process account. This reduces the cost of normal output; process loss is shared by usable units.

2.5.2.2 Abnormal Process Loss

1. Any loss caused by unexpected or abnormal conditions such as plant break down, sub-standard materials, careless, accident etc. or loss excess of the margin anticipated for normal process loss should be regarded as a abnormal process loss. The unit of abnormal loss is calculated as under.

2. Abnormal loss = actual loss – normal loss.

3. The valuation of abnormal process loss should be done with the help of the following formula.

$$\text{Value of abnormal loss} = \frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{units of abnormal loss}$$

4. Calculation of Abnormal loss in Units

Input →		xxx	unit
Less :	Loss in weight →	xx	unit
		xxx	unit
Less :	Normal loss / Scrap	xx	unit
	Expected output	xxx	unit
Less :	Actual output	xx	unit
Abnormal loss / Gain in unit		xxx	unit

Note :

1. Normal cost of Normal output is calculated as follows.

   *Debit side total amount - Normal Loss Amt.

2. Normal output =

   *Total no of units in Debit side - [loss in weight units + Normal loss in units]

5. All cases of abnormal process loss should be thoroughly investigated and steps taken to prevent these recurrence in future. Abnormal process loss should not be allowed to affect the cost of production as it is caused by abnormal or unexpected conditions. Such loss representing the cost of materials, labour and overhead incurred on the wastage should be transferred to an abnormal loss account. If this abnormal loss has got any scrap value, it should be credited to abnormal loss account and the balance is ultimately written off to costing profit and loss account.

Problem No. 1

A certain product passes through three processes before it is completed. The output of each process is charged to the next process at a price calculated to give a profit of 20% on transfer price (i.e. 25% on cost price). The output of Process III is charged to finished stock account on a similar basis. There was no work-in-progress at the beginning of the year and overheads have been ignored. Stock in each process has been valued at prime cost of the process. Following data are obtained at the end of 31st March, 2010.

Particulars	Process I `	Process II `	Process III `	Finished Stock `
Direct material	4,000	6,000	2,000	–
Direct wages	6,000	4,000	8,000	–
Stock on 31st March	2,000	4,000	6,000	3,000
Sale during the year	–	–	–	36,000

From the above information prepare

(a) Process cost accounts showing the profit element at each stage ;

(b) Actual realised profits ; and

(c) Stock valuation as would appear in the balance sheet.

Solution :

(a) The process cost accounts showing the profit at each stage are as follows :

Dr **PROCESS I ACCOUNT** **Cr**

Particulars	Total `	Cost `	Profit `	Particulars	Total `	Cost `	Profit `
To Materials	4,000	4,000	—	By Process II A/c (transfer)	10,000	8,000	2,000
Wages	6,000	6,000	—				
Total	10,000	10,000	—				
Less Closing Stock c/d	2,000	2,000	—				
Prime cost	8,000	8,000	—				
To Gross Profit (25% on Cost)	2,000	—	2,000				
	10,000	8,000	2,000		10,000	8,000	2,000
To Stock b/d	2,000	2,000	—				

Dr **PROCESS II ACCOUNT** **Cr**

Particulars	Total `	Cost `	Profit `	Particulars	Total `	Cost `	Profit `
To Process I A/c (transfer)	10,000	8,000	2,000	By Process III A/c (transfer)	20,000	14,400	5,600
To Materials	6,000	6,000	—				
To Wages	4,000	4,000	—				
Total	20,000	18,000	2,000				
Less : Closing Stock c/d	4,000	3,600	400				
Prime Cost	16,000	14,400	1,600				
To Gross Profit (25% on Cost)	4,000	—	4,000				
	20,000	14,400	5,600		20,000	14,400	5,600
To Stock b/d	4,000	3,600	400				

Dr **PROCESS III ACCOUNT** **Cr**

Particulars	Total `	Cost `	Profit `	Particulars	Total `	Cost `	Profit `
To Process II A/c (transfer)	20,000	14,400	5,600	By Finished Stock A/c (transfer)	30,000	19,520	10,480
To Material	2,000	2,000	—				
To Wages	8,000	8,000	—-				
Total	30,000	24,400	5,600				
Less : Closing Stock c/d	6,000	4,880	1,120				
Prime cost	24,000	19,520	4,480				
To Gross Profit (25% on Cost)	6,000	—	6,000				
	30,000	19,520	10,480		30,000	19,520	10,480
To Stock h/d	6,000	4,880	1,120				

FINISHED STOCK ACCOUNT

Particulars	Total `	Cost `	Profit `	Particulars	Total `	Cost `	Profit `
To Process III A/c	30,000	19,520	10,480	By Sales	36,000	17,568	18,432
Less: Stock A/c	3,000	1,952	1,048				
	27,000	17,568	9,432				
Gross profit	9,000	—	9,000				
	36,000	17,568	18,432		36,000	17,568	18,432
To Stock b/d	30,000	1,952	1,048				

Note: Calculation of profit on closing stock :

This can be easily done looking the line above the closing stock line in each process and applying the following formula :

$$\text{Cost of Stock} = \frac{\text{Cost Column}}{\text{Total Column}} \times \text{Stock}$$

Process I: No profit

Process II: $\frac{\text{`}\ 18,000}{\text{`}\ 20,000} \times 4,000 = \text{`}\ 3,600$

Similarly apply to all the other processes

$\therefore$ Profit = ` 4,000 – ` 3,600 = ` 400

Process III : $\frac{\text{`}\ 24,400}{\text{`}\ 30,000} \times 6,000 = \text{`}\ 4,800$

$\therefore$ Profit = ` 6,000 – ` 4,880 = ` 1,120

Finished Stock = $\frac{\text{`}\ 19,520}{\text{`}\ 30,000} \times \text{`}\ 3,000 = \text{`}\ 1,952$

$\therefore$ Profit = ` 3,000 – ` 1,952 = ` 1,048.

(b) Actual realised profit can be shown as under :

Particulars	Apparent profit from process `	Unrealised profit in closing stock `	Actual profit (gross) `
Process I	2,000	—	2,000
Process II	4,000	400	3,600
Process III	6,000	1,120	4,880
Finished stock	9,000	1,048	7,952
	21,000	2,568	18,432

(*Compare this figure with that of profit column of sales side of finished stock account.)

(c) Stock Valuation for balance sheet purpose : From the stock column of respective closing stocks, we observe :

	Cost of closing stock
Process I	2,000
Process II	3,600
Process III	4,880
Finished stock	1,952
Total	12,432
Check : Total cost incurred in all processes	30,000
Less : Cost of goods sold	17,568
Cost of closing stock	12,432

2.5.2.3 Inter - Process Profits

Sometimes, products transferred from one process to another are valued at a price corresponding to the market price of comparable goods. Where it is not possible to determine the market price correctly, a margin of profit is added to the cost of processing to derive the value of products transferred. Consequently, each process account reveals a profit, and the value of products entering the next process are shown in the latter accounts at comparable market price, rather than at cost.

The profits which come in that way at each stage are known as inter-process profits. These are accounting profits which increase cumulatively as the product advances to the finished stage. The main advantage of this type of profit is that it reveals the economy and efficiency of operation in each process. The complications introduced by this procedure make it undesirable, if only for the reason that for Balance Sheet purposes the profit so introduced must be eliminated from the book values of process and finished stocks.

PROBLEMS ON INTER PROCESS RROFIT

Problem No 1

Raghu and Co. products A product, that passes through three process before it is transfer to finished stock.

Following information is available for the month of December 1993.

Particulars	process - I	Process - II	Process - III	Finished stock
Opening stock	Rs. 40,000	Rs. 48,000	Rs. 32,000	Rs. 1,20,000
Direct material	Rs. 80,000	Rs. 84,000	Rs.120,000	–
Direct wages	Rs. 60,000	Rs.60,000	Rs. 64,000	–
Production over heads	Rs. 56,000	Rs. 24,000	Rs. 1,60,000	–
Closing stock	Rs. 20,000	Rs. 24,000	Rs. 16,000	60,000
Profit on cost	33.33%	25%	25%	–
Inter process profit for opening stock	–	8,000	8,000	44,000

Stock in process are valued at prime cost, finished stock has been valued at which it is received from the process sales during the month is Rs. 14,00,000.

1. Prepare process Accounts
2. Prepare the statement showing profit actually released
3. Stock valuation for balance sheet purpose.

Solution :

Dr. **Process - I A/C** **Cr**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To Opening stock	40,000	40,000	–				
To Material	80,000	80,000	–	By Transfer to Process -II A/c	2,88,000	2,16,000	72,000
To Direct wages	60,000	60,000	–	(Bal. fig)			
	1,80,000	1,80,000	–				
Less : Closing stock	20,000	20,000	–				
Prime cost	1,60,000	1,60,000					
Add : Over heads	56,000	56,000					
Total cost	2,16,000	2,16,000	–				
Add : profit $\left(216000 \times \frac{33.33}{100}\right)$	72,000	–	72,000				
	2,88,000	2,16,000	72,000		2,88,000	2,16,000	72,000

Dr. **Process - II A/C** **Cr**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To Opening stock	48000	40,000	8,000				
To Process - I A/c	2,88,000	2,16,000	72,000				
To Direct material	84,000	84,000	–	By Transfer to process -III A/c	6,00,000	4,04,000	1,96,000
To Direct wages	60,000	60,000	–	(Bal . fig)			
	4,80,000	4,00,000	80,000				
Less: closing stock $\left(\frac{4,00,000}{4,80,000} \times 24,000\right)$	24,000	20,000	4,000				
Prime cost	4,56,000	3,80,000	76,000				
Add : over heads	24,000	24,000	–				
Total cost	4,80,000	4,04,000	76,000				
Add : profit $\left(4,80,000 \times \frac{25}{100}\right)$	1,20,000	–	1,20,000				
	6,00,000	4,04,000	1,96,000		6,00,000	4,04,000	1,96,000

Process - III A/C

Dr. **Cr.**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To opening stock	32,000	24,000	8,000				
To process - 2 A/C	6,00,000	4,04,000	1,96,000				
To Direct Material	1,20,000	1,20,000	–				
To Direct wages	64,000	64,000	–				
	8,16,000	6,12,000	2,04,000	By transfer to			
Less: Closing stock	16,000	12,000	4,000	finished Goods	12,00,000	7,60,000	4,40,000
$\frac{68,320}{1,12,000} \times 14,000$				(Bal. fig)			
Prime cost	8,00,000	6,00,000	2,00,000				
Add : over heads	1,60,000	1,60,000	–				
Total cost	9,60,000	7,60,000	2,00,000				
Add : profit (960.000 × 25%)	2,40,000		2,40,000				
	12,00,000	7,60,000	4,40,000		12,00,000	7,60,000	4,40,000

Finished stock A/C

Dr. **Cr.**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To opening stock	1,20,000	76,000	44,000				
To process - 3A/C	12,00,000	7,60,000	4,40,000	By sales	14,00,000	7,98,000	6,02,000
	13,20,000	8,36,000	4,84,000	(Bal. fig)			
Less : closing stock $\left(\frac{4,84,000}{13,20,000} \times 60,000\right)$	60,000	38,000	22,000				
Prime cost	12,60,000	7,98,000	4,62,000				
Add : over heads	–	–	–				
Total cost	12,60,000	7,98,000	4,62,000				
Add : Profit (Bal. fig)	1,40,000	7,98,000	4,62,000				
	14,00,000	7,98,000	6,02,000			7,989,000	6,02,000

Statement for calculation of Actual Realised profit

Process	Profit Process	Add : unrealised profit	Less : profit profit	Actual Realised profit
Process I	72,000	–	–	72,000
Process II	1,20,000	8,000	4,000	1,24,000
Process III	2,40,000	8,000	4,000	2,44,000
Finished goods A/c	1,40,000	44,000	22,000	1,62,000
Actual realised profit				6,02,000

Valuation of stock for Balance Sheet

Process	Cost Price
Process - I	20,000
Process - II	20,000
Process - III	12,000
Finished Goods	38,000
	90,000

2. A certain product passes through B processes before it is transferred to finished stock. The following information is obtained for the month of December.

Items	Process X	Process Y	Process Z	Finished Goods
Opening stock	Rs. 2,000	Rs. 12,000	Rs. 10,000	Rs. 25,000
Direct material	Rs. 13,000	Rs. 20,000	Rs. 40,000	–
Direct wages	Rs. 10,000	Rs. 10,500	Rs. 50,000	–
Production overheads	Rs. 10,000	Rs. 25,000	Rs. 25,000	–
Closing stock	Rs. 5,000	Rs. 6,000	Rs. 32,000	33,000
Profit on transfer price	20%	25%	10%	–
Inter process profit for	–	2,000	2,800	10,000

opening stock.

Sales during the month Rs. 800,000

1. Prepare process A/c.
2. Statement showing realised profit at each stage.
3. Valuation of stock for Balance sheet purpose.

Solution :

Dr. Process - 'X' A/C Cr

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To Opening stock	2,000	2,000	–				
To Direct material	13,000	13,000	–				
To Direct wages	10,000	10,000	–	By Transfer to			
	25,000	25,000	–	Process - 'Y'	37,500	30,000	7,500
Less: closing stock	5,000	5,000	–	(Bal . fig)			
Prime cost	20,000	20,000					
Add : overheads	10,000	10,000					
Total cost	30,000	30,000					
Add : profit @ 20% $\left(3,000 \times \frac{20}{80}\right)$	7,500	–	7,500				
	37,500	30,000	7,500		37,500	30,000	7,500

Dr. Process - 'Y' A/C Cr

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To opening stock	12,000	10,000	2,000				
To process X	37,500	30,000	7,500				
To Direct material	20,000	20,000	–	By transfer			
To Direct wage	10,500	10,500	–	to process - z (Bal. fig)	1,32,000	90,213	41,787
	80,000	70,500	9,500				
Less : Closing $\left(\frac{9,500}{80,000} \times 6,000\right)$	6,000	5,287	713				
Prime cost	74,000	65,213	8,787				
Add : Over heads	25,000	25,000	–				
Total cost	99,000	90,213	8,787				
Add: profit (25%) $\left(99,000 \times \frac{25}{75}\right)$	33,000		33,000				
	1,32,000	90,213	41,787		1,32,000	90,213	41,787

Dr. **Process - 'Z' A/C** **Cr**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To opening stock	10,000	7,200					
To process y a/c	1,32,000	90,213	41,787				
To direct material	40,000	40,000	–				
To direct wages	50,000	50,000	–	By Transfer to finished			
	2,32,000	1,87,413	44,587	Goods A/c	2,50,000	1,86,563	63,437
Less: closing stock $\left(\frac{44,587}{2,32,000}\times 32,000\right)$	32,000	25,850	6,150	(Bal. fig)			
	2,00,000	1,61,563	38,437				
Prime cost	25,000	25,000	–				
Total cost	2,25,000	1,86,563	38,437				
Add : profit @ 10% $\left(2,25,000\times\frac{10}{90}\right)$	25,000		25,000				
	2,50,000	1,86,563	63,437		2,50,000	1,86,563	63,437

Dr. **Finished Goods A/C** **Cr**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To opening stock	25,000	15,000	10,000				
To process z	2,50,000	1,86,563	63,437				
To Direct material	–	–	–				
To Direct wages	–	–	–	By sales	8,00,000	1,77,375	6,22,625
	2,75,000	2,01,563	73,437				
Less: closing stock $\left(\frac{73,437}{2,75,000}\times 33,000\right)$	33,000	24,188	8,812				
Prime cost	2,42,000	1,77,375	64,625				
Add : overheads	–	–	–				
Total cost	2,42,000	1,77,375	64,625				
Add : profit (Bal. fig)	5,58,000	–	5,58,000				
	8,00,000	1,77,375	6,22,625			1,77,375	6,22,625

Statement for calculation of Realised profit.

Process	profit in process	Add: unrealised Profit in opening stock	Less: unrealised profit in closing stock	Actual profit
Process - 1	7,500	–	–	7,500
Process - 2	33,000	2,000	713	34,287
Process - 3	25,000	2,800	6,150	21,650
Finished goods	5,58,000	10,000	8,812	5,59,188
Actual profit realised				6,22,625

Stock valuation for Balance Sheet purpose

Process	Cost price
Process - I	5,000
Process - II	5,287
Process - III	25,850
Finished Goods A/c	24,188
	60,325

2.5.2.4 Work-in-Progress

Process costing mainly deals with continuous type of production. At the end of the accounting period, there may be some work-in-progress, i.e. semi-finished goods may be in the pipeline. The valuation of such work-in-progress is done in terms of equivalent or effective production.

Equivalent Production

Equivalent production represents the production of a process in terms of completed units. Work-in-progress at the end of an accounting period is converted into equivalent completed units. This is done by the following formula:

Equivalent units = No. of units of work in progress x Degree of completion in %

For example, if there are 50 units in work-in-progress and these are estimated to be 50% complete. Then their equivalent production is 50 units x 50% = 25 units.

In each process, an estimate is made of the degree of completion of work –in-progress in terms of percentage. Such an estimate must be accurate because any error in such estimation will lead to erroneous valuation of work-in-progress stock which enters into final accounts.

Evaluation of Equivalent Production

After work-in-progress has been converted into equivalent completed units, the following steps are taken to evaluate it.

i) Find out the total cost (net) for each element of cost (net) for each i.e. material, labour and overhead. Scrap value of normal loss is deducted from the material cost.

ii) Ascertain the cost per unit of equivalent production separately for each element of cost. This is done by dividing the total cost of each element by the respective number of equivalent units.

iii) At this rate of cost per unit, ascertain the value of finished production and work-in-progress.

For the purpose of computation of equivalent production are classified into the following two categories :

For clear understanding illustrations on equivalent production are classified into the following two categories.

a) When there is no opening stock i.e. when there is only closing stock or work-in-progress. In such a situation there may or may not be process losses.

b) When there is opening as well as closing stock-Here also there may or may not be process losses.

When there is no opening work-in-progress and no process loss

In such a case, valuation of work-in-progress in terms of equivalent production is comparatively simple. Procedure followed in this type of situation is shown in the following illustration.

When there is no opening work-in-progress but there are process losses

As discussed earlier. Losses are inherent in process operations. Normal and abnormal process losses are treated differently in the calculation of equivalent production.

Normal Loss

Equivalent units of normal loss are taken as nil. In other words, normal loss is not added in the equivalent production. However, realizable value of normal scrap is deducted from the cost of material so as to calculate the net material cost. This net material cost becomes the basis of calculating the material cost per unit in the statement of cost.

Abnormal Loss

This is treated as if this were good production lost Abnormal loss, thus, is added to equivalent production with due consideration to its degree of completion. Unless the degree of completion is specified, it may be assumed that abnormal loss units are 100% complete in respect of all elements of cost.

Abnormal Gain

Units of abnormal gain are represented by good finished production. It is therefore, Always taken as 100% complete in respect of all elements of cost i.e. material, labour and overhead abnormal gain is deducted to obtain equivalent production.

PROBLEM ON WORK-IN-PROCESS WITH PROCESS LOSSES

Problem No. 1

During January 2010 units were introduced into Process I. The normal loss was estimated at 5% on input. At the end of the month, 1,400 units had been produced and transferred to the next process, 460 units were uncompleted and 140 units had been scrapped. It was estimated that uncompleted units had reached a stage in production as follows :

Material	75%	completed
Labour	50%	
Overheads	50%	

The cost of 2,000 units was ` 5,800.

Direct material introduced during the process amounted to ` 1,440.

Direct wages amounted to ` 3,340.

Production overheads incurred were ` 1,670.

Units scrapped realised ` 1 each.

Units scrapped passed through the process, so were 100% completed as regards material, labour and overhead.

Find out (a) Equivalent Production, (b) Cost per unit; and (c) Show the necessary accounts.

Solution:

(a)

STATEMENT OF EQUIVALENT PRODUCTION

Input (Units)	Output	Units	Equivalent Production			
			Material		Labour and Overheads	
			Qty.	%	Qty.	%
2,000	Normal Loss	100	–	–	–	–
	Abnormal Loss	40	40	100	40	100
	Finished Production	1,400	1,400	100	1,400	100
	Work-in-Progress	460	345	75	230	50
2,000	Total	2,000	1,785		1,670	

(b)

STATEMENT OF COST

Elements of Cost	Cost (`)	Equivalent Production (Units)	Cost per Unit (`)
Materials			
Cost of units introduced	5,800		
Direct Materials	1,440		
	7,240		
Less : Scrap value of normal loss	100		
	7,140	1,785	4
Direct Wages	3,340	1,670	2
Overheads	1,670	1,670	1
Total	12,150		7

STATEMENT OF EVALUATION

Production	Elements of Cost	Equivalent Production (Units)	Cost per Unit `	Cost Cost `	Total `
Abnormal Loss	Material	40	4	160	
	Labour	40	2	80	
	Overheads	40	1	40	280
Finished Production	Material	1,400	4	5,600	
	Labour	1,400	2	2,800	
	Overheads	1,400	1	1,400	9,800
Work-in-Progress	Material	345	4	1,380	
	Labour	230	2	460	
	Overheads	230	1	230	2,070
					12,150

(c)

PROCESS I ACCOUNT

Particulars	Units	Amount `	Particulars	Units	Amount `
To Units introduced	2,000	5,800	By Normal Loss	100	100
To Direct Material		1,440	By Abnormal Loss	40	280
To Direct Wages		3,340	By Process I Finished Production	1,400	9,800
To Production Overheads		1,670	By Balance c/d (Work-in-Progress)	460	2,070
	2,000	**12,250**		**2,000**	**12,250**

PROCESS II ACCOUNT

Particulars	Units	`	
To Process I A/c	1,400	9,800	

ABNORMAL LOSS ACCOUNT

Particulars	Units	`	Particulars	Units	`
To Process I A/c	40	280	By Cash/Dr. (Sale @ ` 1 per unit)	40	40
			By Costing P. & L. A/c (Loss)		240
	40	280		40	280

Problem No. 2

A statement of Equivalent production [FIFO METHOD]

Opening work in progress → 2,000 units completed as to materials 80%, labour 60% over heads 60% units introduced 8,000 units.

Closing introduced 8,000 units,

Closing work - in - process 3,000 units

Completed as to 3,000 units

Completed as to materials 80%, labour 60% and over heads 60% findout equivalent production using FIFO method.

Solution :

INPUT		OUTPUT		Material % of		Labour % of		Over Heads % of	
Particulars	Units	Particulars	Units	Completion	Units	Completion	Units	Completion	Units
opening WIP	2,000	Opening							
Units Intro-duced	8,000	WIP Comp-leted	2,000	20%	400	40%	800	40%	800
		Completed units out of Issue (8000-3000)	5,000	100%	5,000	100%	5,000	100%	5,000
		Closing WIP of Issued	3,000	80%	2,400	60%	1,800	60%	1,800
Total	10,000		10,000		7,800		7,600		7,600

Problem No. 3

Opening WIP - 10,000 Units completed as to materials 75% labour 60% and over heads 40% units introduced 20,000 units

Close : IN - PROGRESS 4,000 Units completed as to materials 80% labour 60% of over heads 40%.

Find out equivalent production using average cost method and "FIFO method"

A STATEMENT OF EQUIVALENT PRODUCTION [UNDER FIFO METHOD]

Left Right

INPUT		OUTPUT		Material % of		Labour % of		Over Heads % of	
Particulars	Units	Particulars	Units	Completion	Units	Completion	Units	Completion	Units
opening WIP	10,000	–	–	–	–	–	–	–	–
Units Intro-	20,000	Completed units [openingWIP Included]	26,000	100%	26,000	100%	26,000	100%	26,000
		Closing WIP	4,000	80%	3,200	60%	2,400	40%	1,600
Total	30,000		30,000		29,200		28,400		27,600

A STATEMENT OF EQUATION PRODUCTION [UNDER AVERAGE COST METHOD]

Left		Right							
INPUT		**OUTPUT**		**Material % of**		**Labour % of**		**Over Heads % of**	
Particulars	**Units**	**Particulars**	**Units**	**Completion**	**Units**	**Completion**	**Units**	**Completion**	**Units**
openingWIP	10,000	opening WIP	10,000	25%	2,500	40%	4,000	60%	6,000
Units Introduced	20,000	completed unit of issued (B/F)	16,000	100%	16,000	100%	16,000	100%	16,000
		closingWIP of issued	4,000	80%	3,200	60%	2,400	40%	16,000
Total	30,000		30,000		21,700		22,400		23,600

In this statement per unit material cost, per unit labour cost and per unit over head cost is computed, for this purpose the following steps are to be followed.

Problem No. 4

During the month of April 4,000 units were introduced in process 'A'. The cost of 4,000 units was Rs. 23,200 At the end of the month 3000 units has been produced and transferred to process 'B' 720 units were still in process and 280 units were scrap. A normal wastage of 5% on input is allowed. It was estimated that in complete units has reached a stage in production has follows.

Material 75% complete labour 50% complete, production Over Heads 50% complete.

The cost incurred in addition to 4,000 units introduced were Direct Materials Rs. 6,160 direct wages Rs. 13,760, production Over Heads Rs. 6,880.

Units scrap realised at Rs. 2 per unit.

Prepare

(1) A statement showing Equivalent production.
(2) A statement showing cost per unit
(3) A statement apportionment of cost
(4) Process a/c s.

WORKING NOTES

INPUT	4,000	Units
Less : Closing WIP	3,000	
	1,000	
Less : Closing WIP	720	
	280	

Less : Normal loss	200	$\left(4,000 \times \frac{5}{100}\right)$
Abnormal Scrap	80	

left Right

INPUT		OUTPUT		Material % of		Labour % of		Over Heads % of	
Particulars	Units	Particulars	Units	Completion	Units	Completion	Units	Completion	Units
openingWIP	4,000								
		Completed units [opening WIP included]	3,000	100%	3,000	100%	3,000	100%	3,000
		Normal Loss	200	–	–	–	–	–	–
		abnormal Loss	80	100%	80	100%	80	100%	80
		Closing WIP	720	75%	540	50%	360	50%	360
Total	4,000		4,000		3,620		3,440		3,440

A STATEMENT SHOWING COST PER UNITS

1 Element of cost	2 Total Cost in (Rs.)	3 Equivalent product -in units	$\frac{2}{3}$ Cost per units
Direct material:			
Cost of material input	23,200		
(+) Direct material	6,160		
	29,360		28,960
(–) Normal Loss value (200 × 2)	400		3,620
	28,960	3,620	= Rs. 8
Labour	13,760	3,440	$\frac{13,760}{3,440}$ = Rs.4
Over Heads	6,880	3,440	$\frac{6,880}{3,440}$ = Rs. 2

A STATEMENT SHOWING APPORTIONMENT OF COST

Particulars	Equivalent production in units	cost per in units	cost in (Rs.) units	Total Cost
Abnormal loss				
Materials	80	8	640	
Labour	80	4	320	
Over Heads	80	2	160	1,120
Completed unit/output				
Materials	3,000	8	24,000	
Labour	3,000	4	12,000	
Over Heads	3,000	2	6,000	42,000
Closing WIP				
Material	540	8	4,320	
Labour	360	4	1,440	
Over Heads	360	2	720	6,480

Dr. Process - 'A' A/C Cr

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To Input	400	5.80	23,200	By Normal loss	200	2	400
To Direct material			6,160	By Abnormal loss	80	4	1,120
To Direct labour			13,760	By Transfer pro-'B' (output)	3,000	14	42,000
To Over Head			6,880	By closing WIP	720	9	6,480
	4,000		50,000		4,000		50,000

Problem No. 5

The processes Inventory, in process No. 2 at the beginning of a period was valued at Rs. 2,950 is made up of Rs. 1400 towards material Rs. 1,000 towards Labour Rs. 550 towards Overheads for 100 units.

The value added during the period was Rs. 53,600 towards an introduction of 4,100 units from the previous process, besides Rs. 40,800 towards labour and Rs. 19,400 towards over heads.

3,600 units completed and were transferred to next process. 400 units were held back in process with 50% completion towards labour and over heads. While 200 units were lost in processing considered as normal prepare statement of equivalent production using average cost method and also prepare.

1. Statement showing average cost per unit and also statement showing Apportionment of cost and process accounts.

Working Notes

Given opening WIP	100	units
Add : Input from previous process	4,100	units
	4,200	units
Less : Normal Loss	200	units
Less : Output [3,600 + 400]	4,000	units
	4,000	units
	NIL	

STATEMENT OF "EQUIVALENT PRODUCTION" [AVERAGE METHOD]

INPUT		OUTPUT		Material % of		Labour % of		Over Heads % of	
Particulars	Units	Completion	Units	Completion	Units	Completion	Units	Completion	Units
opening WIP	100	Completed unit (output)	3,600	100%	3,600	100%	3,600	100%	3,600
from previous process	4,100	Closing work-in Progress	400	100%	400	50%	200	50%	200
		Normal loss	200	–	–	–	–	–	–
	4,200		4,200		4,000		3,800		3,800

A STATEMENT SHOWING COST PER UNIT

Element of cost		Total cost	Equivalent production	cost per unit
Material				
Opening work -In - progress.		1,400		
(+)Addition material		53,600		
		55,000		
Less : Scrap		NIL		
		55,000	4,000	13.75
Labour				
Opening WIP	1,000	41,800	3,800	Rs. 11 = 00
(+)Additional labour	40,800			
Over Heads				
Opening WIP	500			
(+) Additional 0.4	19,400	19,950	3,800	5.25

A statement showing "Apportionment of Cost"

Elements of cost	Equivalent units	cost per units	cost in (Rs.)	Total Cost
Computed unit [output]				
Materials	3,600	13.75	49,500	–
Labour	3,600	11.00	39,600	–
Over Heads	–	5	18,900	108,000
Closing WIP				
Material	400	13.75	5,500	–
Labour	200	11.00	2,200	–
Over Heads	200	5.25	1,050	8,750

Dr. Process - '2' A/C Cr

Particulars	Units	Cost per unit	Total	Particulars	Units	Cost per unit	Total
To Opening WIP	100		2,950	By Normal	200	–	–
To Process - 1	4,100		53,600	By Process III			
To Labour			40,800	(Completed out)	3,600		1,08,000
To Over Heads			19,400				
				By closing	400		8,750
	4,200		1,16,750		4,200		1,16,750

PROBLEMS ON PROCESS COSTING

I. Problem on without Loss

Problem No. 6

A product passes through three distinct processes to completion. These processes are numbered respectively I, II and III. During the week ended 15th January 2010, 500 units are produced. Following information is obtained :

Particulars	Process I	Process II	Process III
	`	`	`
Direct Materials	3,500	1,600	1,500
Direct Labour	2,500	2,000	2,500

The overhead expenses for the period were ` 1,400 apportioned to the processes on the basis of wages.

No work-in-progress or process stocks existed at the beginning or at the end of the week. Prepare Process Accounts.

Solution :

Process I Account

(Week ended, 15th January, 2010) (Output 500 units)

Particulars	Cost per Unit `	Total Cost `	Particulars	Cost per Unit `	Total Cost `
To Direct Materials	7	3,500	By Process No. II A/c		
To Direct Labour	5	2,500	(output transferred)	13	6,500
To Overhead Expenses $\left(\frac{25}{70}\text{ of } ` 1,400\right)$	1	500			
	13	6,500		13	6,500

Process II Account

Particulars	Cost per Unit `	Total Cost `	Particulars	Cost per Unit `	Total Cost `
To Process No. I A/c	13.00	6,500	By Process No. III		
" Direct Materials	3.20	1,600	(output transferred)	21.00	10,500
To Direct Labour	4.00	2,000			
" Overhead expenses $\left(\frac{20}{70}\text{ of } ` 1,400\right)$	0.80	400			
	21.00	10,500		21.00	10,500

Process III Account

Particulars	`	`	Particulars	`	`
To Process No. II A/c	21	10,500	By Finished Stock A/c		
" Direct Materials	3	1,500	(output transferred)	30	15,000
To Direct Labour	5	2,500	" Overhead Expenses		
$\left(\frac{25}{70}\text{ of } ` 1,400\right)$	1	500			
	30	15,000		30	15,000

Problem No. 7

From the following information prepare process A/c.

Particulars	process- I	process - II	process - III
Raw material introduced	10,000	5,000 unit	5,000 units
Cost per unit	Rs. 10/-	Rs. 81-	Rs. 6/-
Direct labour	Rs. 70,000	Rs.20,000	Rs. 40,000
over heads	Rs. 10,000	Rs. 15,000	Rs. 20,000

Factory over heads Rs. 80000 is allocated on the basis of labour

Solution :

Dr. Process -I A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Raw material (10,000 × 10)	10,000	1,00,000	By Transfer to process -III A/c (Bal. fig)	10,000	2,23,077
To Direct labour	–	70,000			
To over heads	–	10,000			
To Factory over heads $\left(80,000 \times \frac{7}{13}\right)$	–	43,077	Cost per unit $= \frac{2,23,077}{10,000}$ = 22.31.		
	10,000	2,23,077		10,000	2,23,077

Dr. Process -II A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Transfer from process - I A/c	10,000	2,23,077	By Transfer to process -III A/c	15,000	3,10,385
To Raw material (5000 × 8)	5,000	40,000	(Bal. fig)		
To Direct labour	–	20,000			
To over heads	–	15,000	Cost per unit = $\frac{310,385}{15000}$		
To factory over heads $\left(80,000 \times \frac{2}{13}\right)$	–	12,308	= 20.69		
	15,000	3,10,385		15,000	3,10,385

Dr. Process -III A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Transfer from process - II A/c	15,000	3,10,385	By Transfer to finished Goods A/c (Bal. fig)	20,000	4,25,000
To Raw material (5000 × 6)	5,000	30,000			
To Direct labour	–	40,000	Cost per unit =		
To over heads	–	20,000	= 21.25		
To Factory over heads	–	24,615			
	20,000	4,25,000		20,000	4,25,000

2.5.2.5 Process Scrap

It is the incidental residue from certain type of manufacture usually of small amount and low value, recoverable without further processing. Examples : outlined metal from stamping operations, shavings, turnings, short lengths etc. When scrap resulting from one process can be utilized in another process, it can be treated in either of the following manners :

a) If the scrap material is available in the market the latest purchase price may be taken as the value of the scrap and credited to the process of origin.

b) In case if the scrap requires reprocessing before it can be utilized in the subsequent process, it should be valued at the cost of reprocessing the scrap or the market price whichever is lower. Scrap which cannot be utilized in any subsequent process may either be treated as waste if it has no market table value or it may be disposed of as 'seconds' or 'thirds' if it has a marketable value. If scrap of small value is sold, the value realised is credited to a sundry income a/c and transferred to the profit and loss a/c at the end of the year.

2.5.2.6 Process Loss

In many processes a loss of weight arises in the course of manufacture. Such loss is inherent and inevitable. This can be worked out in advance. Usually this is calculated by formula or by experience. Process loss is often caused by such factors as evaporation as inherent in large scale production; but may often include scrap and waste.

When the loss is within the calculated limit, this is considered to be normal process loss. Abnormal process loss is that loss caused by unexpected or abnormal conditions such as sub-standard materials, carelessness and accidents.

All losses under this category should be recorded and thoroughly investigated, and where possible, steps taken to prevent ay recurrence. Accounting procedure for normal and abnormal loss differs. When normal loss occurs the cost is absorbed in the cost of production of good products, so on account for normal loss is required. However, in the event of abnormal loss a separate account must be opened, to which is debited the cost of material, labour and appropriate overhead incurred upto the point of rejection. Abnormal losses should be written off the costing profit and loss a/c.

PROBLEMS ON NORMAL PROCESS LOSS

Problem No. 1

Bengal Chemical Co. Ltd. produced three chemicals during the month of July, 2010 by three consecutive processes. In each process 2% of the total weight put in is lost and 10% is scrap which from processes (1) and (2) realises ` 100 a ton and from process (3) ` 20 a ton. The products of three processes are dealt with as follows :

Particulars	Process 1	Process 2	Process 3
Passed on to the next process	75%	50%	–
Sent to warehouse for sale	25%	50%	100%

Expenses incurred :

Particulars	Process 1		Process 2		Process 3	
	`	Tons	`	Tons	`	Tons
Raw materials	1,20,000	1,000	28,000	140	1,07,840	1,348
Manufacturing wages	20,500	–	18,520	–	15,000	–
General expenses	10,300	–	7,240	–	3,100	–

Prepare Process Cost Accounts showing the cost per ton of each product.

Solution :

Dr **Process 1 Account** **Cr**

Particulars	Tons	`	Particulars	Tons	`
To Raw Materials	1,000	1,20,000	By Normal loss		
To Mfg. Wages		20,500	(2% of 1,000 tons)	20	-
To General Expenses		10,300	By Sale of Scrap		
			(10% of 1,000 tons)	100	10,000
			By Transfer to Warehouse	220	35,200
			By Transfer to Process 2 (cost		
			per ton ` 160)	660	1,05,600
	1,000	1,50,800		1,000	1,50,800

Dr **PROCESS 2 ACCOUNT** **Cr**

	Tons	`		Tons	`
To Process 1 a/c	660	1,05,600	By Normal Loss		
To Raw Materials	140	28,000	(2% of 800 tons)	16	–
To Mfg. Wages		18,520	By Sale of Scrap		
To General Expenses		7,240	(10% of 800 tons)	80	8,000
		75,680	By Transfer to Process 3	352	75,680
			(cost per ton f 215)		
			By Transfer to Warehouse	352	75,680
	800	1,59,360		800	1,59,360

Dr **PROCESS 3 ACCOUNT** **Cr**

	Tons	`		Tons	`
To Process 1 a/c	352	75,680	By Loss of Weight		
To Raw Material	1,348	1,07,840	(2% of 1,700 tons)	34	—
To Mfg. Wages		15,000	By Sale of Scrap		
To General Expenses		3,100	(10% of 1,700 tons)	170	3,400
			By Transfer to Warehouse		
			(cost per ton f 132.50)	1,496	1,98,220
	1,700	2,01,620		1,700	2,01,620

PROBLEM ON ABNORMAL LOSS

Problem No. 2

In process A 100 units of raw materials were introduced at a cost of `1,000. The other expenditure incurred by the process was `602. Of the units introduced 10% are normally lost in the course of manufacture and they possess a scrap value of `3 each. The output of Process A was only 75 units. Prepare Process A Account and Abnormal Loss Account.

Process A Account

Particulars	Units	`	Particulars	Units	`
To Raw Material	100	1,000	By Normal Loss A/c		
To Other Expenses		602	10% of 100 units @ ` 3 each	10	30
			By Abnormal Loss	15	*262
			Process B (output)	75	1,310
	100	**1,602**		**100**	**1,602**

*Units entered	100	
Less: Normal Loss	10	
Normal Output	90	units
Actual Output	75	units
Units of Abnormal Loss	15	units

Value of Abnormal Loss

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

$$= \frac{`1,572}{90} \times 15 = `262.$$

Dr **Process Loss Account** **Cr**

Particulars	Units	`	Particulars	Units	`
To Process A	15	262	By Cash (scrap value of loss @ ` 3)	15	45
			By Costing Profit and Loss a/c		217
	15	**262**		**15**	**262**

PROCESS ACCOUNTS WITH WASTAGE AND NORMAL LOSS

Problem No. 3

A Co produces product 'x' which is passed through 3 process.

Particulars	Process - I	Process - II	Process - III
Cost of Raw materials (for 1000 tons)	Rs. 1,00,000	–	–
Direct labour	20,000	30,000	40,000
Over heads	30,000	50,000	30,000
Loss in weight	1%	2%	1%
Estimated scrap	5%	5%	5%

Realised value of scrap per ton process - I Rs. 10, process - II 9/- and process - III Rs. 5/ respectively prepare process A/cs.

Solution :

Dr. **Process -I A/C** **Cr**

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Raw materials	1,000	1,00,000	By loss in weight $\left(100 \times \frac{1}{100}\right)$	10	–
To Direct Labour	–	20,000	By Scrap $\left(1000 \times \frac{5}{100}\right)$ (50 × 10)	50	500
To Over heads	–	30,000	By Transfer to process-IIA/c (Bal. fig)	940	1,49,500
	1,000	1,50,000		1,000	1,50,000

Dr. **Process -II A/C** **Cr**

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Transfer from process II A/c	940	1,49,500	By loss in weight $\left(940 \times \frac{2}{100}\right)$	18.8	–
To Direct labour	–	30,000	By scrap $\left(940 \times \frac{5}{100}\right)$ (47 × 9)	47	423
To over heads	–	50,000	By Transfer to process III A/c (Bal.fig) Cost per unit $\frac{2,29,077}{874.2} = 262.04$	874.2	2,29,077
	940	2,29,500		940	2,29,500

Dr. **Process -III A/C** **Cr**

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Transfer from process II A/c	874.2	2,29,077	By loss in weight $\left(874.2 \times \frac{1}{100}\right)$	8.74	–
To Direct labour	–	40,000	By Scrap $\left(874.2 \times \frac{5}{100}\right)$ (43.71×5)	43.71	218
To over heads	–	30,000	By Finished Goods A/c (Bal. fig) Cost per unit = $\frac{2,98,859}{821.75} = 363.68$	821.75	2,98,859
	874.2	2,99.077		874.2	2,99,077

Problem No. 4

'X' Co. Ltd produces product 'X' which is passed through 3 process and in each process a percentage of output is carried forward to ware house.

Particulars	Process - I	Process - II	Process - III
Raw materials	10,000 units	–	–
Cost of Raw material (per unit)	Rs. 5/-	–	–
Direct labour	Rs. 20,000	Rs. 30,000	Rs. 20,000
Over heads	Rs. 10,000	Rs. 15,000	Rs. 10,000
Normal loss	5%	5%	5%
Output transferred to next process	75%	50%	–
Output transferred to ware house for sale purpose	25%	50%	–
Scrap value (per unit)	Rs. 1/-	Rs. 1/-	Rs.1/-
Prepare process accounts			

Solution :

Dr. Process -I A/C Cr

Particulars	Units	Cost per units	Total	Particulars	Units	Cost per units	Total
To Raw material	10,000	5.00	50,000	By Normal loss $\left(10,000 \times \frac{5}{100}\right)$	500	1.00	500
To Labour	–	–	20,000				
To over heads	–	–	10,000	By Transfer to ware house [working notes]	2,375	8.37	19,875
				By Transfer to process-IIA/c (W. Notes)	7,125	8.37	59,625
	10,000		80,000		10,000	–	80,000

Dr. Process - II A/C Cr

Particulars	Units	Cost per units	Total	Particulars	Units	Cost per units	Total
To Transfer from process - I A/c	7,125	8.37	59,625	By Normal loss $\left(7,125 \times \frac{5}{100}\right)$	356	1.00	356
To Labour	–	–	30,000	By Transfer to ware			
To over heads	–	–	15,000	house (W.Notes)	3,384	15.40	52.134
				By Transfer to process III A/c(W.Notes)	3,385	15.40	52.135
	7,125		1,04,625		7,125		1,04,625

Dr. Process - III A/C Cr

Particulars	Units	Cost per units	Total	Particulars	Units	Cost per units	Total
To Transfer from process -II A/c	3,385	15.40	52,135	By Normal loss $\left(3,385\times\frac{5}{100}\right)\times 1$	169	1	169
To labour	–	–	20,000	By finished goods (Bal. fig)	3,216	25.49	81,966
To over heads	–	–	10,000				
	3,385		82,135		3,385		82,135

WORKING NOTES

PROCESS I A/C

Input	10,0000	Units
Less : wastage	NIL	
	10,000	Units
Less : Normal loss	500	Units
Output units	9,500	Units

output transferred to process II- 75%

$9500\times\frac{75}{100}$ = 7125 units

Output transferred to ware house = 25% sale = 50%

$9,500\times\frac{25}{100}$ = 2375 units

Calculation of Amt transferred

Debit side amt - Normal loss Amt
80,000 - 500 = 79,500
Amt transferred to process - II A/c = 75%

$79,500\times\frac{75}{100}$ = 59,625

Amt transferred to ware house for sale = 25%

$79,500\times\frac{25}{100}$ = 19,875

PROCESS II A/C

Input	7,125	Units
Less : wastage	NIL	
	7,125	Units
Less : Normal loss	356	Units
output	6,769	Units

Output transferred to process III 50%

$6,769\times\frac{50}{100}$ = 3,384

output transferred to ware house for

$6,769\times\frac{50}{100}$ = 3,385.

Calculation of Amt transferred

Debit side Amt - normal loss Amt
1,04,625 - 356 = 1,04,269
Amt transferred to process-III A/c = 50%

$1,04,269\times\frac{50}{100}$ = 52,135

Amt transferred to ware house for sale purpose = 50%

$1,04,269\times\frac{50}{100}$ = 52,134.

2.5.3 Abnormal Process Gain

Sometimes, it may happen that the actual loss of units in processing is less than the estimated normal loss. The difference is treated as abnormal process gain. The cost of units of abnormal gain should be debited to the process account and credited to an Abnormal Gain Account. The balance of abnormal Gain A/c should be transferred to the credit of Profit and Loss A/C.

Problem No. 1

Following data are available pertaining to a product after passing through two processes A and B :

Output transferred to process C from process B 9,120 units for ` 49,263.

Expenses incurred in Process C :

Sundry materials	` 1,480
Direct labour	` 6,500
Direct expenses	` 1,605

The wastage of process C is sold at `1.00 per unit. The overhead charges were 168% of direct labour. The final product was sold at `10.00 per unit fetching a profit of 20% on sales.

Find the percentage of wastage in process C and prepare Process C Account.

Solution :

Dr **Process C Account** **Cr**

Particulars	Units	`	Particulars	Units	`
To Process B A/c	9,120	49,263	By Normal Loss A/c	456	456
To Sundry Materials		1,480	By Finished Goods A/c (See note)	8,664	69,312
To Direct Labour		6,500			
To Direct Expenses		1,605			
To Overhead Charges (168% Labour)		10,920			
	9,120	**69,768**		**9,120**	**69,768**

Percentage of Normal Loss in Process C = $\frac{456 \text{ Units}}{9{,}120 \text{ Units}} \times 100 = 5\%$

Suppose units of normal loss	= x
No. of units of finished product	= 9,120 – x
Value of normal loss @ ` 1 per unit	= *
Cost of finished goods per unit	= ` 10 – 20% of ` 10 = ` 8.
Cost of finished goods	= (9,120 – x) × ` 8
Thus ` x + (` 72,960 – ` 8×)	= ` 69,768
or ` 72,960 – ` 7x	= ` 69,768
` 7x	= ` 72,960 – ` 69,768 = ` 3,192
or x	= 456 Units.
Normal loss units	= 456 units
Finished goods units	= 9,120 – 456 = 8,664 Units
Cost of finished units	= 8,664 × ` 8 = ` 69,312

2.5.4 Treatment of Wastage in Processing

In industries which are particularly adopting process costing, wastage occurs during the course of manufacture. It requires a very careful treatment in the cost accounts. Reasonable wastage for each process is generally determined on the basis of past experience and by experiments. Elimination of wastage is important as it increases the cost of Production.

Wastage may be of two kinds ; (a) Normal and (b) abnormal. The proportion of wastage which is bound to arise is normal wastage. It should be treated as an additional charge on the usable units produced. Any wastage, arising in excess of normal wastage or caused by circumstances outside the ordinary course of manufacture should be regarded as abnormal wastage. It should be treated as a loss. Normal wastage is part of cost of production but the value of abnormal wastage does not affect cost of production.

The process in which wastage has arisen should be created with the quantity. If the wastage is sold, the process should be credited with that value realised. When the wastage has got very little or no value the process account should be credited with the quantity. If the abnormal wastage has got the scrap value the loss would be recorded, reducing the actual loss. Any sum so realised will be credited to Abnormal Wastage account.

PROBLEM ON ABNORMAL GAIN, ABNORMAL LOSS AND NORMAL LOSS

Problem No. 1

The product of company passes through three distinct processes to completion. they are known as A, B and C. From past experience it is ascertained that loss is incurred in each process as : Process A – 2%, Process B – 5%, Process C – 10%.

In each case the percentage of loss is computed on the number of units entering the process concerned.

The loss of each process possesses a scrap value. The loss of processes A and B is sold at ` 5 per 100 units and that of process C at ` 20 per 100 units.

The output of each process passes immediately to the next process and the finished units are passed from process C into stock.

Particulars	Process A `	Process B `	Process C `
Materials consumed	6,000	4,000	2,000
Direct Labour	8,000	6,000	3,000
Manufacturing expenses	1,000	1,000	1,500

20,000 units have been issued to process A at a cost of `10,000. The output of each process has been as under:

Process A 19,500; Process B 18,800 ; Process C 16,000

There is no work-in-progress in any process.

Prepare process accounts. Calculations should be made to the nearest rupee.

Solution:

Dr **Process A Account** **Cr**

Particulars	Units	Amount	Particulars	Units	Amount
To Units Introduced	20,000	10,000	By Normal Loss a/c	400	20
To Materials		6,000	By Abnormal Loss A/c (1)	100	127
To Direct Labour		8,000	By Process B (output transferred)	19,500	24,853
To Manufacturing Expenses		1,000			
	20,000	25,000		20,000	25,000

Dr **Process B Account** **Cr**

Particulars	Units	Amount	Particulars	Units	Amount
To Process A a/c	19,500	24,853	By Normal Loss a/c	975	49
To Materials		4,000	By Process C (output transferred)	18,800	36,336
To Labour		6,000			
To Manufacturing Expenses		1,000			
To Abnormal Gain A/c (1)	275	532			
	19,775	**36,385**		**19,775**	**36,385**

Dr **Process C Account** **Cr**

Particulars	Units	Amount	Particulars	Units	Amount
To Process A a/c	18,800	36,336	By Normal Loss a/c	1,880	376
To Materials		2,000	By Abnormal Loss a/c (1)	920	2,309
To Direct Labour		3,000	By Finished Stock a/c	16,000	40,151
To Manufacturing Expenses		1,500			
	18,800	**42,836**		**18,800**	**42,836**

Dr **Finished Stock Account** **Cr**

Particulars	Units	Amount	Particulars	Units	Amount
To Process A a/c	16,000	40,151			
	16,000	**40,151**			

Dr **Abnormal Loss Account** **Cr**

Particulars	Units	Amount	Particulars	Units	Amount
To Process A a/c	100	127	By Cash a/c (100 @ ` 5 per		
To Process C a/c	920	2,309	100 + 920 @ ` 20 per 100)	1,020	189
			By Costing Profit and Loss a/c		2,247
	1,020	**2,436**		**1,020**	**2,436**

Dr **Normal Loss Account** **Cr**

Particulars	Units	Amount	Particulars	Units	Amount
To Process A a/c	400	20	By Abnormal Gain a/c	275	14
To Process C a/c	975	49	By Cash/Debtors a/c	2,980	431
	1,880	376			
	3,255	**445**		**3,255**	**445**

Dr **Abnormal Gain Account** **Cr**

Particulars	Units	Amount	Particulars	Units	Amount
To Normal Loss a/c			By Process B a/c	275	532
(loss of income)	275	14			
To costing profit and Loss a/c		518			
	275	**532**		**275**	**532**

Working Note (1)

Calculation of abnormal loss and abnormal gain:

Process A

$$\text{Cost of Abnormal loss} = ` \frac{24,980}{19,600} \times 100$$

$$= `127$$

Process B

$$\text{Cost of Abnormal gain} = ` \frac{35,804}{18,525} \times 275$$

$$= `532$$

Process C

$$\text{Cost of Abnormal Loss} = ` \frac{42,460}{16,920} \times 920$$

$$= `2,309.$$

Problem No. 2

XYZ Co. Ltd. produced as detergent powder in two processes. The following data relates to Dec., 2005.

	Total (Rs.)	Process I (Rs.)	Process II (Rs.)
Raw materials 20,000 units	12,000	12,000	–
Other materials	36,000	17,000	19,000
Direct expenses	4,260	2,400	1,860
Direct wages	20,000	8,000	12,000
Production overheads	15,000	–	–

Production overhead is observed a percentage of direct wages. Output of process - I is the input of process - II. Actual output of process I & II is 18,400 & 17,400 units respectively. Normal loss of process I is 10% and that of the other process is 5% . Loss of has some value ad it is sold at in process I. 0.40 paise and in process II Re. 1/- per unit. There were no opening and closing stocks. Prepare the necessary accounts.

Solution :

Dr. Process -I A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Material Introduced	20,000	12,000	By Normal loss $\left(20,000 \times \frac{10}{100}\right)$ × 1.4	2,000	2,800
To other material	–	17,000			
To Direct wages	–	8,000	By Transfer to process - II A/c (Bal.fig)	18,400	43,547
To Direct Expenses	–	2,400			
To Over heads (W. Notes)	–	6,000	Cost per unit		
To Abnormal Gain (W. Notes)	400	947	$\frac{43,547}{18,400} = 2.37$		
	20,400	46,347		20,400	46,347

Dr. Process -II A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Transfer from process I A/c	18,400	43,547	By Normal loss $\left(18,400\frac{5}{100}\right)$ = 920 × 1	920	920
To other material	–	19,000			
To Direct wages	–	12,000	By Abnormal loss (W.Notes)	80	386
To Direct Expenses	–	1,860	By finished Goods A/c (Bal. fig)	17,400	84,101
To production OH (W.Notes)	–	9,000	Cost per unit = $\frac{84,101}{17,400}=4.83$		
	18,400	85,407		18,400	85,407

Dr. Normal Loss A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Process I A/c (2,000 × 1.4)	2,000	2,800	By Abnormal Gain (400 × 1.4)	400	560
To process II A/c (920 × 1)	920	920	By Cash	1,600	2,240
			By Cash (920 × 1)	920	920
	2.920	3,720		2,920	3,720

Dr. Abnormal Gain A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Normal loss A/c	400	560	By process I A/c	400	947
To P&L A/c (Bal.fig)	–	387			
	400	947		400	947

Dr. Abnormal Loss A/C Cr

Particulars	Units	Amount	Particulars	Units	Amount
To Normal loss A/c	80	386	By Cash	80	80
			By P & L A/c (Bal. fig)	–	306
	80	386		80	386

Working Notes

Process - I A/c

Calculation of Abnormal loss (or) Gain in units

Input	20,000	Unit
Less: loss in weight	NIL	
	20,000	
Less: Normal loss in units	2,000	
Expected output	18,000	
Less : Actual output	18,400	
Abnormal Gain in Units	400	

Calculation of Abnormal Gain Amount

$$\frac{Normal\ cost\ of\ normal\ output}{Normal\ output} \times \text{Abnormal Gain in units.}$$

$$= \frac{42,600}{18,000} \times 400 = 947.$$

Note :

1) Normal cost of Normal output

Debit side amount – Normal

= 45,400 – 2,800

= 42,600.

2) Normal output

Debit side total units = loss in weight units – Normal loss / scrap units

20,000 – 2000 = 18,000.

PROCESS II A/C

1) Calculation of Abnormal loss or Gain in units

Input –	18,400	
Less : Loss in weight	NIL	
	18,400	
Less : Loss in weight in units	920	
Expected output	17,480	
Less : Actual output	17,400	
Abnormal loss	80	Units

Calculation of Abnormal loss Amount,

$$\frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Abnormal loss in units}$$

$$= \frac{84,487}{17,480} \times 80$$

= 386.

Note :

1) Normal cost of normal output

Debit side total amount – Normal loss / scrap amount

85,407 – 920 = 84,487.

2) Normal output : Debit side total units – loss in weight units – Normal loss unit

= 18,400 – 920 = 17,480.

Allocation of over head Expenses on the basis of wages Ratio.

Ratio = 8000 ; 12000 2 : 3

Process I A/C = 15,000 × $\frac{2}{5}$ = 6,000 ; Process - II A/C 15,000 × $\frac{3}{5}$ = 9,000.

Problem No. 3

The product of a manufacturing concern passes through two processes A and B and then to finished stock. It is ascertained that in each process 5% of the total 10 weight is lost and 10% is scrap which is released from processes A & B, Rs. 80 per to and Rs. 200 per ton respectively.

The following are the figures relating to both the process.

Particulars	Process A	Process B
Material (ton)	1,000	70
Cost by materials (Rs. per ton)	125	200
Wages (ton)	28,000	10,000
Manufacturing expenses (Rs.)	8,000	5,250
Output (ton)	830	780

Prepare process cost Accounts showing cost per ton of each process. There was no stock or work - in - process in any process.

Solution :

Dr. Process -'A' A/C Cr

Particulars	Units	Cost per unit	Total	Particulars	Units	Cost per unit	Total
To Material	1,000	125	125,000	By loss in weight $\left(1000 \times \frac{5}{100}\right)$	50	–	–
To wages	–	–	28,000	By Scrap/Normal	100	80	8,000
To Manufacturing Expenses	–	–	8,000	Loss $\left(1000 \times \frac{10}{100}\right)$			
				By Abnormal loss (W. Notes)	20	180	3,600
				By Transfer to process - BA/c (Bal.fig) $\left(\frac{1,49,400}{830} = 180\right)$	830	180	1,49,400
	1,000		1,61,000		1,000		1,61,000

Dr. Process -'B' A/C Cr

Particulars	Units	Cost per unit	Total	Particulars	Units	Cost per unit	Total
To Transfer from process 'A' A/c	830	180	1,49,400	By loss in weight $\left(900 \times \frac{5}{100}\right)$	45	–	–
To material	70	200	14,000	By Scrap/Normal $\left(900 \times \frac{10}{100}\right)$	90	200	18,000
To wages	–	–	10,000				
To manufacturing Expenses	–	–	5,250	By finished Goods A/c (Bal. fig)	780	210	1,63,800
To Abnormal Gain A/c (W.Notes)	15	–	3,150				
	915		1,81,800		915		1,81,800

Working Notes

Process - 'A' A /C

Calculation of Abnormal loss or Gain in units

Input	1,000	Units
Less : Loss in weight	50	Units
	950	Units
Less : Normal loss/scrap units	100	Units
Expected output	850	Units
Less : Actual output	830	Units
Abnormal loss	20	Units

Process- 'B' A /C

Calculation of Abnormal loss or Gain In units.

Input (830 + 70)	900	Units
Less : Loss in weight	45	Units
	855	Units
Less : Scrap/Normal loss in units	90	Units
Expected output	765	Units
Less: Actual output	780	Units
Abnormal Gain	15	Units

Calculation of Abnormal Loss Amount in process - A A/c

$$\text{Abnormal Loss Amt} = \frac{\text{Normal cost of normal output}}{\text{normal output}} \times \text{Abnormal Loss in units}$$

$$= \frac{1,53,000}{850} \times 20$$

$$= 3,600.$$

Note :

a) **Normal cost of normal output**
Debit side total Amt - scrap /Normal Loss Amt. 1,61,000 – 8,000 = 1,53,000

b) **Normal output**
Debit side total Units - loss in weight units - Scrap /Normal Loss Units.
= 1000 - 50 - 1000
= 850.

Calculation of Abnormal Gain Amount in process - B A/c

$$\text{Abnormal Gain Amt} = \frac{\text{Normal cost of normal output}}{\text{normal output}} \times \text{Abnormal Gain in units}$$

$$= \frac{1,60,650}{765} \times 15$$

$$= 3,150.$$

Note :

a) Normal cost of normal output = Debit side total Amt – Normal Loss Amt.
= 1,78,650 – 18,000 = 1,60,650.

b) Normal output : Debit side total units - Loss in weight – Scrap/ Normal loss units
= 900 – 45 – 90 = 765.

Problem No. 4

A product passes through three processes A, B and C. 10,000 units at a cost of Re.1 were issued to process 'A'. The other direct expenses were.

	Process -A Rs.	Process -B Rs.	Process -C Rs.
Sundry materials	1000	1500	1480
Direct Labour	5000	8000	6500
Direct Expenses	1050	1188	1605

The wastage of process 'A' was 5% & process B 4%. The wastage of process A was sold at Rs. 0.25 per unit and that of 'B' at Re. 0.50 per unit. The overhead charges were 168% of direct labour. The final product was sold at Rs. 10-00 per unit, fetching a profit of 20% on sales find the percentage of wastage in process 'C'.

Solution :

Dr. Process -'A' A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Raw material (10,000 × 1)	10,000	10,000	By wastage / Normal $\left(10,000 \times \frac{5}{100}\right)$ × 0.25	500	125
To Sundry material	–	1,000			
To Direct labour	–	5,000	By Transfer to process -B A/c	9,500	25,325
To Direct Expenses	–	1,050	(Bal. fig)		
To over head charges $\left(5000 \times \frac{168}{100}\right)$	–	8,400	Cost per unit $\frac{25,325}{9,500}$ = 2.67		
	10,000	25,450		10,000	25,450

Dr. Process -'B' A/C Cr

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Transfer form process 'A' A/c	9,500	25,325	By wastage / Normal Loss $\left(9,500 \times \frac{4}{100}\right)$ × 0.50	380	190
To sundry material	–	1,500			
To Direct labour	–	80,000			
To Direct Expenses	–	1188	By Transfer to process 'C' A/c (Bal.fig)	9,120	49,263
To over heads $\left(8,000 \times \frac{168}{100}\right)$	–	13,440	cost per unit $\frac{49,263}{9,120} = 5.40$		
	9,500	49,453		9,500	49,453

Dr. **Process -'C' A/C** **Cr**

Particulars	Units	Amount (in Rs.)	Particulars	Units	Amount (in Rs.)
To Transfer from process 'B' A/c	9,120	49,263	By wastage (W.Notes) (456 × 1)	456	456
To sundry material	–	1,480			
To Direct labour	–	6,500			
To Direct expenses	–	1,605	By sales (Bal. fig)	8,664	86,640
To over heads $\left(6,500 \times \frac{168}{100}\right)$	–	10,920			
To profit (Bal. fig)	–	17,328			
	9,120	87,096		9,120	87,096

Note :

In this problem process 'C' wastage percentage or unit are not given so we have to find wastage units.

Let number of wastage unit is = x, sales value of wastage units = x × Re.1 = Rs. x.

Total Cost = 69,768 – x ...(1)

(Total cost = 49,263 + 1,480 + 6,500 + 1,605 + 10,920 = 69,768)

Given selling price = Rs. 10

Less : profit 20% m sales = Rs. 2

Total Cost = 8

Total Cost = cost per unit × no.of unit.

= 8 (9,120 – x)

= 72,960 – 8x ...(2)

Solving (1) and (2) equation.

69,768 – x = 72, 960 – 8x

8x – x = 72,960 – 69768

7x = 3,192

$x = \frac{3092}{7}$ = 456 \ x = 456.

Problem No. 5

Mandex Ltd. process a patent material used in building. The material is produced in 3 consecutive grades namely soft, medium and hard. Figures relating to production for the 6 months of 1986 are as follows.

Particulars	Process - I	Process - II	Process - III
Raw material used	1,000 Units	–	–
Cost per ton	Rs.200	–	–
manufacturing wages	Rs. 72,500	40,800	10,700

& expenses

Weight lost	5%	10%	20%
Scrap-sold at Rs.50 (per ton)	50 tons	30 tons	51 tons
Sales price per ton	Rs. 350	Rs. 500	Rs. 800

Management expenses were Rs. 17,500

Selling expenses Rs. 10,000 and interest on borrowed capital Rs. 4,000.

2/3 of process -1 & 1/2. of process 2 are passed on to the next process and the balances are sold.

You are required to prepare process cost accounts in a form suitable for presentation to the directors at their next board meeting when the production policy of the company will be discussed.

Solution :

Dr. Process -I A/C Cr

Particulars	Units	Cost per unit	Amt (in Rs.)	Particulars	Units	Cost per unit	Amt (in Rs.)
To Raw material	1,000	200	2,00,000	By loss in weight (1,000 × 5/1000)	50	NIL	NIL
To wages and Expenses	–	–	72,500	By Scrap/Normal loss (50 × 50)	50	50	2,500
				By Transfer to process I stock A/c (Bal. fig)	900	300	2,70,000
	1,000		2,72,500		1,000		2,72,500

Dr. Process -I Stock A/C Cr

Particulars	Units	Cost per unit	Amt (in Rs.)	Particulars	Units	Cost per unit	Amt (in Rs.)
To Transfer from	900	300	2,70,000	By sales (1/3) (900 × 1/3)	300	350	1,05,000
To profit (Bal.fig)	–	–	15,000	By Transfer to process - II A/c (900 × 2/3)	600	300	1,80,000
	900	300	2,85,000		900	–	2,85,000

Dr. **Process -II A/C** **Cr**

Particulars	Units	Cost per unit	Amt (in Rs.)	Particulars	Units	Cost per unit	Amt (in Rs.)
To Transfer from process-I stock A/c	600	300	1,80,000	By loss in weight $\left(600 \times \frac{10}{100}\right)$	60	–	–
To wages & Expences	–	–	40,800	By Scrap/Normal loss	30	50	1,500
				By Transfer to process -II Stock A/c (Bal. fig)	510	430	2,19,300
	600	–	2,20,800		600		2,20,800

Dr. **Process -II Stock A/C** **Cr**

Particulars	Units	Cost per unit	Amt (in Rs.)	Particulars	Units	Cost per unit	Amt (in Rs.)
To Transfer from process-I stock A/c	510	430	2,19,300	By sales (1/2) $\left(510 \times \frac{1}{2}\right)$	255	500	1,27,500
To profit (Bal.fig)	–	–	7,850	By Transfer to process III A/c $\left(510 \times \frac{1}{2}\right)$	255	430	1,09,650
	510		2,37,150		510		2,37,150

Dr. **Process -III A/C** **Cr**

Particulars	Units	Cost per unit	Amt (in Rs.)	Particulars	Units	Cost per unit	Amt (in Rs.)
To Transfer from process-II stock A/c	255	430	1,09,650	By loss in weight	51	–	–
To wages and Expenses	–	–	10,710	By scrap/Normal	51	50	2,550
				By Transfer to process - III Stock A/c (Bal.fig)	153	770	1,17,810
				Cost per unit $\frac{1,17,810}{153} = 770$			
	255		1,20,360		255		1,20,360

Dr. **Process -III Stock A/C** **Cr**

Particulars	Units	Cost per unit	Amt (in Rs.)	Particulars	Units	Cost per unit	Amt (in Rs.)
To Transfer from Process - IIIA/c	153	770	1,17,810	By sales	153	800	1,22,400
To profit (B/F)			4,590				
	153		1,22,400		153		1,22,400

Dr. **Profit & Loss A/C** **Cr**

Particulars	Amount (in Rs.)	Particulars	Amount (in Rs.)
To Management Expenses	17,500	By process - I Stock A/c	15,000
To selling expenses	10,000	By process - II Stock A/c	17,850
To Interest on borrowing Capital	4,000	By process - III Stock A/c	4,590
To Net profit (Bal. fig)	5,940		
	37,440		37,440

Problem No. 6

The finished product of a factory has to pass through 3 processes 'A', 'B' & 'C'. The normal wastage of each process is 2% in 'A', 5% in 'B'. & 10% in computed on the wastage is computed on the number of units entering in each processes. The scrap values of wastage of process 'A', 'B', 'C' are Rs. 10, Rs. 40, Rs. 20 per every 100 units.

The output of each processes is transferred to next process & finished products are transferred from process 'C' in to stock. The following further information is obtained.

Items	Process - A (Rs.)	Process - B (Rs.)	Process - C (Rs.)
Material consumed	Rs. 12,000	4,000	4,000
Direct labour	8,000	6,000	6,000
Manufacturing expenses	2,000	4,000	2,000
Output from each Process (in units)	19,600	18,400	16,700

20,000 units were put into process 'A' at a cost of Rs. 16,000. Prepare process accounts.

Solution :

Dr. **Process - 'A' A/C** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Raw material	20,000	0.8	16,000	By Scrap /Normal loss	400	0.1	40
To Sundry material	–	–	12,000	$\left(20,000 \times \frac{2}{100}\right)$			
To Direct labour	–	–	8,000	$\left(one\ unit = \frac{10}{100} = 0.1\right)$			
To manufacturing Exp	–	–	2,000	By Transferred to process - B a/c (Bal. fig)	19,600	1.94	37,960
	20,000	–	38,000		20,000	–	38,000

Dr. **Process - 'B' A/C** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Transfer from				By Scrap	980	0.4	392
Process 'A' A/c	19,600	1.94	37,960	$\left(19600 \times \frac{54}{100}\right)$			
To Sundry mate-							
rials	–	–	4,000	$\left(one\ \text{unit} = \frac{40}{100} = 0.4\right)$			
To Direct labour	–	–	6,000	By Abnormal loss	220	2.8	609
To manufacturing	–	–	4,000	(w. Notes)			
Expenses				By Transfer to	18,400	2.8	50,959
	19,600		51,960		19,600		51,960

Dr. Process - 'C' A/C Cr

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Transfer from 'B' A/C	18,400	2.8	50,959	By Scrap /Normal $\left(18400 \times \frac{10}{100}\right)$ per unit = $\left(\frac{2}{100} = 0.2\right)$	1,840	0.2	368
To sundry material	–	–	4,000				
To Direct labour	–	–	6,000				
To Manufacturing Expenses	–	–	2,000	By finished Goods A/C	16,700	3.78	63.123
To Abnormal Gain (w. Notes)	140	–	532	(Bal. fig)			
	18,540		63,491		18,540		63,491

Dr. Abnormal Gain A/C Cr

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Normal loss A/C	140	0.2	28	By process 'C' A/C	140	3.8	532
To costing profits Loss A/C (Bal fig)	–	–	504				
	140		532		140		532

Dr. Normal Loss A/C Cr

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Process 'A' A/c	400	0.1	40	By Abnormal Gain	140	0.2	28
To Process 'B' A/c	980	0.4	392	By Bank A/c			
To process 'C' A/c	1,840	0.2	368	process 'A' a/c	400	0.1	40
				process 'B' a/c	980	0.4	392
				Process 'C' a/c	1,700	0.2	340
	3,220		800		3,220		800

Dr. **Abnormal Loss A/C** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Process 'B' A/c	220	2.8	609	By Normal loss (sale)	220	0.4	88
				By costing P & L A/c (Bal. fig)	–	–	521
	220	–	609		220	–	609

Working Notes :

PROCESS - 'B' A/C

Calculation of Abnormal loss or Gain in units

Input	units	19600
Less : Scrap / Normal loss	units	980
Estimated output		18,620
Less : Actual output		18,400
Abnormal loss in units		220

PROCESS 'C' A/C

Calculation of Abnormal loss (or) Gain in units

Input	units	18,400
Less : Normal loss (or) scrap in units		1840
estimated output		16,560
Less : Actual output		16,700
abnormal Gain (in units)		140

Calculation of abnormal loss Amt in process 'B'

$$\frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Abnormal loss in units} = \frac{51568}{18620} \times 220 = 609.$$

Note :

(a) Normal cost of normal output = Debit side total amt - Normal Loss Amt.
= 51,960 – 392 = 51,568

(b) Normal output = Debit side total units - Normal loss units
= 19600 – 980 = 18,620

Calculation of Abnormal Gain Amt process - 'C'

$$= \frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Abnormal loss in units} = \frac{62591}{16560} \times 140 = 529$$

Note :

Normal cost of normal output = Debit side total amt - normal loss amt
= 62959 – 368 = 62591

Normal output = Debit side total units – normal loss units
= 18400 – 1840 = 16560.

Problem No. 7

A products process through three process A, B and C the details of expenses incurred on the 3 processes during the year 1992 were as follows.

Particulars	process - A	Process - B	Process - C
Units Issued	10,000	–	–
Cost per unit	Rs.100	–	–
Sundry materials	10,000	Rs.15,000	Rs. 5,000
Labour	Rs. 30,000	Rs.80,000	Rs. 65,000
Direct Expenses	Rs. 6,000	Rs. 18,150	Rs. 27,200
Selling price per unit of output	Rs.120	Rs. 165	Rs. 250

Management Expenses during the year Rs. 80,000 and selling expenses Rs. 50,000 these are not allocable to process .

Actual output

A = 9,300 units
B = 5,400 units
C = 2,100 units

2/3 of output of process 'A' and 1/2 of output of process 'B' was passed on to the next process and balance was sold the entire output of process 'C' was sold.

Normal loss of the three processes calculated on the input of every process. A = 5%, process - B - 15% and process 'C' = 20%.

The loss of process 'A' sold at Rs.2/- per unit, process 'B' Rs. 5/- and process, 'C' Rs. 10/- per unit. Prepare necessary a/c.

Solution :

Dr. Process - 'A' A/C Cr

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Raw material	10,000	10	100,000	By Normal loss $\left(10,000 \times \frac{5}{100}\right)$	500	2	1,000
To Sundry material	–	–	10,000				
To labour	–	–	30,000	By Abnormal loss (w. Notes)	200	110	22,000
To Direct Exp	–	–	6,000	By profit & Loss A/c (Sale) (W. Note)	3,100	110	3,41,000
				By Transfer to process 'B" A/c (Bal. fig)	6,200	110	6,82,000
	10,000	–	10,46,000		10,000	–	10,46,000

Dr. **Process - 'B' A/C** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Transfer from process 'A' a/c	6,200	110	6,82,000	By Normal loss A/c $\left(6200\times\frac{15}{100}\right)$	930	5	4,650
To Sundry material			15,000				
To Labour	–	–	80,000	By Profit & Loss A/c	2,700	150	4,05,000
To Direct Exp	–	–	18,150	By Transfer to (sale) (w. Notes) process 'C' A/c (W.Notes)	2,700	150	4,05,000
To Abnormal Gain A/c (W.Notes)	130	–	19,500				
	6,330	–	8,14,650		6,330	–	8,14,650

Dr. **Process - 'C' A/C** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Transfer from process 'B' a/c	2,700	150	4,05,000	By Normal loss $\left(2,700\times\frac{20}{100}\right)$	540	10	5,400
To Sundry material	–	–	5,000				
To Labour	–	–	65,000	By Abnormal loss (w. Notes)	60	230	13,800
To Direct Exp	–	–	27,200	By finished Good a/c (Bal. fig)	2,100	230	4,83,000
	2,700		5,02,200		2,700		5,02,200

Dr. **Abnormal Gain A/c** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Normal loss A/c	130	5	650	By process 'B' A/c	130	150	19,500
To Costing P & L A/c (Bal. fig)	–	–	18,850				
	130	–	19,500		130	–	19,500

Dr. **Normal Loss A/c** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To Process 'A' A/c	500	2	1,000	By Abnormal Gain	130	5	650
To Process 'B' A/c	930	5	4,650	By **Bank A/c**			
				process 'A' A/c	500	2	1,000
To Process 'C' A/c	540	10	5,400	process 'B' A/c	800	5	4,000
				process 'C' A/c	540	10	5,400
	1,970		11,050		1,970		11,050

Dr. **Abnormal Loss A/c** **Cr**

Particulars	units	cost per unit	Amt in Rs.	Particulars	units	cost per unit	Amt in Rs.
To process 'A' A/c	200	110	22,000	By bank A/c process 'A' (scrap)	200	2	400
				By P & L A/c (Bal. fig)	–	–	21,600
	200		22,000		200		22,000

Working Notes :

Process - 'A' A/C

Calculation of Abnormal loss / Gain in units

Input	10,000 Units
Less : wastage	NIL
	10,000 Units
Less : Normal loss	500 Units
Estimated output	9,500 Units
Less : Actual output	9,300 Units
Abnormal loss	200 Units

Calculation of Abnormal loss Amt :

$$= \frac{Normal\ cost\ of\ normal\ output}{Normal\ output} \times Abnormal\ loss\ in\ units$$

Note :

Normal cost of normal output = Debit side total Amt – Normal loss Amt.

= 10,46,000 – 1,000 = 10,45,000

Normal output = Debit side total units – Normal loss units.

10,000 – 500 = 9,500

Abnormal loss Amt = $\frac{10,45,000}{9,500} \times 200$ = 22,000.

Calculation of Units sold - 1/3

= 9,300 × 1/3 = 3,100

Units transferred to process 'B' - 2/3

= 9,300 × 2/3 = 6,200

Amt transferred to process 'B'

Debit side total Amt – Normal loss Amt – Abnormal Loss Amt.

10,46,000 – 1,000 – 22,000 = 10,23,000

Sales Amt = 10,23,000 × 1/3 = 3,41,000

Amt transferred to process 'B' = 10,23,000 × 2/3 = 6,82,000

Process - B

W. Notes :

Input	6,200 Units
Less : wastage	NIL
	6,200 Units
Less : Normal loss	930 Units
Estimated output	5,270 Units
Less : Actual output	5,400 Units
Abnormal Gain input	130 Units

Calculation of Abnormal Gain Amt :

$$= \frac{Normal\ cost\ of\ normal\ output}{Normal\ output} \times Abnormal\ Gain\ in\ units$$

Note :

Normal cost of normal output = Debit side total Amt – Norma loss Amt.

= 8,14,650 – 4,650 = 7,90,500

Normal output = Debit side total units – Normal loss units

= 6,200 – 930 = 5,270

Abnormal Gain Amt = $\frac{7,90,500}{5,270} \times 130$

= 19,500.

Calculation of units transferred to process 'C' - 1/2

= 5,400 × 1/2 = 2,700 units

No.of units sold – 5,400 × 1/2 = 2,700 units.

Amt transferred to process 'C'

Debit side total amount – Normal loss Amt.

= 8,14,650 – 4,650 = 8,10,000 × 1/2 = 4,05,000

Sales Amt

= 8,10,000 × 1/2 = 4,05,000.

Process - 'C'

working notes :

Calculation of Abnormal loss / Gain in units

Input	2,700 Units
Less : Normal loss	540 Units
Estimated output	2,160 Units
Less : Actual output	2,100 Units
Abnormal loss units	60 Units

Calculation of Abnormal Loss Amt

$$= \frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Abnormal Loss in units}$$

Note : Normal cost of normal output = Debit side total Amt – Norma loss Amt.

= 5,02,200 – 5,400 = 4,96,800

Normal output = Debit side total units – Normal loss units

= 2,700 – 540

= 2,160

\Abnormal Loss Amt = $\frac{4,96,800}{2,160} \times 60$ = 13,800.

2.6 COSTING FOR BY PRODUCTS

Definitions of By-product Costing

1. "By-product is a term which is applied to products produced simultaneously that have a very minor sales value as compared with that main of product".
2. "According to The odove Lang, by-products refer to any saleable or usable value incidentally produce in addition to the main product".
3. Neuner defines, "by-products are produced from the same process as joint products but that by-products are essentially the secondary results of the operations".

By-products may be produced incidentally along with the main product in the production process without taking/using extra resources. By-products have less value when compared to the main products. These products are also called 'minor or secondary products'.

The by-products can be sold in either of the two forms,

i) By-products can be sold without any further processing

ii) By-products can also be sold after processing.

The following are the industries which usually produces the by-products,

Industry	By-products
a) Sugar industry	Bagasse, Molasses
b) Cotton textile	Cotton seed
c) Rice rills	Husk
d) Soap making	Glycerin
e) Coke making	Ammonia, coal tar, benzol, gas

Features of By-product

The following are the features of by-product,

i) By-products may be produced incidentally in the production process.

ii) These products holds very less saleable value when compared to the main products.

iii) They can be sold either in their original form or after processing them.

iv) It is necessary to highlight the technological factors responsible for their production for their accounting treatment.

v) The quantity of by-products is less.

vi) The production of by-products is uncontrollable and unavoidable.

Differences Between By-products and Joint Products

	Point of differences	By-products	Joint Products
1.	Objective of production	Production of by-products is the secondary objective of the firm.	Production of joint products is the primary objective of the firm.
2.	Value of products	By-products have comparatively less value when compared to main product.	Joint products holds a significant value.
3.	Production quantity	By-products production is carried out in very less quantities.	Joint products are produced in large quantities.
		By-products are incidentally produced.	Joint products are produced purposely and willingly.
4.	Relationship between the products	There is no quantitative relationship between the products.	Joint products have a significant quantitative relationship between the products.
5.	Control	These products are uncontrollable.	These products can be controlled.

Treatment of By-products

The two main considerations that forms the basis for the accounting treatment of by-products are,

i) By-products having less significant value

ii) By-products having significant considerable value.

i) By-products Having Less Significant Value

The joint costs cannot be apportioned to the by-products if they have very less value. The net income obtained by the sale of by-products can be treated as, miscellaneous income and credit it to costing profit and loss account or in the process accounts.

The net income can be ascertained by deducting the selling and distribution expenses and costs of further processing from the total sales value of the by-products.

ii) By-products Having Significant Considerable Value

If the by-products have a significant considerable sales value, then a portion of joint cost is allocated to by-products.

These costs of by-products and other costs incurred in further processing are to be debited to the by-product account and credited to main product account. The sales value of by-product is to be recorded on the side of the by-product account or any profit and loss and must be transferred to costing profit and loss account.

There are four different methods of allocating the joint costs to by-products as follows,

a) Sales value method

b) Physical unit method

c) Average cost method

d) Point value or survey method.

Accounting of By-products

The two broad categories for accounting of by-products are,

a) Non-cost or sales method

b) Cost methods.

a) Non-cost or Sales Method

This method usually lays, emphasize on the sales but not on the costs of by-products. Non-cost methods are classified into the following categories,

i) **Other Income or Miscellaneous Method :** In this method by-product sale value is being recorded on the credit side of the profit and loss account and is treated 'as miscellaneous income. This method is usually used in the following conditions,

- If in case the By-product value is insignificant
- If there is no significant change in the costs of main product with the production of by-product along with it,

Limitations

- It may be possible to realise the revenues from the sale of by-product in the following year. This may distort the profits.
- There may be chances for errors in balance sheet because of the negligible value of by-products which leads to overvaluation of main products.
- Sometimes, the uncontrollable and unavoidable nature of by-products leads to losses to the firm.

ii) **By-product Sales Added to Main Product Sales :** In this method, the sales value of both main product and by-product is to be realised after deducting from the cost of both products from the total sale value. This method is best suitable for those firms whose by-products have negligible value or small value and which can be sold without any further processing. The. slock of by-product is not valued in balance sheet.

iii) **Sales Value of By-product Deducted from Total Cost :** In this method the sales value of by product need to be deducted from the total production cost of products.

- In case of fluctuations in sale value of by-products it is not possible to determine the inefficiency in manufacturing cost of main products.
- The valuation of closing stock is usually based on the selling price which does not yield accurate results.

iv) **Credit of By-product value after deducting selling and distribution costs :** The sales of by-product is realised only after deducting the selling and distribution costs incurred in marketing by-products. For creditng the by-product value in process account, this income is to be again deducted from the total production cost. The valuation of closing stock is also conducted

on the basis of the selling price after deducting the selling and distribution cost from it.

v) **Credit of By-product Value After Deducting Selling and Distribution Costs,and Costs Incurred for Further Processing :** In this method the net amount of by-product is usually determined after deducting the sales value from the selling and distribution costs and also the costs which are incurred for further processing of the by-products. This net income is to be recorded on the credit side of the process account. The valuation of closing stock is also based on selling price after deducting the selling and distribution cost and costs incurred for further-processing :

Limitation

There will be fluctuations in the process account because of the changes in the sale value of by-products,

vi) **Replacement Cost Method :** In this method the by-products are valued after deducting the estimated profits, selling and distribution costs and costs incurred for further processing from the sales value of by-product.

b) Cost Methods

The methods under pus category basically emphasizes more on the costs incurred instead of sales. Cost methods include the following,

i) **Opportunity Cost or Replacement Cost Method :** This method is applicable to those firms which make use of the by-products as raw materials for other processes. The price of such products is said to be priced at an opportunity cost which has incurred for purchasing those products from another firm.

Example, use of cotton waste in the production of fine yarn for cleaning the machines or as raw materials in producing low low quality yarn.

ii) **Standard Cost Method :** In this method for each product the firm would fix a standard cost, based on the previous years record. This cost forms the basis for crediting the by-product value and main product value in the process accounts.

iii) **Joint Cost Method :** This method is followed by those firms whose by-products have considerable value in the market. The joint costs are to be apportioned to both main products as well as by-products on equitable basis.

PROBLEMS ON JOINT AND BY PRODUCTSZ

Problem No. 1

In a certain period 500 units of main product are produced and 400 units are sold at ` 50 per unit. The by-product emerging from the main product is sold at ` 1,000. The total cost of production of 500 units is ` 15,000. Calculate the amount of gross profit after crediting by-product value (a) to cost of production, and (b) to cost of sales.

Solution :

(a)	By-product value credited to cost of production		`
	Sale value of main product during the period (400 units @ ` 50)	`	20,000
	Cost of Sales : Total cost of production of 500 units @ ` 30	15,000	
	Less value of by-product	1,000	
	Net production cost of 500 units	14,000	
	Less closing stock of 100 units @ ` 28	2,800	
			11,200
	Gross Profit		8,800
(b)	By-product value credited to cost of sales		`
	Sale value of main product during the period (400 units @ ` 50)	`	20,000
	Cost of Sales : Total cost of production of 500 units @ ` 30	15,000	
	Less closing stock of 100 units @ ` 30	3,000	
	Less value of by-product	12,000	
		1,000	11,000
	Gross profit		9,000

Note the difference in the value of stock. It is ` 2,800 in (a) method as against ` 3,000 in (b) method. That is why there is a difference of ` 200 in the gross profit.

Problem No. 2

In manufacturing the main product A a Company processes the resulting waste material into two by-products, B_1 and B_2. Using reverse cost method of by-products, prepare a Comparative Profit and Loss Statement of the three products from the following data:

(i) Total cost upto separation point was ` 68,000.

		A	B_1	B_2
		`	`	`
(ii)	Sales (all production)	1,64,000	16,000	24,000
(iii)	Cost after separation		4,800	7,200
(iv)	Estimated net profit percentage to sale value		20%	30%
(v)	Estimated selling expenses as percentage of sales value	20%	20%	20%

Solution :

In order to ascertain comparative profit and loss, total cost upto separation point should be apportioned to main product A and by-products B_1 and B_2. Here Reverse Cost method is to be used.

Particulars	B_1		B_2	
	`	`	`	`
Sales		16,000		24,000
Less : Estimated Net Profit	3,200		7,200	
Selling Expenses	3,200		4,800	
Cost after Separation	4,800		7,200	
		11,200		19,200
Share of Joint Cost		4,800		4,800

Therefore, the main product A will bear ` 58,400 (i.e. ` 68,000 – ` 4,800 – ` 4,800).

Comparative Profit and Loss Statement

	Products	A	B_1	B_2	Total
		`	`	`	`
(1)	Sales	1,64,000	16,000	24,000	2,04,000
(2)	Cost of Sales:				
	Pre-separation Costs 58,400	4,800	4,800	68,000	
	Post-separation Costs –	4,800	7,200	12,000	
	Cost of Production	58,400	9,600	12,000	80,000
	Selling Expenses	32,800	3,200	4,800	40,800
	Cost of Sales	91,200	12,800	16,800	1,20,800
(3)	Profit (1) - (2) 72,800	3,200	7,200	83,200	
	Profit % of Sale Value 44.4%	20%	30%	40.78%	

Problem No. 3

A factory is engaged in the production of a chemical X and in the course of its manufacture a by-product Y, is produced, which after a separate process has a commercial value. For the month of January 2007, the following are the summarized cost data :

Particulars	Joint Expenses	Separate Expenses	
		X	Y
	`	`	`
Materials	19,200	7,360	780
Labour	11,700	7,680	2,642
Overheads	3,450	1,500	544

The output for the month was 142 tonnes of X and 49 tonnes of Y and the selling price of Y averaged ` 280 per tonne.

Assuming that the profit of Y is estimated at 50% of the selling price, prepare an account showing the cost of X per tonne.

Solution :

Dr **X Chemical Account** **Cr**

Particulars	`	`	Particulars	`
To Materials			By Y By-product A/c	2,894
Joint	19,200		By Cost of Production	
Separate	7,360		(Chemical X142 tons	
		26,560	@ ` 338 per ton)	47,996
To Labour:				
Joint	11,700			
Separate	7,680			
		19,380		
To Overheads:				
Joint	3,450			
Separate	1,500			
		4,950		
		50,890		50,890

Dr **Y BY-PRODUCT ACCOUNT** **Cr**

Particulars	`	Particulars	`
To X Chemical A/c		By Cost of Production	
(Share of joint expenses)	*2,894	(49 tons at ` 140 per ton)	6,860
Materials	780		
Labour	2,642		
Overheads	544		
	6,860		6,860

The value of products (` 2,894) which Y By-product A/c has obtained from X Chemical (Main Product) to which all joint expenses have been debited, has been calculated as follows :

Output of Y (By-product)	Tons	49
Selling Price Per Ton	`	280
		`
Selling Price of Y By-product (49 × ` 280)		13,720
Less Profit at 50% of the Selling Price		6,860
Cost of Production of the By-product (49 Tons,		
Cost per ton f 140)		6,860
Less Separate expenses incurred upon it:		
Materials	` 780	
Labour	2,642	
Overheads	544	544
		3,966
Cost of goods obtained from the Main-Product		
A/c (X Chemical A/c)		2,894

Problem No. 4

The following data have been extracted from the books of M/S East India Coke Co. Limited :

Joint products	Yield in lbs. of recovered Product per ton of coal
Coke	1,420
Coal tal	120
Benzol	22
Sulphate of ammonia	26
Gas	412
	2,000

The price of coal is Rs,. 80/- per ton. Direct labour and overhead costs to point of split off are Rs. 40 and Rs. 40 and Rs. 60 respectively per ton of coal. Calculate material, labour, overhead and total cost of each product on the basis of weight.

Solution :

Apportionment of total cost on the basis of weight of the materials upto the point of separation.

Joint Products	Yield per ton of coal lbs	Percentage to total	Coal Rs.	Direct labour Rs.	Over-heads Rs.	Total Rs.
Coke	1,420	71.0	56.80	28.40	42.60	127.80
Coal	120	6.0	4.80	2.40	3.60	10.80
Benzol	22	1.1	0.88	0.44	0.66	1.98
Sulphate	26	1.3	1.04	0.52	0.78	2.34
Gas	412	20.6	16.48	8.24	12.06	37.08
	2,000	100	80,00	40,00	60,00	180,00

This method is not suitable where the output cannot be expressed in terms of the same physical units., e.g. where one product is liquid and the other is a solid or gas.

Problem No. 5

A by-product 'Kappa' is derived in the course of manufacturing a product 'Gamma'. The product is further processed for sale. From the following data available from cost records, prepare an account showing the cost per kg. of the product 'Gamma.

Particulars	Joint expenses (Rs.)	Separate (Rs.) (Gamma)	Expenses (Rs.) (Kappa)
Materials	20,000	12,000	1,000
Labour	14,000	10,000	4,000
Overheads	5,000	3,000	1,200

The quantities produced during the period under consideration are : Gamma 400 kg. and Kappa 100 kg. The selling price of Kappa was Rs. 240 per kg. on which the profit earned was estimated at 30% of the selling price.

Solution :

GAMMA PRODUCT ACCOUNT

Particulars	Rs.	Rs.	Particulars	Rs.
To Materials :			By 'Kappa' -	
Joint	20,000		By-product a/c	10,600
Separate	12,000	32,000	cost of production 400 kg @ Rs. 113.50 per kg.	53,400
To Labour :				
Joint	14,000			
Separate	10,000	24,000		
To Overheads :				
Joint	5,000			
Separate	3,000	8,000		
		64,000		64,000

'KAPPA' BY-PRODUCT ACCOUNT

Particulars	Rs.	Particulars	Rs.
To 'Gamma' Account (joint costs)	10,600	By Cost of production 100 kg. @ Rs. 168/- per kg.	16,800
To Materials	1,000		
To Labour	4,000		
To Overheads	1,200		
	16,800		16,800

Working Notes :

	Rs.
Selling price of Kappa per kg.	= 240
Less : Profit (30% on selling price)	72
Cost of production	168

Total Cost of production =

100kg. of Kappa = 100 × 168 = 16,800.

Problem. No. 6

From the following information, find the profit made by each product apportioning joint costs on sales value basis.

Joint costs :	Rs.
Direct material	1,26,000
Power 25,000	
Petrol, oil, lubricants	5,000
Labour	7,500
Other charges	4,100

	Product X	Product Y
	Rs.	Rs.
Selling costs	20,000	80,000
Sales	1,52,000	1,68,000

Solution :

STATEMENT SHOWING APPORTIONMENT OF JOINT COST AND PROFIT

Particulars	Product X Rs.	Product Y Rs.	Total Rs.
Sales	1,52,000	1,68,000	3,20,000
Joint Costs (apportioned to X and Y in the ratio sales i.e, 152 : 168 or 19 : 21)			
Direct material	59,850.00	66,150.00	1,26,000
Power	11,875.00	13,125.00	25,000
Petrol, etc.	2,375.00	2,625.00	5,000
Labour	3,562.50	3,937.50	7.500
Other charges	1,947,50	2,162.50	4,500
	79,160.00	87,990.00	1,67,600
Selling Costs	20,000.00	80,000.00	1,00.000
Total Cost	92,610.00	1,67,990.00	2,67.600
Profit	52,390.00	10.00	52,400

Problem No. 7

(More than one method). From the following figures relating to Jyoti Chemical Products Ltd., calculate net profit for the month of January, 1995 under the following methods of costing by-products. (a) As other income (b) As deduction of cost of goods sold from main product and (c) Net by-product revenue credited to production cost.

Sales 5,000 units @ Rs. 4 per unit.

Direct material - Rs. 6,0000

Direct labour - Rs. 3,000

manufacturing over-head - 100% on Direct wages.

Total production - 6,000 units.

Selling, distribution and administration cost for the main product Rs. 1,000.

Selling, distribution and administration cost for by-product Rs. 800

Sales Realisation from by - products Rs. 2,500.

Cost of processing by-product Rs. 500

Solution :

CALCULATION OF NET PROFIT UNDER DIFFERENT METHODS OF BY-PRODUCTS

Particulars		Method (a) Rs.	Method (b) Rs.	Method (c) Rs.
Cost of Production				
Direct Material	6,000			
Direct Labour	3,000			
Mfg. Overhead (100% on d.L)	3,000	12,000	12,000	12,000
Less : Net Revenue from by-products (2,500-500-800)		- - -	- - -	1,200
	(A)	12,000	12,000	10,800
Less : Closing Stock (1/6 of A)		2,000	2,000	1,800
Cost of goods sold		10,000	10,000	9,000
Less : Net Revenue from by-products		- - -	1,200	- - -
	(B)	10,000	8,800	9,000
Sales	(C)	20,000	20,000	20,000
Gross Profit (C - B)		10,000	11,200	11,000
Less : Selling and Distribution Expenses		1,000	1,000	1,000
		9,000	10,200	10,000
Add : Net Revenue from by-products (Misc.Income)		1,200	- - -	- - -
Net Profit		10,200	10,200	10,000

Problem No. 8

XY Co Ltd. produces 3 products namely P, Q and R. The total joint cost incurred Rs. 50,000. The outputs and cost after separation as given below.

Products	Output in units	cost After Separation
P	10,000	Rs. 10,000
Q	10,000	Rs. 20,000
R	5,000	Rs. 10,000

A selling price of P,Q,R per unit are Rs. 10, Rs.8, Rs. 10, respectively you are required

1. Apportioning the Joint cost
2. Prepare a statement showing profitability assuming the selling & distribution per unit sold is 0.50p.

Step No. 1

Calculating Average cost per unit.

$$\frac{Total\ Joint\ cost}{Total\ out\ put} \quad \frac{50,000}{25,000} \text{ Rs. } 2$$

Step No. 2 :

Apportioning the 'Joint Cost'

Portion of Joint cost to 'P' product → Output × Average Unit Cost
→ 10,000 × 2 → 20,000

Portion of Joint cost to 'Q' product → Output × Average unit cost
→ 10,000 × 2 → 20,000

Portion of Joint cost to 'R' product → Output × Average unit cost
5000 × 2 → 10,000

A STATEMENT SHOWING PROFITABILITY

Particular	P	Q	R
Sales	1,00,000	80,000	50,000
Less : Belling and distribution Exp	5,000	5,000	2,500
	95,000	75,000	47,500
Less : Cost after split off	10,000	20,000	10,000
85,000	85,000	55,000	37,500
Less : Cost before split off	20,000	20,000	10,000
Profit	65,000	35,000	27,500

Problem No. 9

'X' Co. Ltd manufactured four products. The cost incurred up to split off Rs. 2,00,000. Apportioning the joint cost using physical unit method you are given the output of products are as follows.

Product	Output In Units
A	500
B	400
C	300
D	100
	1300

Step No. 1

Calculating percentage of output

Percentage of output of 'A'

$$= \frac{\text{Output in units}}{\text{Total output}} \times 100$$

$$= \frac{500}{1300} \times 100$$

= 38.46%

Percentage of output of 'B'

$$= \frac{\text{Output in units}}{\text{Total output}} \times 100$$

$$= \frac{400}{1300} \times 100$$

= 30.77%

Percentage of output of 'C'

$$= \frac{\text{Output in units}}{\text{Total output}} \times 100$$

$$= \frac{300}{1300} \times 100$$

= 23.08%

Percentage of output of 'D'

$$= \frac{\text{Output in units}}{\text{Total output}} \times 100$$

$$= \frac{100}{1300} \times 100$$

= 7.69%.

Step No. 2

Apportioning the Joint cost

	= Total Joint cost × percentage of output	
Portion of Joint cost of A	= 2,00,000 × 38.46% =	76,920
Portion of Joint cost of B	= 2,00,000 × 30.77% =	61,540
Portion of Joint cost of C	= 2,00,000 × 32.08% =	46,160
Portion of Joint cost of D	= 2,00,000 × 7.69% =	15,380
	Total	2,00,000

Problem No. 10

Given below is an information regarding going product from 1 ton of input.

Joint Product	Output In K.G
Coke	630 kg
Cold-tal	54 kg
Benzol	18 kg
Ammonia	27 kg
Gas	171 kg
Waste	100 kg
Total	**1,000 kg**

The direct labour and over heads cost till the split off Rs. 3,000. and Rs. 1,000 apportioning the Joint cost on the basis of physical units.

Solution :

Calculating percentage of output :

$\therefore$ % of output $= \frac{\text{output in units}}{\text{Total output in units}} \times 100$

Coke $\frac{630}{1000} \times 100 =$ 63% or 0.63 Cold - Tal $\frac{54}{1000} \times 100$ = 5.4% (or) 0.054.

Benzol = $\frac{18}{1000} \times 100$ = 1.8% (or) 0.018. Ammonia = $\frac{27}{1000} \times 100$

= 2.71 (or) 0.027

Gas = $\frac{171}{1000} \times 100$ = 17.1% (or) 0.171 Waste = $\frac{100}{1000} \times 100$ = 0.1 (or) 10%.

Step No. 2

Apportioning the Labour

Coke	= 3,000 × 0.63 →	1,890
Cold - Tal	= 3,000 × 0.054 →	162
Benzol	= 3,000 × 0.018 →	54
Ammonia	= 3,000 × 0.027 →	81
Gas	= 3,000 × 0.171 →	513
Waste	= 3,000 × 0.1 →	300
	Total labour →	3,000

Step No.3

Apportionment of over Heads.

Coke	= 1000 × 0.63	= 630
Cold tal	= 1000 × 0.54	= 54
Benzol	= 1000 × 0.018	= 18
Ammonia	= 1000 × 0.027	= 27
Gas	= 1000 × 0.171	= 171
Waste	= 1000 × 0.1	= 100
Total		**1000**

1 Products	2 Output in kg.	3 %of Output	4 Direct Labour OH	5 Labour	6 [4 + 5] Total
Coke	630	63%	630	1,890	2,520
Cold-Tal	54	5.4%	54	162	216
Benzol	18	1.8%	18	54	72
Ammonia	27	2.7%	27	81	108
Gas	171	17.5%	171	513	684
Waste	100	10%	100	300	400

Problem No. 11

The Joint cost of making 100 units of product A, 200 units of product 'B' and 300 units of product 'C' is Rs. 8,800. The selling price of product 'A' 'B' and 'C' are Rs. 5, Rs.6 and Rs.9. The products did not required any further processing cost after split off. Apportion the Joint cost using.

1. On sales price.
2. Sales value.

Solution :

A. On Sales Price Method

The Ratio of sales price 5 : 6 : 9 20

∴ Apportionment of Joint Expenses for product 'A'

$$8{,}800 \times \frac{5}{20} = 2{,}200$$

Apportionment of Joint Expense for product 'B'

$$8{,}800 \times \frac{6}{20} = 2640$$

Apportionment of Joint cost for product 'C'

$$8{,}800 \times \frac{9}{20} = 3960$$

B. Sales Value Method

Sales value of product A = 100 × 5 = 500
Sales value of product B = 200 × 6 = 1200
Sales value of product C = 300 × 9 = 2700.
∴ Ratio = 5 : 12 : 27 = 44.
Apportionment of Joint Expenses for product 'A'

$$8{,}800 \times \frac{5}{44} \Rightarrow 1000$$

Apportionment of Joint Expenses for product 'B'

$$8{,}800 \times \frac{12}{44} \Rightarrow 2400$$

Apportionment of Joint Expenses for product 'C'

$$8800 \times \frac{27}{44} = 5400$$

Problem No. 12

A factory is engaged in production of chemical 'X' in the course of its manufacture a by product 'Y' is produced which after separate process has a commercial value for the month of Jan 1996. The following are the summarised costing data.

Particulars	Joint Expenses	Subsequent	Exp
Material	19,200	7,360	780
Labour	11,700	7,680	2,642
Overheads	3,400	1,500	544

The out put of the month was 142 tonnes of 'X' and 49 Tones of 'Y' and selling price of 'Y' is Rs. 280 per tonne.

Assuming that the profit on Y is estimated that 50% of selling price.

1. Prepare A statement cost of production of 'X'
2. Prepare An account showing cost of production of 'X'.

Solution :

A STATEMENT SHOWING SHARE IN JOINT EXPENSES OF

Particulars	Product Y Amount
Sales [49 × 280]	13,720
Less : Estimation profit $\left[13,720 \times \frac{50}{100}\right]$	6,860
Total cost	6,860
Less : selling and distribution Exp	–
Works cost	6,860
Less: Cost after separation [780 + 2642 + 555]	3,966
Joint cost	2,894

(Or)

Share in Joint cost of Product 'Y'.

Calculating share in joint cost of product 'X'

Total Joint expenses 34,350

[19,200 + 11,700 + 3,450]

Less : Share in joint Expenses of product Y2,894

Sales in joint expenses of Joint product X31,456

A Statement showing cost of production of Product 'X'

Particulars		Amount
Joint Cost		
Materials		19,200
Labour		11,700
Over Heads		34,000
Less : Joint cost of product 'Y'		2,894
Joint Expenses of 'X'		31,406
ADD : Subsequent Exp		
Materials	7,360	
Labour	7,680	
Over Heads	1,500	16,540
Cost production of 'X'		47,946

Product 'X' Account.

Particulars	Amount	Particulars	Amount
To Material		By By- product 'Y'	2,894
Joint → 19,200		[Share in Joint cost]	
Further cost → 7,360	26,560	26,560	
To Labour		By cost of production	47,996
Joint → 11,700		(B/F)	
Further cost → 7,680	19,380		
To Overheads			
Joint → 3,450			
Further cost → 1,500	4,950		
	50,890		50,890

2.7 EQUIVALENT PRODUCTION

Most of the firms follow continuous production where there exists work-in-progress in the form of inventory. The work-in-progress at the end of accounting period is being transformed into equal complete units. This production of completed units are called as the equivalent production.

In other words, equivalent production refers to the conversion of uncompleted production of the previous accounting period into equivalent completed units in the next accounting period. For this conversion estimates about the percentage of completion is made on the basis of which production schedule and cost schedule are prepared which would carry out the continuous production. The formula which is being used to calculate the equivalent complete units is as follows,

Equivalent production = No. of units of work-in-progress
x Degree of completion in %

Example

If there are 300 units in work-in-progress out of which 70% are completed at the end of the period then the equivalent production would be,

$$= 300 \times 70\% \Rightarrow 300 \times \frac{70}{100} = 210 \text{ units}$$

The estimates regarding the completion of work-in-progress units must be made accurately because any small error would lead to greater fluctuations in the stock valuation.

Calculation of Equivalent Production

The following methods are used to calculate the, equivalent production,

1. Method I

In this method the percentage or degree of work which is required to finish the work-in-progress of the previous period is being highlighted. To these equivalent units the units that are being started and completed are added, further to this the equivalent units of the closing work-in-progress are also added'.

Formula for calculation of equivalent units in Method I

Equivalent unit = Degree of completion x No. of units in work-in-progress

2. Method II

In this method equivalent production units are determined by adding the number of units that are completed during the period to the closing stock of that period and are deducted from the opening stock units that are finished already in the previous period.

$$\text{Equivalent units} = \left[\begin{array}{c}\text{No. of units}\\ \text{completed in}\\ \text{this period}\end{array} + \begin{array}{c}\text{Closing stock}\\ \text{of that period}\end{array}\right] - \begin{array}{c}\text{No. of units of opening stock}\\ \text{completed in previous year}\end{array}$$

3. Method III

In this method, the equivalent production can be determined by adding the unfinished units of opening stock to the unfinished input of the present period and then deducting the unfinished work of closing stock of that period.

$$\text{Equivalent units} = \left[\begin{array}{c}\text{No. of units unfinished}\\ \text{in the}\\ \text{previous period}\end{array} + \begin{array}{c}\text{No. of input units}\\ \text{unfinished in}\\ \text{present period}\end{array}\right] - \begin{array}{c}\text{No.of units unfinished in}\\ \text{the closing stock present}\\ \text{period}\end{array}$$

Formula for Calculation of Equivalent Units in Methods

Equivalent units = (Degree of completion)x(No.of units in work-in-progress)

Total equivalent production = Equivalent units of opening stock + Equivalent units of closing stock.

Evaluation of Equivalent Production

Immediately after the calculation of equivalent production/completed units the procedure for the evaluation of the equivalent production is to be followed,

i) Ascertain the total equivalent units.

ii) Calculate the total cost for each element of cost. If it has any scrap value then deduct it from the material cost.

iii) Calculate the cost per unit of production by dividing the total cost with the respective number of equivalent units.

iv) Determine the number of units and value of finished products and remaining work-in-progress. The statements that are important for valuing work-in-progress are,

   a) Statement of equivalent production

   b) Statement of cost and

   c) Statement of evaluation.

Classification of Equivalent Production Problems

The equivalent production problems are basically classified into four groups for their easy identification, as follows,

a) When There is Only Closing Work-in-progress But With No Process Losses : In this case the firm will not take into consideration the process losses. On the basis of the estimates about the completion of materials, labour and production overhead the work-in-progress in being converted into equivalent completed units. This is the simplest method when compared to the other three methods. The procedure for evaluation of closing work-in-progress is same as explained above.

b) When There is Only Closing Work-in-progress with Process Losses : It is not possible to avoid losses in the process operations. The process losses are being treated differently on the basis of their type and degree of loss.

i) **Normal Loss :** If there is a normal loss in the processes then there is no need of taking into consideration the equivalent units of normal loss. If it holds/includes any scrap value then it must be deducted from the material cost in order to ascertain the net cost of materials which would form the basis for calculating the material cost/units.

ii) **Abnormal Loss :** The abnormal loss-is to be added to the equivalent production. If the estimates of completion are not mentioned then it is assumed ,that the abnormal losses are 100% completed.

iii) **Abnormal Gain :** It is given as good finished production which is to be deducted from the total cost in order to ascertain the equivalent production.

c) **When there are both Opening and Closing Work-in-progress With No Process Losses :** As the firms are engaged in continuous production there will be both opening and closing work-in-progress. In order to apportion the process costs these units are to be converted into equivalent complete units. This conversion mainly depends on the method of cost apportionment i.e., using either the average cost method or the FIFO method.

i) **Average Cost Method :** This method takes into consideration the average of costs of opening work-in-progress and new production units. This method is best suitable in the case of price fluctuations. In this method it is not necessary to make an estimate of the degree of completion of opening work-in-progress.

ii) **FIFO Method :** The costs of opening work-in-progress which are yet to be completed in the present period and the cost of finished products in the present period are supposed to be shown separately in this method. The issue of units of opening work-in-progress for their completion in the following period is based on First in First Out (FIFO) principle, i.e.,the work-in-progress units from the opening stock are completed first and then the production of new units is started. Through this there is no possibility for finding the opening stock in the closing work- in-progress.

In this method, the opening work-in-progress units are valued at the cost rules of previous period and the work-in-progress of the present period is valued at the cost rules of the present period.

This method holds good incase of stable markets and material prices, wage rates and overheads.

iii) LIFO Method : In this method, the units of work-in-progress that enter the process last are being completed first. In this method, there is a possibility of finding out the opening stock in the closing work-in-progress. The valuation of the completed units is usually based on the current cost.

iv) Weighted Average Method : In the case of firms engaged in production of two or more products simple average cost method does not give accurate results. In order to avoid this, firms usually go for weighted average method for managing the production and costs of each product. The relative importance of one product is being compared with others in terms of points which are necessary.

d) When there are Both Opening and Closing Work-in-progress With Process Losses : If the production includes process losses then the equivalent production units are to be calculated after adjusting them with the process costs which is similar to the treatment of only closing work in-progress with process losses.

PROBLEMS ON EQUIVALENT PRODUCTION

1. A company manufactures a product which involves two consecutive processes viz., Pressing and Polishing. For the month of March, 2007, the following information is available :

	Pressing (`)	Polishing (`)
Input of units in process	1,200	1,000
Units completed	1,000	500
Units under process	200	500
Materials cost (?)	96,000	8,000
Conversion cost (?)	3,36,000	54,000

For incomplete units in process, charge materials cost at 100 percent and conversion cost at 60 percent in the pressing process and 50 percent in polishing process. Prepare a statement of cost and calculate the selling price per unit which will result in 25 percent profit on sale price.

Solution :

Statement of Equivalent Production for Processing

Input		Output		Equivalent Production Units			
				Mateial		Conversion cost	
Items	Units	Items	Units	Units	%	Units	%
Units introduced	1200	Units completed	1000	1000	100	1000	100
		work-in-progress	200	200	100	120	60
	1200		1200	1200		1120	

Statement of Cost for Pressing

Element of Cost	Cost	Equivalent production	Cost per completed unit
Materials	96,000	1200	80
Conversion	3,36,000	1120	300
	4,32,000		380

Statement of Evaluation for Pressing

Particulars	Amount	Amount
Finished goods (1000 × 380)		3,80,000
Work in progress :		
Materials 200 × 80	16,000	
Conversion 120 × 300	36,000	
Value of WIP	52,000	

Input		Output		Equivalent Production Units			
				Mateial		Conversion cost	
Items	Units	Items	Units	Units	%	Units	%
Units introduced	1000	Units Completed	500	500	100	500	100
		work-in-progress	500	500	100	250	50
	1000		1000	1000		750	

Statement of Cost for Polishing

Element of Cost	Cost	Equivalent production	Cost per completed unit
Materials	8,000	1000	8
Conversion	54,000	750	1/2
	62,000		80

Statement of Evaluation for Polishing

Particualrs	Amount	Amount
Finished goods (500 × 80)		40,000
Work-in-progress :		
Materials 500 × 8	4,000	
Conversion 250 × 72	18,000	
Value of WIP	22,000	

Calculation of Selling Price per unit

Particulars	Amount
Total cost per unit	80
(+) profit (25% of sale price)	26.67
Selling price	106.67

Working Notes :

Profit is 25% of sales or $\frac{1}{3}$ of cost

$= 80 \times \frac{1}{3} = 26.67$

Short Question and Answers

Q1. Unit Costing

Ans :

Unit costing is a method of cost ascertainment which is used in those industries which have the following features :

i) Production consists of a single product or a few varieties of the same product with variations in size, shape, quality, etc., and

ii) Production is uniform and on continuous basis. Unit costing is also known as output costing and single costing.

Examples of industries in which this method is commonly used are cement, steel, sugar, paper, brick works, quarries, breweries, dairies,, etc. Cost units in these industries are a tonne of cement or steel or sugar, 1,000 bricks, a barrel of beer a gallon of milk, etc.

Q2. Job Costing

Ans :

Job costing is a costing method applied to determine the cost of specific jobs or lots of production generally manufactured according to customers' specifications. A dictionary for accountants defines job order costing, "as a method of cost accounting whereby costs are complied for a specific quantity of products, equipment, repairs or other services that move through the production process, as a continuously identifiable unit".

Q3. Cost Sheet

Ans :

Cost sheet is a cost statement which is prepared periodically for showing the detailed cost structure of a cost centre or cost unit. Cost sheet consists of different cost elements in the production of goods which includes prime cost, factory cost, production cost and total cost.

The cost sheet is prepared periodically at regular intervals i.e., weekly, monthly, quarterly, yearly etc. The cost sheet also shows the relative comparison of the present cost structure with that of previous years and helps in analyzing the firm's performance.

Q4. Tenders (or) Quotations

Ans :

Cost accounts help a great deal in preparation of estimates for the tender. Generally, expenses incurred in the pervious year are made on the basis for submission of tenders or quotations.

Direct materials required, direct wages and direct expenses are identifiable with the product. Thus, they can be easily ascertained.

Q5. Job costing Vs Process Costing

Ans :

Process Costing may be defined as a method of ascertaining the average cost of each process, department or operation. Job costing is used in businesses which perform work on specific jobs, orders or contracts that can be identified through out the various stages of production.

The following are the important difference between job costing and process costing :

1. In the case job costing, production is made by specific orders; whereas in the case of process costing, production is uniform and continuous.
2. In job costing jobs may be independent of each other. In process costing, products may e interdependence and lose their individuality.
3. Job cost is calculated when the job is completed whereas process costs are calculated at the end of the cost period.
4. In job costing, costs are collected in respect of each job separately; whereas in process costing, total expenses incurred during the period are collected together and divided by the number of units manufactured.
5. In job costing, there is generally no transfer from one job to another. In process costing, costs are transferred from one process to another process.
6. In the case of job costing, managerial attention is needed more as production is no continuous. In the case of process costing, managerial attention and control is comparatively easier as production is continuous and can be standardised.

Q6. Normal Process Loss

Ans :

If the loss is unavoidable on account of inherent nature of production processes. Such loss can be estimated in advance on the basis of past experience or data. The normal process loss is recorded only in items of quantity and the cost per unit of usable production is increased accordingly, where scrap possesses some value as a waste product or a raw material for an earlier process, the value thereof is credited to the process account. This reduces the cost of normal output; process loss is shared by usable units.

Q7. Process Scrap

Ans :

It is the incidental residue from certain type of manufacture usually of small amount and low value, recoverable without further processing. Examples : outlined metal from stamping operations, shavings, turnings, short lengths etc. When scrap resulting from one process can be utilized in another process, it can be treated in either of the following manners :

a) If the scrap material is available in the market the latest purchase price may be taken as the value of the scrap and credited to the process of origin.

b) In case if the scrap requires reprocessing before it can be utilized in the subsequent process, it should be valued at the cost of reprocessing the scrap or the market price whichever is lower. Scrap which cannot be utilized in any subsequent process may either be treated as waste if it has no market table value or it may be disposed of as 'seconds' or 'thirds' if it has a marketable value. If scrap of small value is sold, the value realised is credited to a sundry income a/c and transferred to the profit and loss a/c at the end of the year.

Q8. Process Loss

Ans :

In many processes a loss of weight arises in the course of manufacture. Such loss is inherent and inevitable. This can be worked out in advance. Usually this is calculated by formula or by experience. Process loss is often caused by such factors as evaporation as inherent in large scale production; but may often include scrap and waste.

When the loss is within the calculated limit, this is considered to be normal process loss. Abnormal process loss is that loss caused by unexpected or abnormal conditions such as sub-standard materials, carelessness and accidents.

All losses under this category should be recorded and thoroughly investigated, and where possible, steps taken to prevent ay recurrence. Accounting procedure for normal and abnormal loss differs. When normal loss occurs the cost is absorbed in the cost of production of good products, so on account for normal loss is required. However, in the event of abnormal loss a separate account must be opened, to which is debited the cost of material, labour and appropriate overhead incurred upto the point of rejection. Abnormal losses should be written off the costing profit and loss a/c.

Q9. By-product Costing

Ans :

1. "By-product is a term which is applied to products produced simultaneously that have a very minor sales value as compared with that main of product".

2. "According to The odove Lang, by-products refer to any saleable or usable value incidentally produce in addition to the main product".

3. Neuner defines, "by-products are produced from the same process as joint products but that by-products are essentially the secondary results of the operations".

By-products may be produced incidentally along with the main product in the production process without taking/using extra resources. By-products have less value when compared to the main products. These products are also called 'minor or secondary products'.

The by-products can be sold in either of the two forms,

i) By-products can be sold without any further processing

ii) By-products can also be sold after processing.

Q10. Equivalent Production

Ans :

Most of the firms follow continuous production where there exists work-in-progress in the form of inventory. The work-in-progress at the end of accounting period is being transformed into equal complete units. This production of completed units are called as the equivalent production.

In other words, equivalent production refers to the conversion of uncompleted production of the previous accounting period into equivalent completed units in the next accounting period. For this conversion estimates about the percentage of completion is made on the basis of which production schedule and cost schedule are prepared which would carry out the continuous production. The formula which is being used to calculate the equivalent complete units is as follows,

Equivalent production = No. of units of work-in-progress

x Degree of completion in %

UNIT III

Marginal Costing I: Introduction, Application of Marginal costing in terms of cost control, profit planning, Closing down a plant, dropping a product line, charging general and specific fixed costs, fixation of selling price. Make or buy decisions, key or limiting factor.

3.1 MARGINAL COSTING

Marginal Costing is an accounting technique. Marginal Costing is not a system of Costing such as process or Job Costing. As Marginal Costing is a technique, it may be used in conjunction with any costing method. Marginal Costing as a technique helps the management to measure the profitability of an undertaking by considering the underlying cost behaviour. Marginal Costing is an important technique, which guides the management theory. Marginal Costing is also known as Direct Costing or Variable Costing or Differential Costing or Incremental Costing or Comparative Costing.

3.1.1 Features of Marginal Costing

The following are the main features of marginal costing :

1. Marginal costing is a technique of costing which is used in conjunction with other methods of costing like process or job costing.
2. Only marginal costs i.e., variable costs are charged to products. These include direct material, direct labour, direct expenses and variable over heads.
3. Fixed costs are treated as period costs and are directly charged to profit and loss account for the period for which they are incurred. They are not charged to products.
4. The finished goods and work in process are valued at marginal cost.
5. In marginal costing prices are determined on the basis of marginal cost plus contribution.
6. Profitability of departments and products is determined with reference to their contribution margin.
7. Fixed costs remain constant irrespective of level of activity.
8. Cost -volume-profit relationship is fully employed to reveal the state of profitability at various levels of activity.
9. It high lights the effect of costs on the level of output planned.
10. Break-even point is the prime component of marginal costing technique.

3.1.2 Advantages of Marginal Costing

The technique of marginal costing is of immense value of managerial decisions. In addition it can be significant tool for cost control, profit planning, selection of product mix etc. The following are the main advantages of marginal costing :

1. **Simple to operate and easy to understand :** Marginal costing is a simple technique. It is very simple to operate and easy to understand. It is constant in nature. Complications involved in allocation, apportionment and absorption of overheads are avoided.

2. **Cost Control :** In marginal costing costs are divided into fixed and variable costs. Variable costs are always controllable. Thus, greater control may be exercised over these costs. Further, effective control on fixed costs becomes easier by treating them as a whole in the determination of the profit.

3. **Helps Management in decision making :** This technique helps the management in taking various decisions. Marginal costing is most useful in taking decisions like price fixation, make or buy, introduction of new product line, selection of product mix, etc.

4. **Relationship of Net Income with Sales :** Marginal costing system establishes direct relationship of net income with the sales. The Marginal contribution technique provides a better and more logical basis for the fixation of sales prices with intending profits.

5. **Treatment of overheads simplified :** It reduces the degree of over or under recovery of overheads due to the separation of fixed overheads from production cost.

6. **Helps in preparing flexible budget :** Marginal costing facilitates the preparation of flexible budget by differentiating variable costs and fixed costs. It also helps in the evaluation of the performance of responsible personnel.

7. **Stock valuation :** In marginal costing inventory is valued at variable cost. Thus, unrealized or fictitious profits are not taken into account. Under this method stock valuation will be uniform and realistic.

8. **Aid to Profit Planning :** Marginal costing technique provides data relating to cost- volume-profit relationship. This facilitates profit planning in future.

9. **Helps in Pricing :** Marginal costing is very helpful in fixation of selling price of the products under various conditions. It gives a better and more logical base for the fixation of sales price as well as in tendering for contracts when business is at low level.

10. **Cost per unit constant :** Marginal costing takes only variable cost into account. Fixed cost which influences the unit cost at various levels of production is ignored. Hence, unit cost remains constant at various levels of production.

11. **Helps to know marginal thinking :** The form in which the marginal cost information is presented and disseminated closing confirms to the marginal thinking and philosophy.

12. **Profitability Appraisal :** Marginal costing helps the management in evaluating the profitability of alternate operations.

13. **Complementary to standard costing :** Marginal costing is complementary to standard costing and budgetary control. It can be used along with standard costing to yield better results.

3.1.3 Limitations (or) Disadvantages of Marginal Costing

1. **Practical difficulty in dividing the cost :** The whole concept of marginal costing is based on the classification of total cost into fixed and variable cost which is a very difficult task. In marginal costing semi-variable or semi-fixed cost are not considered.

2. **Time factor ignored :** Marginal costing technique does not attach much importance to time factor. If time taken for completing two different jobs is not the same, costs will naturally will be higher for the job which has taken longer time. Though marginal cost may be the same for both the jobs.

3. **Improper basis of pricing :** Marginal costing gives impression that as long as the price is more than the marginal cost production is profitable. But it may result in over all loss. In long run, price without covering total cost will not yield profit to the firm.

4. **Not suitable to all industries :** Marginal costing technique is not effective in all types of industries. For example in capital intensive industries fixed cost like depreciation is more. If fixed costs are ignored proper results cannot be ascertained. With the increase of automation the scope of marginal costing is decreasing.

5. **Fluctuation in profits :** Marginal costing technique cannot be applied in industries where there is large stock of work-in-progress. As fixed overheads are not included in the value of stock, firm will get losses in some years. This results in wide fluctuations in profits.

6. **Difficulty in the fixation of price :** Under marginal costing, selling price is fixed on the basis of contribution. In case of cost plus contract it is very difficult to fix price.

7. **Under or over absorption :** Application of variable overheads depends on estimate and not on actual as such there may be under or over absorption.

8. **Full claim cannot be claimed :** Since stock is valued at marginal cost, in case of fire full amount of loss cannot be recovered from the insurance company.

9. **Not suitable for external reporting :** This technique is not suitable for external reporting viz., for tax authorities, where marginal income is not considered to be taxable profit.

10. **Significance Lost :** In capital intensive industries fixed costs occupy major portion in the total cost. But marginal costs cover only variable costs. As such, it losses its significance in capital intensive industries.

11. **Full information not give :** Marginal costing does not explain the reasons for increase in production or sales.

3.1.4 Assumptions of Marginal Costing

The technique of marginal costing is based upon the following assumptions :

1. All elements of cost-production, administration and selling and distribution can be segregated into fixed and variable components.

2. Variable cost remains constant per unit on output irrespective of the level of output and thus fluctuates directly in proportion to changes in the volume of output.

3. The selling price per unit remains unchanged or constant at all levels of activity.

4. Fixed costs remain unchanged or constant for the entire volume of production.

5. The volume of production or output is the only factor which influences the costs.

3.2 CVP ANALYSIS

Cost Volume Profit (CVP) analysis is a technique for studying the relationship between cost, volume and profit. Profits of an undertaking depend upon a large number of factors. But the most important of these factors are the cost of manufacture, volume of sales and the selling prices of the products. But the most significant single factor in profit planning of the average business is the relationship between the volume of business, costs and profits. The CVP relationship is an important tool used for the profit planning.

When analyzing CVP it is seen that its three components costs, volume and profit are interconnected and dependent on one another. Profit depends upon sales. Selling price to a large extent depends upon cost and cost depends upon volume of production. In CVP analysis an attempt is made to analyze the relationship between variations in cost with variations in volume.

The CVP relationship is of great use to management - it assists in profit planning, cost control and decision making. Cost-vo1ume-profit analysis can be used to answer questions such as,

a) At what volume of sales will the firm break-even?

b) At what volume of sales will it earn desired profits?

c) How will changes in cost or price effect profits?

d) Which product/product mix earn the most profit?

e) Which product/component should be manufactured and which should be bought?

Objectives (Applications)

1. It helps to forecast profit fairly accurately.
2. It is useful in setting up flexible budgets which indicate costs at various levels of activity.
3. It assists in evaluation of performance for the purpose of control.
4. It also assists in formulatjng price policies by showing the effect of different price structures on costs and profits.

5. It helps to know the amount of overhead costs to be charged to the products cost at various levels of operations.

Uses of CVP Analysis in Decision-making

CVP analysis is a very important aid in the decision making process of the management in almost all areas as shown by the following,

1. Management can estimate the profit over different levels of volume with the help of CVP analysis which is useful in preparing flexible budgets.
2. CVP analysis also helps the management in analysing the impact of changes in the price on the profit position of the company.
3. CVP analysis is also useful to the management in determining the BEP and the profits to be made to meet the proposed expenditure.
4. CVP analysis is vital in pricing too. Modern economy is characterised with huge competition. In order to maintain competitive edge, the company has to price its products competitively.

Assumptions of CVP Analysis

The following are the assumptions of CVP analysis,

1. All costs can be divided into fixed and variable costs.
2. Fixed costs remain constant whereas the variable costs vary with a change in the output.
3. Selling price remains constant.
4. The number of units produced and sold will be one and the same.
5. There will be no change in the operating efficiency.
6. There is only one product or the product mix will remain the same.

Limitations of CVP Analysis

1. Total fixed costs increase in a step like manner beyond the range in which they were constant.
2. With changes in demand, the sales mix also changes and the constant sales mix assumption does not hold good'.

3. All costs cannot be separated into fixed or variable costs.
4. Under the concept of absorption costing principle, profits change with production and sales while under marginal costing profits vary with sales.
5. Costs and sales are unpredictable,
6. Inflationary conditions and political factors also influence costs and not just volume.

PROBLEMS ON MARGINAL COSTING AND ABSORPTION COSTING

When there is Production but no Sales

Under this case, the income under absorption costing may reflect profit though no sales has been made. This is due to the fact that fixed manufacturing overheads have been over absorbed above normal capacity production than its actual fixed manufacturing overheads. But variable income statement will show loss as there are no sales. Though no sales has been made but income statement will show gross profit equal to the amount of over absorption of fixed manufacturing overheads. Thus profit under absorption costing is influenced by various factors as quantity of production units, units sold, selling price, cost of production etc.

Problem No. 1

Following data relate to XYZ company :

Normal capacity 40,000 units per month

Variable cost @ ` 10 per unit

Actual production 44,000 units.

Sales – Nil.

Fixed manufacturing overheads ` 1,00,000 per month or ` 2.50 per unit at normal capacity.

Other fixed expenses ` 8,000.

You are required to prepare income statement under (a) absorption costing and (b) marginal costing.

Solution :

INCOME STATEMENT (Absorption Costing)

Particulars	`	`
Sales		
Less : Variable Cost @ ` 10 per unit	4,40,000	
Fixed manufacturing overheads for 44,000 units @ ` 2.50	1,10,000	
Cost of goods manufactured	5,50,000	
Less : Closing inventory	5,50,000	
Cost of goods sold	Nil	
Less : Overabsorption of overheads (4,000 x ` 2.50)	- 10,000	
Gross Profit		10,000
Less : Other fixed expenses		8,000
Net Income		2,000

Note:

The above income statement will not show the profit if other fixed expenses are more than the gross profit.

(b)

INCOME STATEMENT (Marginal Costing)

Particulars	`	`
Sales		Nil
Less : Variable Cost:		
Cost of goods manufactured for 44,000 units @ ` 10 per unit	4,40,000	
Less : Closing inventory	4,40,000	
Cost of goods sold		Nil
Contribution		Nil
Less : Fixed manufacturing overhead	1,00,000	
Other fixed expenses	8,000	1,08,000
Net Loss		1,08,000

(2) When production is equal to sales: When production and sales are equal i.e., there is no opening or closing stock or when the inventory of finished goods does not fluctuate from period to period, net income will be the same under absorption costing and marginal costing techniques.

Problem No. 2

Following data relate to XYZ company :

Output and sales 40,000 units. Sale price per unit `15. Material and Labour cost per unit `8.

Production overheads :

Variable ` 2 per unit

Fixed ` 50,000

Other fixed overheads `1,00,000

Prepare income statement under : (a) absorption costing and (b) marginal costing.

Solution :

(a) INCOME STATEMENT (Absorption Costing)

Particulars	`	`
Sales (40,000 units @ ` 15 per unit)		6,00,000
Less : Cost of goods manufactured :		
Material and labour cost for 40,000 units @ ` 8	3,20,000	
Variable manufacturing overheads	80,000	
Fixed manufacturing overheads	50,000	
		4,50,000
Gross Profit		1,50,000
Less : Other fixed overheads		1,00,000
Net Income		50,000

(b) INCOME STATEMENT (Marginal Costing)

Particulars	`	`
Sales		6,00,000
Less : Variable Cost		
Material & labour cost (40,000 × ` 8)	3,20,000	
Variable manufacturing overheads 40,000 × ` 2)	80,000	
		4,00,000
Contribution		2,00,000
Less : Fixed Cost		
Manufacturing overheads	50,000	
Other fixed cost	1,00,000	
		1,50,000
Net Income		50,000

(3) When production is more than sales: When closing stock is more than the opening stock i.e., production exceeds sales, profit will be higher in absorption costing as compared to marginal costing. It will be more clear from the following illustration :

Problem No. 3

Following data relates to XYZ Ltd. which makes and sells toys.

Production	1,00,000 units
Sales	80,000 units
	`
Selling price/unit	15
Direct materials	2,50,000
Direct labour	3,00,000
Factory overheads:	
Variable	1,00,000
Fixed	2,50,000
Selling and distribution overheads:	
Variable	1,00,000
Fixed	2,00,000

You are required to present income statments using (a) absorption costing and (b) marginal costing. Account briefly for the difference in net profit between the two income statments.

Solution :

(a) Income Statement (Absorption Costing)

Particulars	`	`
Sales (80,000 × ` 15)		12,00,000
Less: Cost of Goods Manufactured		
Direct material	2,50,000	
Direct Labour	3,00,000	
Factory overheads : Variable	1,00,000	
Fixed	2,50,000	
	9,00,000	
Less: Closing Stock $\left(\frac{20,000}{1,00,000} \times ` 9,00,000\right)$	1,80,000	7,20,000
Gross profit		4,80,000
Less : Selling and Distribution Expenses		
Fixed	2,00,000	
Variable	1,00,000	
		3,00,000
Net Profit		1,80,000

(b) Income Statement (Absorption Costing)

Particulars		`	`
Sales (80,000 × ` 15)			12,00,000
Less :	Variable Cost :		
	Direct Material	2,50,000	
	Direct Labour	3,00,000	
	Variable Factory Overheads	1,00,000	
		6,50,000	
Less :	Closing Stock $\left(\frac{20,000}{1,00,000} \times ` 6,50,000\right)$	1,30,000	
		5,20,000	
Add :	Variable Selling and Distribuiton Expenses	1,00,000	6,20,000
	Contribution		5,80,000
Less :	Fixed Factory Overheads	2,50,000	
	Fixed Selling and Distribuiton Expenses	2,00,000	4,50,000
	Net Profit		1,30,000

The difference in profits ` 50,000 (i.e., ` 1,80,000 – ` 1,30,000) is due to difference in valuation of closing stock. The value of closing stock in absorpiton costing is ` 1,80,000 whereas this value is ` 1,30,000 in marginal costing.

(4) When production is less than sales : When closing stock is less than the opening stock i.e., ales exceeds production (or production is less than sales), profit in marginal costing will be higher as compared to absorption costing. This will be more clear from the following illustration:

Valuation of Stock Under Marginal Costing And Absorption Costing

Problem No. 4

Your company has a production capacity of 2,00,000 units per year. Normal capacity utilisation is reckoned as 90%. Standard variable production costs are ` 11 per unit. The fixed factory costs are ` 3,60,000 per year. Variable selling costs are ` 3 per unit and fixed selling costs are ` 2,70,000 per year. The unit selling price is ` 20. In the year just ended on 30th June, 2010, the production was 1,60,000 units and sales were 1,50,000 units. The closing inventory on 30-6-2010 was 20,000 units. The actual variable production costs for the year were ` 35,000 higher than the standard.

(i) Calculate the profit for the year
   (a) by the absorption costing method, and
   (b) by the marginal costing method.

(ii) Explain the difference in the profits.

Solution :

(i) (a) PROFIT STATEMENT FOR THE YEAR ENDED 30TH JUNE, 2010

(Absorption Costing)

Particulars	`	`
Sales : 1,50,000 units @ ` 20 per unit		30,00,000
Less : Cost of Production :		
Variable production costs		
For 1,60,000 units @ ` 11 per unit	17,60,000	
Increase in variable cost	35,000	
Fixed costs for 1,60,000 units @ ` 2	3,20,000	
	21,15,000	
Add : Opening Stock : 10,000 units (i.e., sales 1,50,000 units + closing stock 20,000 units—production 1,60,000 units) @ ` 13 (i.e., variable cost ` 11 + ` 2 fixed cost at normal capacity utilisation i.e., $\left(\frac{`3,60,000}{90\% \text{ of } 2,00,000 \text{ Units}}\right)$	1,30,000	
	22,45,000	
Less : Closing Stock : 20,000 units valued at current cost $\left(\frac{`21,15,000}{1,60,000 \text{ Units}} \times 20,000 \text{ units}\right)$	2,64,375	
	19,80,625	
Add: Underabsorption of fixed costs (` 3,60,000 – ` 3,20,000)	40,000	
		20,20,625
Gross Profit		9,79,375
Less : Selling Expenses		
Variable	4,50,000	
Fixed	2,70,000	
		7,20,000
Net Profit		2,59,375

(i) (b) PROFIT STATEMENT FOR THE YEAR ENDED 30TH JUNE, 2010
(Marginal Costing)

Particulars	`	`
Sales : 1,50,000 units @ ` 20 per unit		30,00,000
Less : Marginal Cost:		
Variable production cost		
For 1,60,000 units @ ` 11 per unit	17,60,000	
Additional variable production cost	35,000	
	17,95,000	
Variable cost of opening stock of finished goods (10,000 units @ ` 11)	1,10,000	
	19,05,000	
Less: Closing stock of finished goods : units valued at current variable production cost $\left(\text{i.e.,} \frac{` 17,95,000}{1,60,000 \text{ units}} \times 20,000 \text{ units}\right)$	20,000	
	2,24,375	
Variable production cost of 1,50,000 units	16,80,625	
Add : Variable selling cost of 1,50,000 units sold (1,50,000 × ` 3)	4,50,000	
		21,30,625
Contribution		8,69,375
Less : Fixed Cost:		
Fixed production cost	3,60,000	
Fixed selling cost	2,70,000	
		6,30,000
Net Profit		2,39,375

(ii) The difference in profits, ` 20,000 (i.e., ` 2,59,375 – ` 2,39,375), as arrived at under absorption costing and marginal costing is due to the element of fixed factory cost included in the valuation of opening stock and closing stock as shown below :

Particulars	Opening Stock `	Closing Stock `
Absorption costing	1,30,000	2,64,375
(-) Marginal costing	1,10,000	2,24,375
	20,000	40,000

Net difference = ` 40,000 – ` 20,000 = ` 20,000.

Probelm No. 5

Cost Data:

Selling Price	` 5 per unit
Variable Cost	` 3 per unit
Fixed Cost	` 1 per unit
Normal Production	15,000 units
Total Fixed Cost for the year	` 15,000

Following statement shows the position of production, sales, opening and closing stock :

Particulars	Period I units	Period II units
Opening Stock	—	3,000
Production	17,000	14,000
Sales	14,000	16,000
Closing Stock	3,000	1,000

Prepare statements showing the figure of profit by both the methods, i.e., marginal costing method and absorption costing method. Also explain the difference in profits.

Solution :

STATEMENT OF PROFIT (Absorption Costing Method)

Particulars		Period I `	Period II `
Sales	(A)	70,000	80,000
Opening Stock		—	12,000
Cost of Production		68,000	56,000
		68,000	68,000
Less : Cost of Closing Stock		12,000	4,000
Cost of Sales (Actual)		56,000	64,000
Less: Overabsorption of Fixed Costs (1)		2,000	—
Add : Underabsorption of Fixed Costs (1)		—	1,000
Adjusted Cost of Goods Sold	(B)	54,000	65,000
Profit (A - B)		16,000	15,000

(1) It should be noted that production in period I is more than normal production by 2,000 units and period II production is less than normal production by 1,000 units. Rate of fixed cost per unit has been determined with reference to normal production of 15,000 units. For this reason it is necessary to carry out adjustments for overabsorption/underabsorption of fixed costs.

STATEMENT OF PROFIT (Marginal Cost Method)

		Period I `	Period II `
Sales	(A)	70,000	80,000
Opening Stock		–	9,000
Goods Manufactured		51,000	42,000
		51,000	51,000
Less : Cost of Closing Stock		9,000	3,000
Cost of Sales (Actual)	(B)	42,000	48,000
Contribution Margin (A-B)		28,000	32,000
Less: Fixed Cost		15,000	15,000
Profit		13,000	17,000

Particulars	Period I		Period II	
	Opening Stock `	Closing Stock `	Opening Stock `	Closing Stock `
Absorption Costing	—	12,000	12,000	4,000
Marginal Costing	—	9,000	9,000	3,000
Difference		3,000	3,000	1,000
Net Difference		3,000		2,000

3.3 Applications of Marginal Costing

Marginal costing is a very useful tool for management because of its following applications and merits :

1. Cost Control
2. Profit planning and maintaining desired level of profit
3. Closing down a plant
4. Dropping a product line
5. Charging general and specific fixed cost
6. Fixation of selling price
7. Make or buy decisions
8. Key or limiting Factor
9. Selecation of suitable product mix
10. Diversification of products
11. Closing down or suspending activities
12. Level of activity planning

3.3.1 Cost Control

Marginal costing divides the total cost into fixed and variable cost. Fixed cost can be controlled by the top management and that to a limited extent. Variable costs

can be controlled by the lower level of management. Marginal cost by concentrating all efforts on the variable costs can control and thus provides a tool to the management for control of total cost.

In marginal costing fixed costs are not eliminated at all. These are shown separately as a deduction from the contribution instead of merging with cost of sales and inventories. This helps the management to have a control on fixed costs.

3.3.2 Profit planning and maintaining desired level of profit

Marginal costing helps the profit planning, i.e., planning for future operations in such a way as to maximize the profits to maintain a specified level of profit. Absorption costing fails to bring out the correct effect of change in sale price, variable cost are product mix on the profits of the concern but that is possible with the help of marginal costing.

Profits are increased or decreased as a consequence of fluctuations in selling prices, variable costs, and sales quantities in case there is fixed capacity to produce and sell.

The first step in the profit planning is to know the break-even point. The second step is to bring out the effect of changes on sale price, variable cost, or product mix clearly on the profits of the concern. The volume of sales required to maintain a desired profit may be ascertained as follows :

$$\text{Desired Sales} = \frac{\text{Fixed costs} + \text{Desired profit}}{\text{P / V ratio}}$$

3.3.3 Closing down a plant Shut down Decision/Closing down a Plant

A factory may have to case operation for sometime due to various reasons such as labour troubles, Material shortage, Major break down, market depression, etc. this shut down may be of temporary nature and operations are renewed when the situation improves. Shut down costs are classified as follows :

1. Costs incurred on suspension of operations. These include cost of notifying customers about shut down, retrenchment and lay off costs, etc.

2. Costs incurred during continued shut down such as cost of care and custody of plant and machinery and other equipments. etc.

3. Costs incurred on remaining operations after shut down e.g. cost of recruiting and training new workers time lag in picking up production and sales, additional promotional costs. etc.

3.3.4 Dropping (Discontinuance) a Product Line

Another type of condition of decision-making in multi-product firm is regarding the discontinuance of a product line.

The following factors should be considered before taking a decision about the discontinuance of a product line :

1. The contribution given by the product, This contribution is different from profit. Profit is arrived at after deducting fixed cost from contribution. Fixed costs are apportioned over different products on some reasonable basis which may not be very much correct. Hence, contribution gives a better idea about the profitability of a product as compared to profit.

2. The capacity utilization, i.e. whether the firm is working to full capacity or below normal capacity. In case a firm is having idle capacity, the production of any product which can contribute toward the recovery of fixed costs can be justified.

3. The availability of product to replace the product which the firm wants to discontinue and which is already accounting for a significant proportion of the total capacity.

4. The long-term prospects in the market for the product.

5. The effect on sale of other products. In some cases, discontinuance of one product may result in heavy decline in sales of other products affecting the overall profitability of the firm.

3.3.5 Charging General and Specific Fixed Cost

Some times it is observed that general fixed cost is apportioned to departments (or products). This may be done for ascertainment of total cost but will not be prudent for decision-making. Any apportionment of general fixed costs may give misleading results. However, where fixed costs are specific. The same may be taken into consideration as a relevant cost.

3.3.6 Fixation of Selling Price

Although the prices are more controlled by market conditions and other economic factors than by decisions of management yet fixation of selling prices is one of the most important functions of management. This function is to be performed :

- Under normal circumstances
- In times of competition
- In times of trade depression
- In accepting additional orders for utilizing idle capacity
- In exporting and exploring new markets.

1. Selling Price below the Marginal Cost
2. When a new product is introduced in the market
3. When foreign market is to be explored to earn foreign exchange
4. When the concern has already purchased large quantities of materials
5. At the time of closure of business
6. When the sales of one product at a price below the marginal cost will push up the sales of other profitable products
7. When employees cannot be retrenched
8. When the goods are perishable nature.

EXERCISE PROBLEMS

1. The central foundries undertakes to deliver 100 machine elements to be manufactured out of mild steel at ` 7.50 per casting, the expenses pertaining to the job are given below.

   Material :

   150 kgs of mild steel at Re. 1.50 per kg.

   Labour :

   Moulding - 80 hours at Re. 1 per hour;

   Core-making : 40 hours at Re. 0.80 per hour;

   Finishing - 50 hours at Re. 1.25 per hour.

   Overhead expenses:

   Moulding -150 percent of labour cost;

   Core-making - 200 percent of labour cost;

   Finishing -100 per cent of labour cost.

   Cupola cost came to ` 250 per operation and the input of mild steel in this case was 1,000 kgs, 30 kgs of the metal is fettled out and the value creditable is Re. 1 per kg. Also 2 kgs were lost in the process to melting and moulding.

   Actually 105 pastings were made, out of which 3 were defective and/or rejected in inspection.

   The excess castings in good condition were also delivered to the customer at a concessional rate of ` 6 per casting.

   Prepare a job, cost sheet suitably showing all the details furnished above.

Ans :

Profit ` 113.55

2. The following figures are extracted from the Trial balance of Gogetter Co. on 30th September, 2004

Debit Balances:	`	**Debit balance**	`
Inventories		Repairs and Upkeep-factory	14,000
Finished stock	80,000	Heat, Light and Power	65,000
Raw materials	1,40,000	Rates and taxes	6,300
Work-in-progress	2,00,000	Misc. factory expenses	18,700
Office appliances	17,400	Sales commission	33,600
Plant & machinery	4,60,500	Sales travelling	11,000
Buildings	2,00,000	Sales promotion	22,500
Sales returns and rebates	14,000	Distribution Deptt.	
Materials purchased	3,20,000	Salaries and expenses	18,000
Freight incurred on materials	16,000	Office salaries and expenses	8,600
Direct labour	1,60,000	Interest on borrowed funds	2,000
Indirect labour	18,000	Credit balances	
Factory supervision	10,000	Sales	7,68,000
		Purchase returns	4,800

Further details are available as follows,

(i) Closing inventories: Finished goods ` 1,15,000; Raw materials ` 1,80,000; Work-in-progress ` 1,92,000.

(ii) Accrued expenses on : Direct labour ` 8,000; Indirect labour ` 1,200; Interest on borrowed funds

(iii) Depreciation to be provided on; Office appliances 5%; Plant and machinery 10%; Building 4%.

(iv) Distribution of the following costs.

Heat, light and power to factory, office and distribution in the ratio of 8 :1 :1.

Rates and taxes two-thirds to factory and one-third to office. Depreciation on buildings to factory, office and selling in the ratio of 8 : 1 : 1.

With the help of the above information; you are required to prepare: (i) a statement of cost showing various elements of cost and (ii) a statement of profit.(i)

Ans :

(i) Materials consumed ` 2,91,200; Prime cost ` 4,59,200; Gross works cost ` 6,29,750; Works cost ` 6,37,750; Cost of production ` 6.56,620; Cost of goods sold ` 6,21,620; Cost of Sales ` 7,14,020;

(ii) Net profit ` 35,980.

3. Product P_{63} is made by three sequential processes I, II, III. In process III a by-product arises and after further processing in process BP, at a cost of ` 2 per unit, by-product $BP_9$ is produced. Selling and distribution expenses of ` 1 per unit are incurred in marketing BP_9 at a selling price of Rs. 9 per unit.

Particular	Process I	Process II	Process III
Standards provided for Normal loss in process of units of loss in process, having a scrap value per unit of	10% Re. 1	5% Re. 3	10% ` 5

For the month of April, 2004, the following data are given,

Particular	Process I	Process II	Process III	Process BP
Output in units	8,800	8,400	7,000 of P 63	420 of BP_9
Costs:	`	`	`	Total `
Direct materials introduced (10,000 units)	20,000			20,000
Direct materials added	6,000	12,640	23,200	41,840
Direct wages	5,000	6,000	10,000	21,000
Direct expenses	4,000	6,200	4,080	14,280

Budgeted production overhead for the month was 84,000. Absorption is based on a percentage of direct wages.

There were no stocks at the beginning or at the end of the month. You are required, using the information given, to prepare accounts for,

(a) Each of process I, II and III;

(b) Process BP;

(c) (i) abnormal losses;

(ii) abnormal gains;

Showing the balances to be transferred to the profit and loss statement.

(d) Normal loss A/c.

Ans :

Process I

Abnormal loss (200 units) valued at ` 1,200; Transfer to Process II (8,800 units at ` 52,800;

Process II

Abnormal gain (40 units) valued at ` 480; Transfer to Process III (8,400 units) at ` 1,00,800;

Process III

Abnormal loss (140 units) valued at ` 3,360; Transfer to finished goods (7,000 units) at ` 1,68,000; Transfer from Process III to BP process (420 units) at ` 2,520.

4. A certain product passes through two processes desired before it is transferred to finished stock. The following information is obtained for the month of December:

Items	Process-I `	Process-II `	Finished stock `
Opening stock	7,500	9,000	22,500
Direct material	15,000	15,750	
Direct wages	11,200	11,250	
Production overheads	10,500	4,500	
Closing stock	3,700	4,500	11,250
Profit % on transfer price to the next process	25%	20%	
Inter-process profits for opening stock	-	1,500	8,250

Stocks in processes are valued at prime cost and finished stock has been valued at the price at which it was received from Process II. Sales during the period were ? 1,40,000.

Prepare and compute,

(a) Process cost accounts showing profit element at each stage;

(b) Actual realised profit; and

(c) Stock valuation for balance sheet purposes.

Ans :

(a) Profit: Process-I ` 13,500; Process-II ` 22,500; Finished stock ` 16,250;

(b) ` 57.500

(c) ` 14,950

5. From the following particulars extracted from the books of New Colour Limited for the month of March, 2004 prepare,

(a) Statement of equivalent production,

(b) Statement of apportionment of cost, and

(c) Process account. (Use FIFO method).

1.	Opening stock as on 1st March	200	units @ ` 4.00
	Degree of completion	100%	Material
		40%	Labour
		40%	Overhead
2.	Introduced during March	1050	Units
3.	Transfer to next process	1100	Units
4.	Closing stock as on 31st March	150	Units
	Degree of completion	100%	Material

Other relevant information regarding the process account are,

	`
Material cost	3,150
Labour cost	4,500
Production overhead	2,250
	9,900

Ans :

Effective units: Material 1,050; Labour and overhead 1.125; cost per equivalent Unit; Material ` 3.00, Labour ` 4.00 and Overhead ` 2.00; Value of Opening stock (for completion) ` 720; Finished goods ` 8.100; Work-in-progress ` 1.080.

6. One tonne of raw material put into a common process yields four joint products P, Q, R and S, their weight being 63 kgs. 117 kgs, 180 kgs., and 540 kgs respectively. The balance in weight is considered as normal wastage.

   Based on the total processing cost of `20,000 per tonne of raw material, your are required to apportion the joint cost to products P, Q, R and S.

Ans :

[P–`. 1,400; Q – ` 2,600, S-` 4,000; S-` 12,000]

7. A firm manufactures three joint products A, B and C and a by-product 'X' by processing a common stock of raw material which costs ` 8 per kg. The details of output, market price and the initial processing cost for an input of 10,000 kgs of raw material is as follows,

Product	Output (kgs)	Current Market price/kg (`)	Initial Processing Cost
A	5,000	18	Direct labour: 1,000 hrs @ `20/hr
B	2,500	20	Variable overhead: 80% of direct labour
C	1,500	24	Fixed overheads: ` 21,000
X	500	4	

The company apportions common cost among joint products on physical units basis.

All the products including the by-product can be processed further and sold at a higher market price, with some sales promotion effort. The estimated further processing cost, marketing cost and the final selling price are given below,

Product	Further processing cost per kg	Further marketing cost per kg	Final market price/kg
A	4	2	28
B	5	2	26
C	6	2	34
X	2	1	6

Required

(a) Cost of the joint products at the point of separation after initial processing. Comment on the method of apportioning joint costs.

(b) Profit or loss if the products are sold without further processing.

(c) Which of the products have to be processed further for maximising profits? Show workings.

Ans :

(a) `. 1,35,000

(b) Profit : A ` 15,000, B ` 12,500 and C ` 13,500.

(c) A and C should be further processed.

3.4 MAKE OR BUY DECISION

A firm may make some products; parts or tools or some times it may buy the same thing from outside. The management must decide which is profitable. In taking such a make or buy decision marginal costing technique helps the management.

Make or buy decisions become necessary when unutilized production facilities exist and the product being produced has a component, which can either be made in the factory itself or purchased from outside market.

While deciding to make or buy, the cost comparison should be made between the marginal cost of manufacture and the price at which the product or component could be obtained from outside. It is profitable to the firm to buy the component from others only when the supplier's price is less than the marginal cost. Fixed costs are excluded on the assumption that they have been already recovered.

Factors that Influence Make or Buy Decision

In a make or buy decision, the following cost, and non-cost factors must be considered specifically.

Cost Factors

a) Avilability of plant facility

b) Quality and type of item which effects the production schedule.

c) The space required for production of item

d) Any special machinery or equipment required.

e) Any transportation involved due to the location of the product, i.e., the "feeder point".

f) Cost of acquiring special know-how required for the item.

PROBLEMS ON MAKE OR BUY DECISION

Problem No. 1

A manufacturing company finds that while the cost of making a component part is ` 10, the same is available in the market at ` 9 with an assurance of continuous supply. Give your suggestion whether to make or buy this part. Give also your views in case the supplier reduces the price from ` 9 to ` 8. The cost information is as follows :

Materials	` 3.50	Other Variable Expenses	` 1.00
Direct Labour	` 4.00	Fixed Expenses	` 1.50

Solution :

To take a decision on whether to make or buy the component part, fixed expenses being irrelevant cost should not be added to the cost because these will be incurred even if the part is not produced. Thus, additional cost of the part will be as follows :

Particulars	`
Materials	3.50
Direct Labour	4.00
Other Variable Expenses	1.00
Total	8.50

The company should produce the part if the part is available in the market at ` 9.00 because the production of every part will give to the company a contribution of 50 paise (i.e., ` 9.00 – ` 8.50).

The company should not manufacture the part if it is available in the market at ` 8 because additional cost of producing the part is 50 paise (i.e., ` 8.50 – ` 8) more than the price at which it is available in the market.

Problem No. 2

A firm can purchase a separate part from an outside source @ ` 11 per unit. There is a proposal that the spare part be produced in the factory itself. For this purpose a machine costing `1,00,000 with annual capacity of 20,000 units and a life of 10 years will be required. A foreman with a monthly salary of ` 500 will have to be engaged. Materials required will be ` 4.00 per unit and wages ` 2.00 per unit. Variable overheads are 150% of direct labour. The firm can easily raise funds @ 10% p.a. Advice the firm whether the proposal should be accepted.

Solution :

Increase in Fixed Costs		`
Depreciation of Machine		10,000
Salary of Foreman		6,000
Interest on Capital		10,000
		26,000
		`
Contribution per unit		11
Purchase Price		
Less : Variable Cost:	4.00	
Materials	2.00	
Wages	3.00	
Variable Overheads		9
Contribution per unit		2

$$\text{Minimum Volume} = \frac{`26,000}{`2}$$

= 13,000 units.

In order to accept the proposal it is essential that the volume should be at least 13,000 units.

If there is no idle capacity and making of the spare part in the factory involves the loss of other work, the loss of contribution arising from displacement of work should also be considered alongwith variable cost of production. The loss of contribution is found with reference to key or limiting factor. If the purchase price is higher than the total variable cost of production plus traceable fixed costs plus the loss of contribution of production, it will be more profitable to manufacture.

Problem No. 3

A Radio manufacturing company finds that while it costs Rs. 6.25 to make a component × 273Q. The same is available in the market at Rs. 5.75 each with an assurance of a continued supply.

The break - down of cost is :

Material	Rs.	2.75 each
Labour	Rs.	1.75 each
Other variables	Rs.	0.50 each
Depreciation and other fixed. cost		1.25 each
		6.25

a) Should you make or buy ?

b) What would be your decision, if the supplier offers the components at Rs. 4.85 each.

Solution :

Calculation of making cost (or) variable cost

MaterialsQ	Rs.	2.75 each
Labour	Rs.	1.75 each
Other variables	Rs.	0.50 each
Making cost	Rs.	5.00 each

Market price 5.75 each

Decision

It is advisable to make the component because making charges are less than the market price.

i.e making charges	5 – 00
market price	5 – 75

If company buy the product from out sider than, company loose Re. 0.75 per component.

ii) If market price is 4.85

It is advisable to buy the product from outsiders if company buy the product from outsiders it can save Rs. 0.15 per component.

Problem No. 4

An automobile manufacturing company finds that while the cost of making in its own workshop part no 0028 is Rs. 6.00 each, the same is available in the market at Rs. 5.60 with an assurance of continuous supply. Write a report to the managing director giving your views whether to make or buy this part. Give also your views in case the suppliers reduce the price from Rs. 5.60 to Rs. 4.60. The cost data is as follows :

Material	Rs 2.00 per component
Direct labour	Rs.2.50 per component
Other variable over heads	Rs.0.50 per component
Depreciation and other fixed costs	1.00 per component
	6.00 per component

Solution :

a) Calculation of variable cost (or) making charges.

Material	Rs 2.00 per component
Direct labour	Rs.2.50 per component
Other variable over heads	Rs.0.50 per component
	5.00 per component

Making charge Rs. 5 – 00 per component

Market price Rs. 5 – 60 per component

∴ It is advisable to the company to make the product Instead of buying. If company buys the product from outsiders. It will loose Rs. 0.60 paisa per unit.

b) If market price reduced from 5.60 to 4.60 paisa.

If market price is reduced to 4.60. It is advisable to buy the product from outsiders instead of making. Because market price (buying) is less than the making cost.

Problem No. 5

Pipes manufacturing company is using a spar part Ax. The cost structure to manufacture is made up as under

Direct material	32 per unit
Direct wages	12 per unit
Variable over heads	5 per unit
Fixed cost	7 per unit
Total cost	56 per unit

The same component is offered by a seller for Rs. 45 with assumed. Supply should the company make or buy the component.

Solution :

Calculation of variable cost or making cost per unit.

Direct material	Rs. 32 – 00
Direct wages	Rs.12 – 00
Variable over heads	Rs. 5 – 00
Making charge	49 – 00

Making charge	Rs. 49 – 00
Market price	Rs. 45 – 00

Decision

It is advisable to the company to buy product. Because making charges is more than the buying costs if company make the product than It can loose Rs. 4 per unit.

3.5 KEY OR (LIMITING) FACTOR

The limiting factor, which prevents an enterprise form earning unlimited profit, is known as the key factor. Usually this limiting factor is sales. A concern may not be able to sell as much as it can product. But some times a concern cancel all it produces but

production is limited due to the shortage of materials, lower plant capacity, or capital. In such a case, decision has to be taken the choice of the product whose production is to be increased, reduced, or stopped. The key factor is also called as limiting factor or principle budge factor.

When there is no limiting factor, the choice of the product will be on the basis of the highest P/V Ratio. But when there is scarce or limited resources selection of the product will be on the basis of contribution per unit of scarce factor of production. When a limiting is in operation, the contribution per unit of such a factor should be the criterion to judge the profitability of a product. When two or more limiting factors are in operation simultaneously, it is necessary to take all of them into consideration to determine the profitability.

When the material is in short supply, profitability is determined by contribution per kg, when labour shortage is there profitability is measured contribution per labour hour.

PROBLEM ON KEY OR LIMITING FACTOR

Problem No. 1

A company manufactures and markets three products X, Y and Z. All the three products are made from the same set of machines. Production is limited by machine capacity. From the data given below, indicate priorities for products X, Y and Z with a view to maximising profits :

	Products		
Particulars	**X**	**Y**	**Z**
Raw material cost per unit (`)	11.25	16.25	21.25
Direct labour cost per unit (`)	2.50	2.50	2.50
Other variable cost per unit (`)	1.50	2.25	3.55
Selling price per unit (`)	25.00	30.00	35.00
Standard machine time required per unit in minutes	39	20	28

Solution :

Statement Indicating Priorities of Different Products to Maximise Profits

Particulars	Products					
	X		Y		Z	
	`	`	`	`	`	`
Selling Price per unit		25		30		35
Less : Variable Cost per unit:						
Raw Material Cost per unit	11.25		16.25		21.25	
Direct Labour Cost per unit	2.50		2.50		2.50	
Other Variable Cost per unit	1.50		2.25		3.55	
		15.25		21		27.30
Contribution per unit (A)		9.75		9		7.70
Standard machine time required per unit in minutes (B)		39		20		28
Contribution per minute (A) ÷ r (B)		0.25		0.45		0.275
Priorities for products		III		I		II

Short Question and Answers

Q1. Marginal Costing

Ans :

Marginal Costing is an accounting technique. Marginal Costing is not a system of Costing such as process or Job Costing. As Marginal Costing is a technique, it may be used in conjunction with any costing method. Marginal Costing as a technique helps the management to measure the profitability of an undertaking by considering the underlying cost behaviour. Marginal Costing is an important technique, which guides the management theory. Marginal Costing is also known as Direct Costing or Variable Costing or Differential Costing or Incremental Costing or Comparative Costing.

Q2. CVP Analysis

Ans :

Cost Volume Profit (CVP) analysis is a technique for studying the relationship between cost, volume and profit. Profits of an undertaking depend upon a large number of factors. But the most important of these factors are the cost of manufacture, volume of sales and the selling prices of the products. But the most significant single factor in profit planning of the average business is the relationship between the volume of business, costs and profits. The CVP relationship is an important tool used for the profit planning.

Q3. Applications of Marginal Costing

Ans :

Marginal costing is a very useful tool for management because of its following applications and merits :

1. Cost Control
2. Profit planning and maintaining desired level of profit
3. Closing down a plant
4. Dropping a product line
5. Charging general and specific fixed cost
6. Fixation of selling price
7. Make or buy decisions
8. Key or limiting Factor
9. Selecation of suitable product mix
10. Diversification of products
11. Closing down or suspending activities
12. Level of activity planning

Q4. Charging General and Specific Fixed Cost

Ans :

Some times it is observed that general fixed cost is apportioned to departments (or products). This may be done for ascertainment of total cost but will not be prudent for decision-making. Any apportionment of general fixed costs may give misleading results. However, where fixed costs are specific. The same may be taken into consideration as a relevant cost.

Q5. Make or Buy Decision

Ans :

A firm may make some products; parts or tools or some times it may buy the same thing from outside. The management must decide which is profitable. In taking such a make or buy decision marginal costing technique helps the management.

Make or buy decisions become necessary when unutilized production facilities exist and the product being produced has a component, which can either be made in the factory itself or purchased from outside market.

While deciding to make or buy, the cost comparison should be made between the marginal cost of manufacture and the price at which the product or component could be obtained from outside. It is profitable to the firm to buy the component from others only when the supplier's price is less than the marginal cost. Fixed costs are excluded on the assumption that they have been already recovered.

Q6. Key or (Limiting) Factor

Ans :

The limiting factor, which prevents an enterprise form earning unlimited profit, is known as the key factor. Usually this limiting factor is sales. A concern may not be able to sell as much as it can product. But some times a concern cancel all it produces but production is limited due to the shortage of materials, lower plant capacity, or capital. In such a case, decision has to be taken the choice of the product whose production is to be increased, reduced, or stopped. The key factor is also called as limiting factor or principle budge factor.

When there is no limiting factor, the choice of the product will be on the basis of the highest P/V Ratio. But when there is scarce or limited resources selection of the product will be on the basis of contribution per unit of scarce factor of production. When a limiting is in operation, the contribution per unit of such a factor should be the criterion to judge the profitability of a product. When two or more limiting factors are in operation simultaneously, it is necessary to take all of them into consideration to determine the profitability.

UNIT IV

Marginal Costing II: Selection of suitable product mix, desired level of profits, diversification of products, closing down or suspending activities, level of activity planning. Break-even analysis: application of BEP for various business problems. Inter-firm comparison: need for inter-firm comparison, types of comparisons, advantages.

4.1 Selection of a Suitable Product Mix

When a factory manufacturers more than one product, a problem is faced by the management as to which product mix will give the maximum profits. The best product mix is that which yields the maximum contribution.

- The best product mix is that which yields the maximum contribution.
- The products which give the maximum contribution are to be retained and their production should be increased.
- The products which give comparatively less contribution should be reduced or closed down altogether.
- The effect of sales mix can also be seen by comparing the P/V ratio and breakeven point.
- The new sales mix will be favorable if it increases the P/V ratio and reduces the breakeven point.

PROBLEMS ON PRODUCT MIX

Problem No. 1

Present the following informtion to show to the management:

(i) The marginal product cost and the contribution per unit.

(ii) The total contribution and profits resulting from each of the following sales mixtures.

(iii) The proposed sales mixes to earn a proft of ` 250 and ` 300 with total sales and A and B being 300 units.

Particulars	Product A `	Product B `
Direct materials (per unit)	10	9
Direct wages (per unit)	3	2
Sales price (per unit)	20	15

Fixed expenses ` 800

(Variable expenses are allocated to products as 100% of direct wages)

Sales mixtures :

(a) 100 units of Product A and 200 of B

(b) 150 units of Product A and 150 of B

(c) 200 units of Product A and 100 of B

Recommend which of the sales mixture should be adopted.

Solution :

(i) Statement of Marginal Cost and Unit Contribution

Sale Price	Product A		Product B	
	Per unit `	Per unit `	Per unit `	Per unit `
Sale Price		20		15
Less: Variable Cost				
Direct Materials	10		9	
Direct Wages	3		2	
Variable Overheads	3	16	2	13
Contribution		4		2

(ii)

Particulars	Mix A			Mix B			Mix C		
	A	B	Total	A	B	Total	A	B	Total
Sales (units)	100	200	300	150	150	300	200	100	300
Contribution per unit (`)	4	2		4	2		4	2	
Total Contribution (`)	400	400	800	600	300	900	800	200	1,000
Less : Fixed Cost			800			800			800
Profit (`)			–			100			200

Mix (c) should be adopted as it gives the maximum contribution and profit.

(iii) Propsoed Mixes

Particulars	Case I `	Case II `
Required profit	250	300
Fixed cost	800	800
Contribution	1,050	1,100

Case I

Let p nos. of A be sold.

Then (300 – p) nos. of B are to be sold.

Equating $4p + 2(300 - p) = 1,050$

$4p + 600 - 2p = 1,050$

$2p = 450$

$\therefore \quad p = 225$

Proposed Mix A = 225 units

B = 75 units (i.e., 300 – 225)

Case II

Say 'x' nos. of A to be sold then (300 – x) nos of B are to be sold.

Equating, $4x + 2(300 - x) = 1{,}100$

$4x + 600 - 2x = 1{,}100$

$2x = 500$

$x = 250$

Proposed Mix A = 250

B = 50 units.

Problem No. 2

Small Tools Factory has a plant capacity adequate to provide 19,800 hours of machine use. The plant can produce all A type tools or all B type tools or a mixture of the two types. Following information is relevant.

Per type	A	B
Selling Price (`)	10	15
Variable Cost (`)	8	12
Hours required to produce	3	4

Market conditions are such that not more than 4,000 A type tools and 3,000 B type tools can be sold in a year. Annual fixed costs are ` 9,900.

Compute the product-mix that will maximise the net income to the company and find that maximum net income.

Solution :

Statement Showing the Contribution Per Machine Hour

Particulars	**Type A** `	**Type B** `
Selling Price per type	10.00	15.00
Less: Variable Cost per type	8.00	12.00
Contribution per type	2.00	3.00
Hours required to produce	3	4
Contribution per machine hour	$\frac{2.00}{3} = 0.67$	$\frac{3.00}{4} = 0.75$
Ranking	II	I

From the above, it is clear that type B should be produced to the maximum extent and the balance machine hours should be utilized for production of A type tools.

Statement Showing the maximum Net Income

Type	No. of Tools	Machine Hours	Contribution per unit	Total Contribution
(1)	(2)	(3)	(4) `	(5) ` =(2×4)
B	3,000	12,000	3.00	9,000
A	2,600	7,800	2.00	5,200
		19,800		14,200
Less: Annual Fixed Cost				9,900
Net Income				4,300

Problem No. 3

Present the following information to show clearly to management.

a) The marginal product cost and the contribution per unit.

b) The total contribution and profits resulting from each of the following mixtures.

Particulars	Product	Price per unit (Rs.)
Direct material	A	10
Direct material	B	9
Direct wages	A	3
Direct wages	B	2
Fixed Expenses Rs. 800.		

Variable expenses are allotted to the products as 100% of direct wages.

Particulars	Product	Price per unit (Rs.)
Sales price	A	20
Sale price	B	15
Sales mixtures :		

a) 100 units of product A and 200 of B

b) 150 units product A and 150 of B

c) 200 units of product A and 100 of B.

Solution :

i) Calculation of contribution per unit

Particulars	Product - A		Product - B	
	Amt (in Rs.)	Amt (in Rs.)	Amt (in. Rs.)	Amt (in.Rs.)
Selling price per unit		20 – 00		15 – 00
Less : Variable cost				
Direct material	10 – 00		9 – 00	
Direct wages	3 – 00		2 – 00	
Variable expenses	3 – 00		2 – 00	
(100%)		16 – 00		13 – 00
		4 – 00		2 – 00

ii) Calculation of profit

Particulars	Mix – A	Mix – B	Mix – C
	A – 100 Units	A – 150 Units	A – 200 Units
	B – 200 Units	B – 150 Units	B – 100 Units
Total contribution (A)	100 × 4 – 400	150 × 4 – 600	200 × 4 – 800
(B)	200 × 2 – 400	150 × 2 – 300	100 × 2 – 200
Total contribution	800	900	1,000
Less : Fixed cost	800	800	800
Profit	NIL	100	200

Decision

It is advisable to accept mix - c. Because its having more profit with compare to other mixes.

Problem No. 4

From the following information you are required to ;

i) Calculate and present the marginal product cost and contribution per unit.

ii) State which of the alternative sales mix you would recommend to management, and why;

	x (Rs.)	y (Rs.)
Selling price, per unit	25	20
Direct material per unit	8	6
Direct wages	24 hours @Rs. 0.25 per hours	16 hours @ Re 0.25 per hours

Fixed over head - Rs. 750

Variable over heads - 150% of direct wages

Alternatives sales mix

a) 250 Units of x and 250 units of y.

b) Nil unit of x and 400 units of y.

c) 400 units of x and 100 units of y.

Solution :

i) Calculation of contribution per unit

	X		Y	
Particulars	**Amt**	**Amt**	**Amt (in. Rs.)**	**Amt (in.Rs.)**
Selling price per unit		25 – 00		20 – 00
Less : Variable cost				
Direct material	8 – 00		6 – 00	
Direct wages $\begin{bmatrix} 24\times 0.25 \\ 16\times 0.25 \end{bmatrix}$	6 – 00		4 – 00	
Variable over heads (150%) on wages	9 – 00		6 – 00	
		23 – 00		16 – 00
∴ Contribution per unit		2 – 00		4 – 00

ii) Calculation of profit

Particulars	Mix – A	Mix – B	Mix – C
Total contribution	x = 250 units y = 250 units A = 250 × 2 = 500 B = 250 × 4 = 1,000	x = NIL; y = 400 units A = 0 × 2 = 0 B = 400 × 4 = 1,600	x = 400 units; y = 100 units A = 400 × 2 = 800 B = 100 × 4 = 400
Total Contribution	= 1500	1,600	1,200
Less : Fixed cost	750	750	750
Profit	750	850	450

Decision

It is advisable to accept product mix = B. Because it having more profit with compare to other mixes.

Problem No. 5

M/s. Renuka LTD. Manufactures a single product which it sells to other companies, which process it (product) further before sale to ultimate consumers. The company's last year's volume of production and sales were 20,000 units the relevant cost data were :

		Rs.
Selling price per unit		60
Direct material	Rs. 10	
Direct labour	Rs. 15	
Variable over heads	Rs. 15	40
Fixed overheads per unit		5
		45
Profit per unit		Rs. 15

The company's management has an option to process further and sell the finished product to the ultimate consumers. The management estimates that the fully processed product known as 'cream' can be sold for Rs. 100 per unit. The following are the estimates of additional costs for processing 20,000 units :

Direct Labour Rs. 5 per unit

Variable overheads Rs. 3 per unit

The company also has to incur a one time promotion (advertising) expenditure of Rs. 40,000.

Your are required to advise the Management whether further processing should be done ?

Solution :

Cost Comparison and Incremental Analysis
(Production and Sales : 20,000 units)

Item	Without further processing		With further processing into 'cream'		Difference from further processing	
	Per Unit Rs.	Total Rs.	Per Unit Rs.	Total Rs.	Per Unit Rs.	Total Rs.
Sales (A)	60	12,00,000	100	20,00,000	40	8,00,000
Less : Variable Cost :						
Direct materials	10	2,00,000	10	2,00,000	–	–
Direct Labour	15	3,00,000	20	4,00,000	5	1,00,000
Variable overheads	15	3,00,000	18	3,60,000	3	60,000
Total variable costs (B)	40	8,00,000	48	9,60,000	8	1,60,000
Contribution (A) – (B)	20	4,00,000	52	10,40,000	32	6,40,000
Less : Fixed costs	5	1,00,000	7	1,40,000	2	40,000
Profit	15	3,00,000	45	9,00,000	30	6,00,000

From the above analysis it can be observed that further processing would bring an incremental profit of Rs. 6,00,000.

Recommendation

In-view of the 200 per cent increase on the present level of profit, further processing is recommended to the management.

4.2 Desired Level of Profits

The organisational management has to take the decisions about the maintenance of desired lever of profits. It is necessary for a firm to maintain optimum profits for maintaining its high performance. The decisions that are involved in this area of management for earning high profits are as follows,

i) Increasing the sales volume by decreasing the selling price and

ii) Increasing the selling price if the P/V ratio is low.

Marginal costing technique guide's the management in taking the decisions about the maintenance of desired profits. The relative profitability of the products can be determined with the help of P/V ratio. The firm should increase the production of the product whose P/V ratio is high.

The use of absorption costing does not helps in taking effective decisions about the maintenance of the desired profit level of the firm whereas the use of marginal costing assists the management in decision-making and suggests that the product which has high P/V ratio will have the capacity to meet all the costs including marginal cost and fixed cost and is the most profitable product. The significant emphasizes on this product will also increases the firms performance and profitability.

The management should consider different factors and the profit behaviour of the firm while taking the decisions of the maintenance of desired profit. The decrease in the price should result in an increase in sales volume, otherwise the price reduction will result in losses. The decrease in unit price is unimportant, but if the unit differential is multiplied by thousands of units, then the total impact is very important and must be considered in the decision making. The firm has to sell several units for covering the loss and earning a desired profit.

4.3 Diversification of Products

Sometimes it becomes necessary for a concern to introduce a new product to the existing product or products in order to utilize the idle capacity or to capture a new market or for other purposes. General fixed costs will however, be charged to the old product/products.

- In order to decide about the profitability of the new product, it is assumed that the manufacture of the new product will not increase fixed costs of the concern.
- If the price realized from the sale of such product is more than its variable cost of production it is worth trying.
- If the data is presented under absorption costing method, the decision will be wrong.

- If with the introduction of new product, there is an increase in the fixed costs, then such specific increase in fixed costs must be deducted from the contribution for making any decision.
- General fixed costs will be charged to the old product/products.

4.4 Closing Down all Suspecting Activities

The decision to close down or suspend its activities will depend whether products are making contribution towards fixed costs or not. ie. Whether 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)

If the business is closed down:

- There may be certain fixed costs which could be avoided.
- There will be certain expenses which will have to be incurred at the time of closing the operations like redundancy payments, necessary maintenance of the plant or overhauling of plant on reopening training of personal etc.
- Such costs are associated with closing down of business and must be taken into consideration before taking any decision.

Shutdown or Suspending Activities

Problem No. 1

The annual flexible budget of a company is as follows :

Production Capacity **Cost**	**40%** `	**60%** `	**80%** `	**100%** `
Direct Material	12,000	18,000	24,000	30,000
Direct Labour	16,000	24,000	32,000	40,000
Production Overhead	11,400	12,600	13,800	15,000
Administration Overhead	5,800	6,200	6,600	7,000
Selling and Distribution Overhead	6,200	6,800	7,400	8,000
	51,400	67,600	83,800	1,00,000

Owing to trade difficulties the company is operating at 50% capacity. Selling prices have had to be lowered to what the directors maintain is an uneconomic level and they are considering whether or not their single factory should be closed down until the trade recession has passed.

A market research consultant has advised that in about twelve months' time there is every indication that sales will increase to about 75% of normal capacity and that the revenue to be produced from sales in the second year will amount to ` 90,000. The present revenue from sales at 50% capacity would amount to only ` 49,500 for a complete year.

If the directors decide to close down the factory for the year, it is estimated that:

(a) The present fixed costs would be reduced to ` 11,000 a year.

(b) Closing down costs (redundancy payments etc.) would amount to ` 7,500.

(c) Necessary maintenance of plant would cost ` 1,000 p.a.

(d) On reopening the factory the cost of overhauling plant, training and engagement of new personnel would amount to ` 4,000.

Prepare a statement for the directors presenting in such a way as to indicate whether or not it is desirable to close the factory.

Solution:

STATEMENT OF PROFIT AND LOSS

Production Capacity	Zero %	50%	75%
Sales	–	49,500	90,000
Less : Marginal Costs	–	40,500(1)	60,750 (2)
Contribution	–	9,000	29,250
Less: Fixed Costs	11,000	19,000(1)	19,000 (1)
Specific Costs (` 7,500 + ` 1,000 + ` 4,000)	12,500		
Profit/ (–) Loss	(–) 23,500	(–) 10,000	10,250

From the above it is clear that the amount of loss can be reduced by ` 13,500 (i.e. ` 23,500 – ` 10,000) if the factory is continued to operate at 50% capacity. There will be profit of ` 10,250 in the second year, so closing down of factory is undesirable.

Working Notes:

(1) Calculation of Variable Costs at 50%

On 60% Total Cost is ` 67,600

On 40% Total Cost is ` 51,400

Difference 20% ` 16,200 (Variable)

∴ on 40% Variable Costs = ` 16,200 × 2 = ` 32,400

∴ Fixed Cost = (` 51,400 – ` 32,400) = ` 19,000

Variable Costs at 50% = Variable Costs at 40% + Variable Costs at 10%

= ` 32,400 + ` 8,100 = ? 40,500

(2) Calculation of Variable Cost at 75%

On	80%	Total Cost	83,800
On	60%	" "	67,600
Difference	20%		16,200 Variable
For	15%		`12,150 $\left(\text{i.e.,}\frac{`16,200}{20}\times 15\right)$

∴ Variable Cost at 75% = Variale Cost at 60% + Variable Cost at 15%

= `16,200 × 3 + `12,150 = `48,600 + `12,150 = `60,750

Problem No. 2

M/s Naveen Ltd. Is operating at 50% of its normal capacity. It is expecting a drop in present volume of sals of 10,000 units per month. The income statement of monthly sales shows the following position :

Particulars	Rs.
Sales (10,000 units @ Rs. 5 per unit)	50,000
Less : Variable costs	37,500
Contribution	12,500
Less : Fixed costs	12,500
Profit	Nill

It is proposed that the company should suspend production until market conditions improve. The president estimates that a minimum fixed cost (shut down cost) amounting to Rs. 2,500 will be necessary in any event.

As Management Accountant at which level of sales you would recommend the suspension of production, if the selling price comes down to Rs. 4.55.

Solution :

Avoidable fixed costs = Total fixed costs – Unavoidable fixed costs

= Rs. 12,500 – 2,500

= Rs. 10,000

Contribution per unit (on new price) = Rs. 4.55 – 3.75)

= Rs. 0.80

Shut down point in units = Rs. 10,000 = 12,500 units

Shut down point of sales 12,500 × Rs. 4.45.

= Rs. 55,625

Recommendation

The plant should be shut down or suspend its operations only if its sales revenue falls below 12,500 units or Rs. 55,625 (wen selling price per unit is Rs. 4.55).

Problem No. 3

M/s. Rahul sugars Ltd. Has daily avoidable expenses of Rs. 2,000. Other particulars are :

Selling price per ton of Sugar	Rs. 2,000
Variable cost per ton	Rs. 1,150
Excise duty @ 20 % of selling price	
Packing and delivery cost per ton	Rs. 50

Sugar cane is bought form Local Farmers @ Rs. 115 per ton which control NS 10% sucrose.

From the above details compute the point of closure of the mill for the off season.

Solution :

i) Ascertainment of sugarcane required for production of one ton sugar :

Sucrose contents is 10 %

- 10 tons of Sugar cane is required per ton of sugar
- Cost of sugar cane per ton is Rs. 115
- Cost of 10 tons of sugar cane is Rs. 1,150 (given above)
- Cost of sugar cane required per ton of sugar is Rs. 1,150.

Calculation of contribution per ton of sugar cane :

Selling price per ton of sugar Rs. 2,000		
Less : (1) Excise duty @ 20% of sales	Rs. 400	
ii) Packaging & delivery charges	Rs. 50	450
Net price realizable per ton Rs.	1,550	
Less : Variable costs	150	1,150
Contribution per ton of sugar		Rs. 400

Contribution per ton of Sugar Cane = Rs. 400 = Rs. 40

10 tons

Shut down point = Available costs = Rs. 2,000 = 50 tons

Contribution per ton of sugar cane = Rs. 40

Recommendation.

When supply of sugar cane will be less than 50 tons per day, the mill should be closed for off-season.

4.5 LEVEL OF ACTIVITY PLANNING

In the contest of profit maximization, management of a concern operating at less than the installed capacity, has to face the problem of planning the level of activity. It is a known fact that the impact of fixed cost per unit will be higher at lower levels or production. A concern producing goods on a small scale cannot take advantage of the economics of scale unless it expands itself and produces on large scale. It is also true that a concern has to increase its output and sell a larger quantity by lowering the price.

When a concern is not working to its full capacity, decision with regard to the level it should operate becomes relevant for the following reasons,

1. Increased capacity utilization resulting in increased output results in lower fixed cost per unit, since the same amount of total fixed cost gets spread over a large number of units.
2. It is possible to take advantage of economics of sale by increasing the capacity utilization.
3. Bulk purchases of materials results in lower purchase cost due to quantity discount allowed by the supplier.
4. If the level of activity is much more than which should be fixed cost may increase in step-like fashion.
5. To cope with the increased level of activity, the concern may have to hire skilled labour by paying a higher wage.

Problem No. 1

A company is at present working at 90% of its capacity and produces 13,500 units per annum. It operates a flexible budgetary control system. The following figures are obtained from its budget :

Particulars	At 90% 13,500 units Rs.	At 100% 15,000 units Rs.
Sales	15,00,000	16,00,000
Fixed expenses	3,00,500	3,00,600
Semi-variable expenses	97,500	1,00,000
Variable expenses :		
(Other than material and labour)	1,45,000	1,49,000

Labour and material cost per unit remain the same under present conditions. Profit margin has been 10% on sales (I) You are required to determine the differential cost of producing 1.500 units by increasing capacity to 100% (ii) What price would you suggest for an export of these 1,500 units, taking into account that the overseas prices are lower than those of the home market ?

Solution :

Ascertainment of material and labour cost using the available particulars.

Particulars	At 90 %	At 100 %
Fixed expenses	3,00,000	3,00,000
Semi-Variable expenses	97,500	1,00,500
Variable overheads	1,45,000	1,49,500
Direct materials & labour (Balancing figure)	8,07,000	8,89,500
Marginal cost	13,50,000	14,40,000
Profit	1,50,000	1,60,000
Sales	**15,00,000**	**16,00,000**

i) Differential cost statement (for 1,500 units)

Particulars	Cost at 90% (13,500 units)	Cost at 100% (13,500 units)	Differential cost (1,500 units)
	Rs.	Rs.	Rs.
Direct martial	8,07,000	8,89,500	82,500
Labour			
Variable overheads	1,45,000	1,49,500	4,500
Semi-variable expenses	97,500	1,00,500	3,000
Fixed costs Irrelevant here	10,49,500	11,39,500	90,000

ii) Export Price

Incremental costs = Rs. 90,000

(+) Profit (10 % of sales) = Rs. 10,000

Price to be quoted = Rs. 1,00,000

Since overseas prices are less than domestic prices any price over Rs. 90,000 (for 1,500 units) is profitable and floor price (Bread-even) will be Rs. 90,000 or Rs. 60 per unit.

4.6 BREAK-EVEN ANALYSIS

The success of a business is measured in terms of the profit. The profit of any firm depends on three elements namely

a) Cost of production

b) Selling price

c) Volume of sales

These three factors are interdependent. Cost determines the selling price. The selling price affects the volume of sales. The volume of sales influences the volume of production. This volume of production in turn affects the cost. Thus, an analysis of relationship between cost, volume and profits helps the management for profit planning.

The study of cost-volume-profit analysis is popularly known as break-even analysis. It is an extension of marginal costing principles. The cost-volume-profit (CVP) analysis is a management accounting tool to show the relationship between these ingredients of profit planning.

Break-even Analysis is used in two senses namely narrow and broad sense. In a narrow sense it means finding break-even point i.e., No profit or no loss point. At break-even point total sales are equal to total costs. Thus, there is neither profit nor loss. In a broad sense Break-even Analysis refers the relationship between costs, volume and profit at different levels of sales or operations.

According to Matz, Curry and Frant a break-even analysis indicates the level at which cost and revenue are in equilibrium.

Assumptions of Break-even Analysis

The break-even analysis is based on the following assumptions :

1. All elements of cost i.e., production, administration, selling and distribution can be segregated into fixed and variable.
2. Costs and revenues are influenced only by volume.
3. Selling price per unit remains unchanged or constant at all levels of output.
4. Variable cost per unit is constant where as total variable costs varies in proportion to production.
5. Total fixed cost remains constant.

6. There is synchronization between production and sales.
7. Productivity per worker remains mostly unchanged.
8. There will be no change in operating efficiency.
9. There will be no change in the general price level.
10. The state of technology, methods of production and efficiency remain unchanged.
11. The analysis related to one product only or constant product mix.
12. Costs and revenues are linear over the range of activity under consideration.

Advantages of Break-even Analysis

The following are the advantages of break-even analysis :

1. It helps to determine the break-even point.
2. It helps in determining the selling price which will give the desired profit.
3. It helps to determine the most profitable mix.
4. It helps in the determination of comparative profitability of each product line.
5. It helps in determining costs and revenue at various levels of output.
6. It helps to study the effect of price change in different markets.
7. It assists the management in decision making.
8. It shows the impact of increase or decrease of fixed and variable costs on profits.
9. It offers suggestions for shift in sales unit.

Break - Even Analysis - Management accountant

Break-even analysis is useful to the management accountant in the following respects

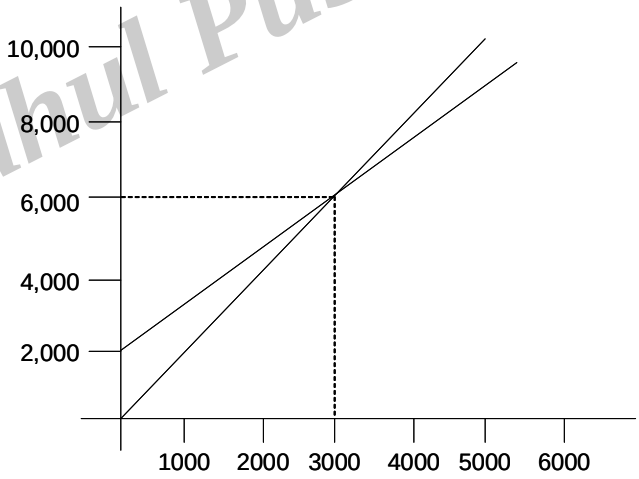
1. Break-even analysis helps the management in forecasting the profit fairly and accurately.
2. It helps the management accountant in preparing flexible budgets.

3. It helps the management accountant in formulating price policy.
4. It assists the management accountant in performance evaluation fro the purpose of management control.
5. It helps the management accountant in determining the amount of overhead cost to be charged at various levels of operations since, overhead rates are generally predetermined on the basis of a selected volume of production.

4.6.1 Applications of BEP for various business problems

1. Make or Buy Decision

Every business process need planning to select, plan, analyze and reengineering and it is essence of operating management. One of the commonly used quantitative method in process selection is break-even-analysis. This helps in identifying what volume of sales and production can make a profit. Process planning involve major issues such as make or buy decision. This make or buy decision refer to a decision such as which components is purchased and which components is manufactured. Management is usually confronted with the problem of decision of make or buy of any item. This problem can be solve by a large extent through break-even chart.



2. Pricing Decision

Break-even point is valuable analytical tool to recognize and interpret its results. For management it is useful in pricing determination, expenses control and profitability forecast.

Changing the price of a product would change the total revenue function of the business and this would affect the break-even point and the margin of safety. These factors need to be considered along with market-based factors such as the demand for the product.

3. Sales Mix Decisions

Altering the sales mix in a multi-product environment would tend to alter the total revenue function of the business and also the variable cost function (and hence the total cost function). This would affect the break-even point and margin of safety but by explaining the effects of different sales mixes it is possible to consider their effect on the profitability of the business and this will facilitate decisions regarding the sales mix.

4. Production Capacity Planning

We have seen that the cost and revenue relationship do not apply indefinitely but only within the relevant range. As activity is expanded it will eventually be constrained by shortage of one of the factors of production (example, machine hours, factory space or skilled labour) and this factor is known as the limiting factor. While this limitation can be overcome in the long term, in the short term maximum profits can be made by maximizing the contribution per unit of the limiting factor.

The limiting factor is the major constraint on organizational activity. Here we will merely state that C.V.P. analysis can facilitate an understanding of the effect upon profit of the limiting factor.

PROBLEMS ON CHANGE IN SALES PRICE

Problem No. 1

Hansa Ltd. manufacturing a single product is facing severe competition in selling it at ` 50 per unit. The company is operating at 60% level of activity, at which level sales are ` 12,00,000. Variable costs are ` 30 per unit. Semi-variable costs may be considered as fixed at ` 90,000 when output is nil and the variable element is ` 250 for each additional 1% level of activity. Fixed costs are ` 1,50,000 at the present level of activity, but if a level of activity of 80% or above is reached, these costs are expected to increase by ` 50,000.

To cope with the competition, the management of the company is considering a proposal to reduce the selling price by 5%. You are required to prepare a statement showing the operating profit at levels of activity of 60%, 70%, 80% and assuming that:

(a) The selling price remains at `50; and

(b) The selling price is reduced by 5%.

Show also the number of units which will be required to be sold to maintain the present profits if the company decided to reduce the selling price of the product by 5%.

Solution :

Statement Showing Operating Profit

(a) When Selling Price is ` 50 per unit

Particulars	Production Capacity		
	60%	70%	80%
Output in units	24,000	28,000	32,000
	`	`	`
Sales @ ` 50 per unit	12,00,000	14,00,000	16,00,000
Less : Variable Cost @ ` 30 per unit + Variable	7,20,000	8,40,000	9,60,000
part of semi-variable expenditure			
@ ` 250 for each 1% of activity	15,000	17,500	20,000
Contribution	4,65,000	5,42,500	6,20,000
Less: Fixed Overheads	1,50,000	1,50,000	2,00,000
+ Fixed part of semi-variable expenditure	90,000	90,000	90,000.
Profit	2,25,000	3,02,500	3,30,000

(b) When Selling Price is f 47.50 i.e. 5% less than f 50

Particulars	Production Capacity		
	60%	70%	80%
Output in units	24,000	28,000	32,000
	`	`	`
Sales @ ` 47.50 per unit	11,40,000	13,30,000	15,20,000
Less : Variable Cost @ ` 30 per unit + Variable	7,20,000	8,40,000	9,60,000
part of semi-variable expenditure @			
` 250 for each 1% of activity	15,000	17,500	20,000-
Contribution	4,05,000	4,72,500	5,40,000
Less: Fixed Overheads	1,50,000	1,50,000	2,00,000
+ Fixed part of semi-variable expenditure	90,000	90,000	90,000 .
Profit	1,65,000	2,32,500	2,50,000

The sales volume required at selling price of ` 47.50 to maintain existing profit of ` 2,25,000 (earned at 60% capacity when selling price is ` 50) is calculated as follows:

$$\frac{\text{Fixed Cost} + \text{Profit}}{\text{P/V Ratio}} = \frac{` 2,40,000 + ` 2,25,000}{0.3553} = ` 13,08,889.$$

$$\text{Number of units required to be sold} = \frac{\text{Sales}}{\text{Selling price per unit}}$$

$$= \frac{` 13,08,889}{` 47.50} = 27,556 \text{ units.}$$

P/V Ratio is calculated as follows:

$$\text{P/V Ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

Contribution at 60% capacity when selling price is ` 47.50 = ` 4,50,000

Sales at 60% capafity when selling price is ` 47.50 = ` 11,40,000

$$\text{P/V Ratio} = \frac{` 4,05,000}{` 11,40,000} = \frac{27}{76} = 0.35573$$

Problem No. 2

The revenue account of Goodwill Co. Ltd. has been summarised as shown below:

Particulars	`	`
Sales		60,00,000
Direct Materials	18,00,000	
Direct Wages	12,00,000	
Variable Overheads	4,80,000	
Fixed Overheads	17,20,000	52,00,000
Profit		8,00,000

The licensed capacity of the company is ` 80,00,000 but the key factor is sales demand. It is proposed by the management that in order to utilise the existing capacity, the selling price of the product should be reduced by 5%.

You are required to prepare a forecast statement showing the effect of the proposed reduction in selling price after taking into account the following changes in costs :

(i) Sales forecast ` 76,00,000 (at reduced prices).

(ii) Direct wages rates and variable overheads are expected to increase by 5%.

(iii) Direct material prices are expected to increase by 2%.

(iv) Fixed overheads will increase by ` 80,000.

Solution :

GOODWILL CO. LTD.

Forecast Statement Showing the Effect of Change in Selling Price and Costs

	`	`
Sales at full licensed capacity		80,00,000
Less : 5% Reduction in Selling Price ` 80,00,000 $\times \frac{5}{100}$		4,00,000
Sales Forecast		76,00,000
Less : Direct Materials	` 24,48,000 (2)	
Direct Wages	` 16,80,000 (3)	
Variable Overheads	` 6,72,000 (4)	
Marginal Cost		48,00,000
Contribution		28,00,000
Less : Fixed Overheads (5)		18,00,000
Estimated Profit		10,00,000

Working Notes :

(1) The sales volume has increased by $33\frac{1}{3}$ %. It is calculated as follows :

Particulars	`
Sales forecast at old prices	80,00,000
Less : Last year's sales	60,00,000
Increase in sales volume as compared to last year	20,00,000

$$\% \text{ increase in sales volume} = \frac{` 20,00,000}{` 60,00,000}$$

Thus production is expected to increase by $33\frac{1}{3}\%$ because sale volume is increased by this percentage.

Consequently, variable expenses will also increase by $33\frac{1}{3}\%$ if there is no change in prices.

(2) Direct Material Costs :

	`
Last year	18,00,000
Add : $33\frac{1}{3}\%$ increase in production	6,00,000
	24,00,000
Add : 2% of ` 24,00,000 for increase in price of materials	48,000
	24,48,000
(3) Direct Wages : Last year	12,00,000
Add : $33\frac{1}{3}\%$ increase due to increase in production	4,00,000
	16,00,000
Add : 5% of ` 16,00,000 due to increase in labour rates	80,000
	16,80,000
(4) Variable Overheads Last year	4,80,000
Add : $33\frac{1}{3}\%$ increase in production	1,60,000
	6,40,000
Add : 5% increase in rates	32,000
	6,72,000
(5) Fixed Overheads : ` Last year	17,20,000
Add : Increase	80,000
	18,00,000

4.7 INTERFIRM COMPARISON

Interfirm comparison is a technique, which studies the performances, efficiencies, costs, and profits of various concerns in an industry with the help of exchange of information in order to have a relative comparison. It involves the process by bringing together a number of identical firms and collecting their business figures and statistics through a neutral organization in which the participating firms repose their full confidence.

The figures under comparison may relate to :

1. Financial results viz., the position of assets, liabilities, profit, capital employed, etc., expressed in terms of financial ratios.
2. Cost structure of the products viz., material cost, labour cost, overhead, etc., expressed in terms of cost ratios.
3. Physical and operational performance such as output or operation per man-hour, expressed in terms of productivity ratios, percentages, and so on.

4.7.1 Need for Interfirm Comparison

Progressive management, the world over has always asked itself the question – how is my company performing in comparison to that of others ? The published trading and profit and loss accounts and the balance sheets along with the annual reports provide scanty data for purposeful study and assessment of the performance of a company.

The figures from these reports just indicate, in a general way, the profitability, stability, solvency and growth of an organization, but they do not throw light on whether a company has really made the optimum use of all the available resources in men, materials, etc. It is the interfirm comparison that provides the management with a vivid comparative picture of how its operating performance, financial results and product cost structure compare with those of other firms of similar size, nature, industry or trade.

4.7.2 Requirement (prerequisites) of an Interfirm Comparison Scheme

The following are the main requirements while installing a scheme of interfirm comparison.

1. **Adoption of uniform costing :** There must be a sound system of uniform costing in the firm where interfirm comparison scheme is to be implemented. A uniform manual should also be prepared and distributed among the member units to enable the function of the system efficiently.

2. **Organization responsible :** An organization must be established to run the system efficiently and for better results firms of different sizes in an industry should become member of the organization.

3. **Information to be collected :** The nature of information to be collected from the participating firms depends upon the needs of the management, comparative importance of the information and the efficiency of the central body responsible for the collection of the information.

4. **Method of collection and presentation of information :** The time and the form in which the information is to be submitted by the member units must be decided in advance. The various statistical tools for the purpose of collection of data, it's editing, classification, presentation, drawing conclusions and inferences can be used. Ratio analysis for measuring profitability, efficiency and productivity, e., can also be used.

4.7.3 Types of Comparisons

The following are the three types of comparisons made for this purpose :

1. **Comparison of management ratios :** The Management ratios are those, which are linked to sales, profits, and assets of a business. These ratios are meant to provide management in a nutshell, with a comparative picture of its operating performance.

2. **Comparison of cost ratios :** Management may not be satisfied with the ratios calculated in :

They would like to go a step further to make interfirm comparison more meaningful and to find out how they are doing in relation to others as regards the cost of production.

3. **Comparison of technical data :** This type of comparison will be of special interest to industries working in highly competitive economics. It is visualized that technical comparison will be in the realm of quality of materials used, their utilization, process involved, machinery used and certain other technical aspects of production.

The following are the main ratios, which are calculated for this purpose :

1. $\frac{\text{Quantity of raw material consumed}}{\text{Man hours / machine hours}}$

2. $\frac{\text{Cost of raw material consumed}}{\text{Man hours / machine hours}}$

3. $\frac{\text{Cost of raw material consumed}}{\text{Man hours / machine hours}}$

4. $\frac{\text{Cost of scrap}}{\text{Cost of raw material consumed}}$

5. $\frac{\text{Quantity of scrap}}{\text{Quantity of raw materials consumed}}$

6. $\frac{\text{Quantity produced}}{\text{Rated capacity}}$

7. $\frac{\text{Quantity produced}}{\text{Man hours / machine hours}}$

8. $\frac{\text{Cost of rejected material}}{\text{Cost of production}}$

9. $\frac{\text{Cost of reworking}}{\text{Cost of production}}$

10. $\frac{\text{Loss on process}}{\text{Cost of material}}$

11. $\frac{\text{Idle time hours}}{\text{Total available time}}$

12. $\frac{\text{Over time hours}}{\text{Man hours}}$

13. $\frac{\text{Cost of idle time}}{\text{Direct labour cost}}$

14. $\frac{\text{Cost of over time}}{\text{Direct labour cost}}$

15. $\frac{\text{Power units consumed}}{\text{Machine hours}}$

16. $\frac{\text{Total cost of production}}{\text{Man hours / machine hours}}$

17. $\frac{\text{Cost of machine maintenance}}{\text{Cost of production}}$

18. $\frac{\text{Cost of maintenance of other factory assets}}{\text{Cost of production}}$

4.7.4 Advantages of Inter Firm Comparison

Interfirm comparison is nothing more than learning. It is for the management that interfirm comparison has been evolved as a technique in industry.

The following are the main advantages of Interfirm comparison :

1. It encourages managerial efficiency in the organization by pointing out the spots of inefficiencies and thus brings stability in the cost structure and presentation of information.
2. It creates cost consciousness among the participating firms and they are cautious in this respect at all levels of management.
3. It helps the member firms to reduce their costs in case their costs are more as compared to other firms.
4. It increases the productivity by locating the weaknesses and in economics.
5. It provides useful information to management of every member unit to make proper decisions.
6. It helps the government, regulatory agencies and researchers in getting useful data and information to improve policies and conducting depth studies and research.

PROBLEMS

Problem No. 1

M/s. Ramkrishna LTD. has an installed capacity of 1,00,000 units of Creases in a month. The market survey reveals the following relationship between output and prices.

Volume of output	Selling price per unit Rs.
50 %	1.00
60 %	0.97
70 %	0.95
80 %	0.91
90 %	0.86
100 %	0.80

The company's variable cost per unit is 60 paise and fixed costs per month are Rs. 20,000.

At what level of production and sale, the company should operate ?

Solution :

Statement showing incremental Revenue and different cost at various levels of operation.

Level of ratio	Output (erasers)	Variable cost	Fixed cost	Total cost	Differential cost	Sales	Incremental revenue
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
50%	50,000	30,000	20,000	50,000	–	50,000	–
60%	60,000	36,000	20,000	56,000	6,000	58,200	8,200
70%	70,000	42,000	20,000	62,000	6,000	66,500	8,300
80%	80,000	48,000	20,000	68,000	6,000	72,800	6,300
90%	90,000	54,000	20,000	74,000	6,000	77,400	4,600
100%	1,00,000	60,000	20,000	80,000	6,000	80,000	2,600

Explanation of column values :

Column :

1. Given in the problem
2. Installed capacity multiplied by percentage i.e. 50% of 1,00,000 etc.
3. Column 2 multiplied by 60 paise, i.e., 50,000 X 60 paise = Rs. 30,000 etc.
4. Given in the problem
5. Values of column 3 + 4
6. Total cost at (higher % less lowered %) 60% minus total cost at 50% i.e,

   Rs. 56, 000 – 50,000 .

   Rs. 62,000 – 56,000 and so on
7. Output at the % age multiplied by corresponding selling price per unit.
8. Sales at Higher percentage less immediate next percent, e.g., 60% sales 50% sales i.e. Rs.58,200 – 50,000 = 8,200 etc.

Problem No. 2

Modern Sewing Machines Co. Manufacturing hand operated machines in batches of 60,000. Prepares a schedule showing the total different costs and increments in Revenue from the following data. At what volume the company should set its level of production ?

Output (No. in lakhs)	Selling price Per machine	Total semi-fixed cost (Rs. In lakhs)	Total variable cost (Rs. In lakhs)	Total fixed cost (Rs. In lakhs)
0.60	240	30	83.6	28.4
1.20	220	30	163.6	28.4
1.80	200	34	255.6	28.4
2.40	180	34	255.6	28.4
3.00	160	40	355.6	28.4
3.60	140	40	380.4	28.4

Solution :

Output (No. in lakhs)	Revenue (Rs. In lakhs)	Incremental Revenue (Rs. In lakhs)	Total costs (Rs. In lakhs)	Differential (Rs. In lakhs)
0.60	144		142.0	–
1.20	264	120	222.0	80.0
1.80	360	96	318.0	96.0
2.40	432	72	378.0	60.0
3.00	480	48	424.0	46.0
3.60	504	24	448.8	24.8

Observation and Recommendation

If we carefully observe, incremental revenue is higher than differential costs upto the output level of 3,00,000. Therefore, the level of production should be set at 3,00,000 machines and the selling price per unit at Rs. 160.

Problem No. 3

The following particulars are extracted from the records of Ellora sales LTD.

Particulars	Product A	Product B
Sales per unit	Rs. 100	Rs. 120
Consumption of material	2 Kg.	3 Kg.
Material cost	Rs. 10	Rs. 15
Direct wage cost	Rs. 15	Rs. 10
Direct expenses	Rs. 5	Rs. 6
Machine hours used	3	2
Over head expenses		
Fixed	Rs. 5	Rs. 10
Variable	Rs. 15	Rs. 20

Direct wage per hour is Rs. 5

a) Comment on the profitability of each product (both use the same material) when

i) Total sales potential in units is limited :

ii) Total sales potential in value is limited :

iii) Raw material is in short supply; and

iv) Production capacity (in terms of machine hours) is the limiting actor.

b) Assuming raw material as the key factor, availability of which is 10,000 kg. And maximum sales potential of each product being 3,500 units, find out the product mix which will yield the maximum profit.

Solution :

Marginal Cost Statement

Particulars	Per unit of	
	(A) Rs.	(B) Rs.
Selling price (A)	100	120
Direct materials	10	15
Direct wages	15	10
Direct Expenses	5	6
Variable overhead	15	20
Marginal Cost (b)	45	51
Contribution margin (A) – (B)	55	69
Contribution / Sales or P/V ratio	55%	57.5%
Contribution per Kg of material	27.5	23
Contribution per machine hour	18.3	34.5

a) Comments on the profitability of each product :

i) When total sales potential in units is a limiting factor, B is more profitable as it is making a larger contribution margin per unit as compared to A.

ii) When total sales potential in value is a limiting factor, B itself is more profitable as it contribution/sales or P/V Ratio is more than that of A.

iii) When raw material is in short supply. A is more profitable as its contribution per kg. Of material is more that of product 'B'.

iv) When production capacity is limited, b is more profitable as it makes larger contribution per machine hour than A.

b) When raw material is a key factor. A is more profitable to produce as its contribution per kg. Of material is higher than B. If 3,500 units of A are manufactured, total material consumption will be 7,000 kg. (i.e., 3,500 / 2 Kg.) the balance 3,000 kg. of material can be used to manufacture 1000 kgs. (3,000 kg/3kg) of B. The total profit by this product mix will be profit from.

PRODUCT - A

Sales	**Per unit (Rs.)**
Sales	100
(–) Variable cost	45
Contribution	55
(–) Fixed cost	5
Profit	50

Profit from 3,500 units @ Rs. 50 per unit = Rs. 1,75,000

Product - B	**Per unit (Rs.)**
Sales	120
(–) Variable	51
Contribution	69
(–) Fixed Cost	10
Profit	59

Profit from 1,000 units @ Rs. 59 Per unit = 59,000

Total Profit = Rs. 1,75,000 + 59,000 = 2,34,000.

Note

In the case absence of any information about the base used for utilising the fixed cost, the fixed cost per unit has been taken as given. Normally fixed costs is deducted from contribution in total, and not from unit contribution.

Problem No. 4

M/s. Mini Toy Limited receives an offer from a large mail order house for 10,000 toy trains at Rs. 15 each. There has to be a slight modification in the design so as to differentiate it from the same product sold to regular customer, but it will not affect the direct product costs.

The company expects to incur its regular unit variable costs, and in addition, it must absorb Rs. 10,000 as the cost of freight to the customer's central godown.

The Company's previous year's cost data are given below :

Production and sales		35,000 Tonnes
		Per train
		Rs.
Selling price		20.00
Less : costs		
Materials	Rs. 4	
Labour	Rs. 4	
Overheads (60% fixed)	Rs. 10	
		18.00
Profit		Rs. 2,00

The management has almost decided to turn the offer, saying that the price offered is less than cost per unit, but before writing to the customer, the management requests your advise.

Advise the management in this matter.

Solution :

The problem can be worked out by applying the marginal costing technique.

		Rs.
Special offer price per unit :		15
Less : Variable cost –		
Materials	Rs. 4	
Labour	Rs. 4	
Overheads (40 %) of Rs. 10)	Rs. 4	12
Contribution per unit	Rs.	3

Total contribution on 10,000 trains	
@ Rs. 3 per train	Rs. 30,000
Less : Additional freight charges	Rs. 10,000
Net profit (because fixed costs and	Rs. 20,000
Already covered from market)	

The problem can also be solved by applying differential cost analysis technique, as shown below :

From the above it can be seen that by accepting the special offer the company can get an additional profit of Rs.20,000. This is because, fixed costs are already covered from regular sales revenues, however, freight changes i.e. Rs. 10,000 which are borne by the company have to be deducted from additional contribution of Rs. 30,000.

Recommendation

The offer brings an additional profit of Rs. 20,000 to the firm and therefore, should be accepted.

Short Question and Answers

Q1. Selection of a Suitable Product Mix

Ans :

When a factory manufacturers more than one product, a problem is faced by the management as to which product mix will give the maximum profits. The best product mix is that which yields the maximum contribution.

- The best product mix is that which yields the maximum contribution.
- The products which give the maximum contribution are to be retained and their production should be increased.
- The products which give comparatively less contribution should be reduced or closed down altogether.
- The effect of sales mix can also be seen by comparing the P/V ratio and breakeven point.
- The new sales mix will be favorable if it increases the P/V ratio and reduces the breakeven point.

Q2. Desired Level of Profits

Ans :

The organisational management has to take the decisions about the maintenance of desired lever of profits. It is necessary for a firm to maintain optimum profits for maintaining its high performance. The decisions that are involved in this area of management for earning high profits are as follows,

i) Increasing the sales volume by decreasing the selling price and

ii) Increasing the selling price if the P/V ratio is low.

Marginal costing technique guide's the management in taking the decisions about the maintenance of desired profits. The relative profitability of the products can be determined with the help of P/V ratio. The firm should increase the production of the product whose P/V ratio is high.

Q3. Diversification of Products

Ans :

Sometimes it becomes necessary for a concern to introduce a new product to the existing product or products in order to utilize the idle capacity or to capture a new market or for other purposes. General fixed costs will however, be charged to the old product/products.

- In order to decide about the profitability of the new product, it is assumed that the manufacture of the new product will not increase fixed costs of the concern.
- If the price realized from the sale of such product is more than its variable cost of production it is worth trying.
- If the data is presented under absorption costing method, the decision will be wrong.
- If with the introduction of new product, there is an increase in the fixed costs, then such specific increase in fixed costs must be deducted from the contribution for making any decision.
- General fixed costs will be charged to the old product/products.

Q4. Assumptions of Break-even Analysis

Ans :

The break-even analysis is based on the following assumptions :

1. All elements of cost i.e., production, administration, selling and distribution can be segregated into fixed and variable.
2. Costs and revenues are influenced only by volume.
3. Selling price per unit remains unchanged or constant at all levels of output.
4. Variable cost per unit is constant where as total variable costs varies in proportion to production.
5. Total fixed cost remains constant.
6. There is synchronization between production and sales.
7. Productivity per worker remains mostly unchanged.

8. There will be no change in operating efficiency.
9. There will be no change in the general price level.
10. The state of technology, methods of production and efficiency remain unchanged.
11. The analysis related to one product only or constant product mix.
12. Costs and revenues are linear over the range of activity under consideration.

Q5. Interfirm Comparison

Ans :

Interfirm comparison is a technique, which studies the performances, efficiencies, costs, and profits of various concerns in an industry with the help of exchange of information in order to have a relative comparison. It involves the process by bringing together a number of identical firms and collecting their business figures and statistics through a neutral organization in which the participating firms repose their full confidence.

The figures under comparison may relate to :

1. Financial results viz., the position of assets, liabilities, profit, capital employed, etc., expressed in terms of financial ratios.
2. Cost structure of the products viz., material cost, labour cost, overhead, etc., expressed in terms of cost ratios.
3. Physical and operational performance such as output or operation per man-hour, expressed in terms of productivity ratios, percentages, and so on.

UNIT V

Budgetary Control: Budget, budgetary control, steps in budgetary control, Flexible budget, different types of budgets: sales budget, Cash budget, Production budget, Performance budgets, Zero Based Budgeting; An introduction to cost audit and management audit.

Standard Costing: Standard Cost and Standard Costing, Standard costing Vs Budgetary control, Standard costing Vs estimated cost, Standard costing and Marginal costing, analysis of variance, Material variance, Labor variance and Sales variance.

5.1 BUDGET

Every one is familiar with the idea of a budget because it is essential in every walk of our life national, domestic and business. A budget is prepared to have effective utilization of funds and for the realization of objectives as efficiently as possible. Budgeting is a powerful tool to the management for performing its functions (i.e., formulating plans, coordinating activities and controlling operations etc.) efficiently. The Chartered Institute of Management Accountants, England, defines a budget as under.

"A plain quantified in monetary terms prepared and approved prior to a defined period of time usually showing planned income to be generated and /or expenditure to be incurred during that period and the capital to be employed to attain a given objective".

An analysis of this definition reveals the following essentials of a budget :

- It is a plan expressed in monetary terms but it can also contain physical units.
- It is prepared prior to a defined period of time (budget period) during which it will operate.
- It is related to a definite future period.
- It is approved by the management for implementation.
- It usually shows the planned income to be generated and expenditure to be incurred.
- It also shows capital to be employed during the period and
- It is prepared for the purpose of implementing the policy formulated by the management and the objective to be achieved during the period.

Thus, a budget fixes a target in terms of rupees or quantities against which the actual performance is measured. A budget can, therefore, be taken as a document which is closely related to both the management function as well as the accounting function of an organization.

5.1.1 Estimate, Forecast and Budget

An estimate is predetermination of future events either on the basis of simple guess work or following scientific principles. Forecast is an assessment of probable future events. Budget is based on the implications of a forecast and related to planned events. Forecasting proceeds preparation of a budget as it is an essential part of the budgeting process. It is said that the budgetary process is more a test of forecasting skill than anything else.

To establish realistic budgets, it is necessary to forecast a wide range of factors like sales volume, sales prices, material availabilities and prices, wage rates, the cost of overheads etc. It is not sufficient merely to add or deduct a percentage to or from last year's budget ; rather a proper forecasting should be made and after the budget should be prepared. A budget is a detailed statement of forecast resulting from joint action of a number of planned operations conducted with normal efficiency.

Budget Vs Forecast

Budget and forecast both refer to the anticipated actions and events in a specified future period but still there are wide differences between the two as given below :

Basis of Distinction	Budget	Forecast
Events	It relates to planned events i.e. the policy and programme to be followed in a future period under planned conditions.	It is concerned with probable events likely to happen anticipated conditions during a specified period of time.
Period	It is usually planned separately for each accounting period.	It may cover a long period or years.
Coverage	It (refer budget) comprises the whole business unit. Sectional budgets are coordinated into a logical whole.	It may cover a limited function or activity of business as sales forecast.
Control	Budget is a tool of control as it represents actions which can be shaped according to will be suit conditions which may or may not happen.	It does not connote any sense of control as forecast is merely a statement of future events.
The process	The process of budget starts where forecast ends and Converts it not a budget.	The function of forecast ends with the forecast of likely events.
Spheres	It is made in respect of those spheres which are related to business or industry.	It is made in several other spheres which may not be connected with the budgeting process.

5.1.2 Characteristics of Good Budgeting

1. A good budgeting system should involve persons at different levels while preparing the budgets. The subordinates should not feel any imposition on them.
2. There should be a proper fixation of authority and responsibility. The delegation of authority should be done in a proper way.
3. The targets of the budgets should be realistic, if the targets are difficult to be achieved then they will not enthuse the persons concerned.
4. A good system of accounting is also essential to make the budgeting successful.
5. The budgeting system should have a whole-hearted support of the top management.
6. The employees should be imparted budgeting education. There should be meetings and discussions and the targets should be explained to the employees concerned.
7. A proper reporting system should be introduced, the actual results should be promptly reported so that performance appraisal is undertaken.

5.2 BUDGETARY CONTROL

Budgetary control is applied to a system of management and accounting control by which all operations and output are forecasted as far ahead as possible and actual results when known are compared with budget estimates. CIMA, London defines budgetary control as the establishment of the budgets relating to the responsibilities of executives to the requirements of a policy and the continuous comparison of actual with budgeted result either to secure by individual action the objectives of that policy or to provide a firm basis for its revision.

The essentials of budgetary control that are contained in this definition are :

i) Establishment of budgets for each function and section of the organisation.

ii) Executive responsibility in order to perform the specific tasks so that objectives of the enterprise may be attained.

iii) Continuous comparison of the actual performance with that of the budget so as to know the variations from budget and placing the responsibility of executives for failure to achieve the desired result as given in the budget.

iv) Taking suitable remedial action to achieve the desired objective if these is a variation of the actual performance from the budgeted performance.

v) Revision of budgets in the light of changed circumstances.

Objectives of Budgetary Control

Budgetary control is essential for policy planning and control. It also acts as an instrument of coordination. The main objectives of budgetary control are as follows :

1. To ensure planning for future by setting up various budgets. The requirements and expected performance of the enterprise and anticipated.
2. To coordinate the activities of different departments.
3. To operate various cost centres and departments with efficiency and economy.
4. Elimination of wastes and increase in profitability.
5. To anticipate capital expenditures for future.
6. To centralize the control system
7. Correction of deviations from the established standards.
8. Fixation of responsibility of various individuals in the organisation.

5.2.1 Steps in Budgetary Control

The following are the prerequisites or steps for the successful implementation of a sound system of budgetary control:

(i) Organisation Chart: A concern must have an organisation chart. This is necessary in order to have a clear idea of authority and responsibility of each executive so that there may be no conflict among functional executives for shirking responsibilities and blaming others for poor performance.

(ii) The business objectives, plans and policies should be clearly defined and stated in unambiguous terms. The scope of budgetary control should be clearly laid down.

(iii) The budgeted output should be stated in clear terms,

(iv) The budget or key factor, if any, must be indicated before starting the preparation of budgets.

(v) There must be efficient system of accounting in order to record and provide necessary accounting information to the management for successful system of budgetary control.

(vi) Budget committee should be set up for the establishment and efficient execution of the plan.

(vii) To make budgetary control successful, there should be a proper system of communication and reporting between the various levels of management. A two way system of communication should be adopted. The top management should be able to communicate budgeted plan to the lower levels in clear terms who in turn should feedback by reporting the deviations from the targets to the higher levels. On the basis of feedback, the top management may again communicate instructions to the lower management for taking corrective action.

(viii) Budget centers should be established for cost control and all budgets should be related to cost centers. Budget centers will disclose the sections of the organisation where planned performance is not achieved.

(ix) There should be a budget manual to indicate charter of programme. It contains all details regarding the plan and procedures for its execution. It should also specify the length of the budget period.

(x) To motivate the workers, the budget must be prepared by those who are responsible for its performance.

(xi) The budget should cover all phases.

(xii) Top management approval is necessary in order to get full cooperation and acceptance of the system of budgetary control. The system may fail in future due to disagreements which may arise later on without approval of the top management.

5.2.2 Advantages of Budgetary Control

The budgetary control system helps in fixing the goals for the organisation as a whole and concerted efforts are made for its achievements. It enables economies in the enterprise. Some of the advantages of budgetary control are :

1. **Maximization of Profit :** The budgetary control aims at the maximization of profits of the enterprise. To achieve this aim, a proper planning and coordination of different functions is undertaken. There is a proper control over various capital and revenue expenditures. The resources are put to the best possible use.

2. **Coordination :** The working of different departments and sectors is properly coordinated. The budgets of different departments have a bearing on one another. The coordination of various executives and subordinates is necessary for achieving budgets targets.

3. **Specific Aims :** The plans, policies and goals are decided by the top management. All efforts are put together to reach the common goal of the organisation. Every department is given a target to be achieved. The efforts are directed towards achieving some specific aims. If there is no definite aim then the efforts will be wasted in pursuing different aims.

4. **Tool for Measuring performance :** By providing targets to various department. Budgetary control provides a tool for measuring managerial performance. The budgeted targets are compared to actual results and deviations are determined. The performance of each department is reported to the top management. This system enables the introduction of management by exception.

5. **Economy :** The planning of expenditure will be systematic and there will be economy is spending. The finances will be put to optimum use. The benefits derived for the concern will ultimately extend to industry and then to national economy. The national resources will be used economically and wastage will be eliminated.

6. **Determining Weaknesses :** The deviations in budgeted and actual performance will enable the determination of weak sports. Efforts are concentrated on those aspects where performance is less than the stipulated.

7. **Corrective Action :** The Management will be able to take corrective measures whenever there is a discrepancy in performance. The deviations will be regularly reported so that necessary action is taken at the earliest. In the absence of a budgetary control system the deviations can be determined only at the end of the financial period.

8. **Consciousness :** It creates budget consciousness among the employees. By fixing targets for the employees, they are made conscious of their responsibility. Every body knows what he is expected to de and he continues with his work uninterrupted.

9. **Reduces Costs :** In the present day competitive world budgetary control has a significant role to play. Every businessman tries to reduce the cost of production for increasing sales. He tries to have those combinations of products where profitability is more.

10. **Introduction of Incentive Schemes :** Budgetary control system also enables the introduction of incentive schemes of remuneration. The comparison of budgeted and actual performance will enable the use of such schemes.

5.2.3 Limitations of Budgetary Control

Despite many good points of budgetary control there are some limitations of this system. Some of the limitations are discussed as follows :

1. **Uncertain Future :** The budgets are prepared for the future period. Despite best estimates made for the future, the predictions may not always come true. The future is always uncertain and the situation which is presumed to prevail in future may change. The change in future conditions upsets the budgets which have to be prepared on the basis of certain assumptions. The future uncertainties reduce the utility of budgetary control system.

2. **Budgetary Revisions Required :** Budgets are prepared on the assumptions that certain conditions will prevail. Because of future uncertainties, assumed conditions may not prevail necessitating the revision of budgetary targets. The frequent revision of targets will reduce the value of budgets and revisions involve huge expenditures too.

3. **Discourages Efficient Persons :** Under budgetary control system the targets are given to every person in the organisation. The common tendency of people is to achieve the targets only. There may be some efficient persons who can exceed the targets but they will also feel contented by reaching the targets. So budget may serve as constraints on managerial initiatives.

4. **Problem of Coordination :** The success of budgetary control depends upon the coordination among different departments. The performance of one department affects the results of other departments. To overcome the problem of coordination a Budgetary Officer is needed. Every concern cannot afford at appoint a Budgetary Officer. The lack of coordination among different departments results in poor performance.

5. **Conflict among Different Departments :** Budgetary control may lead to conflicts among functional departments. Every departmental head worries for this department goals without thinking of business goal. Every department tries to get maximum allocations of funds and this raises conflict among different departments.

6. **Depends upon Support of Top Management :** Budgetary control system depends upon the support of top management. The management should be enthusiastic for the success of this system and should given full support for it. If at any time there is a lack of support from top management then this system will collapse.

5.3 FLEXIBLE BUDGET

A flexible budget, or "flex" budget, incorporates different expense levels into the budget, depending upon changes in the amount of actual revenue generated. This approach varies from the more common static budget, which contains nothing but fixed expense amounts that do not vary with actual revenue levels.

Importance of Flexible Budget

1. Flexible budget provides a logical comparison of budgeted allowances with the actual cost i.e., a comparison with like basis.
2. Flexible budget reckons operational realities and streamlines control function and profit planning. It gives balanced perspective on comparison. When flexible budget is prepared, actual cost at actual activity is compared with budgeted cost at actual activity i.e. two things to a like basis.
3. Flexible budget recognizes concept of variability and provides logical comparison of expenditure with actual expenditure as a means of control.
4. With flexible budget, it is possible to establish budgeted cost for any rang of activity.
5. A flexible budget, it is possible to establish budgeted cost for any range of activity.
6. It is helpful in assessing the performance of departmental heads because their performance can be judged in relation to the level of activity attained by the organisation.
7. Cost ascertainment at different levels of activity is possible because a flexible budget is prepared for various levels of activity.
8. It is helpful in price fixation and sending quotations.

To conclude, a flexible budget is more useful, elastic and practical.

5.3.1 Fixed Budget Vs Flexible Budget

The following are the main differences between these budgets :

Point of Distinction	Fixed budget	Flexible Budget
Flexibility	It is inflexible and does not change with the actual volume of output achieved.	It is flexible and can be suitably recasted quickly according to the level of activity attained.
Condition	It assumes that conditions would remain static.	It is designed to change according to changed conditions.
Classification of costs	Costs are not classified according to their variability i.e., fixed, variable	Costs are classified according to the nature of their variability.
Comparison	Comparison of actual and budgeted performance cannot be done correctly if the volume of output differs	Comparisons are realistic as the changed plan figures are placed against actual ones.
Forecasting	It is difficult to forecast accurately the results in it.	It clearly shows the impact of various expenses on the operational aspect of the business.
Budget	Only one budget at a fixed level of activity is prepared due to an unrealistic expectation on the part of the management i.e, all conditions will remain unaltered.	Under it, series of budgets are prepared at different levels of activity.
Ascertainment of costs	It is not possible to ascertain costs correctly if there is a change in circumstances.	Costs can be easily ascertained at different levels of activity under this type of budget.
Tools for cost	It is a limited application and is ineffective as a tool for cost control.	It has more applications and can be used as a tool for effective cost control.
Fixation of prices & sub-mission of tenders.	If the budgeted and actual activity levels vary, the correct ascertainment of costs and fixation of prices becomes difficult.	It helps in fixation of price and submission of tenders due to correct ascertainment of costs.

PROBLEMS ON FLEXIBLE BUDGET

Problem No. 1

The expenses budgeted for production of 10,000 units in a factory are furnished below :

Particulars	Per unit `
Materials	70
Labour	25
Variable Factory Overheads	20
Fixed Factory Overheads (` 1,00,000)	10
Variable Expenses (Direct)	5
Selling Expenses (10% fixed)	13
Distribution Expenses (20% fixed)	7
Administrative Expenses (Fixed – ` 50,000)	5
Total cost of sales per unit	155

You are required to prepare a budget for the production of 6000 units and 8,000 units.

Solution

FLEXIBLE BUDGET

Particulars	Output 6,000 units		Output 8,000 units	
	Per Unit `	Amount `	Per Unit `	Amount `
Variable or Production Expenses :				
Material	70.00	4,20,000	70.00	5,60,000
Labour	25.00	1,50,000	25.00	2,00,000
Direct Variable Expenses	5.00	30,000	5.00	40,000
Prime Cost	100.00	6,00,000	100.00	8,00,000
Factory Overheads :				
Variable Overheads	20.00	1,20,000	20.00	1,60,000
Fixed Overheads	16.67	1,00,000	12.50	1.00,000
Works Cost	136.67	8,20,000	132.50	10,60,000
Administrative Expenses Fixed	8.33	50,000	6.25	50,000
Cost of Production	145.00	8,70,000	138.75	11,10,000
Selling Expenses :				
Fixed 10% off `13	2.17	13,000	1.63	13,000
Variable 90% off `13	11.70	70,200	11.70	93,600
Distribution Expenses :				
Fixed 20% off ` 7	2.33	14,000	1.75	14,000
Variable—80% off ` 7	5.60	33,600	5.60	44,800
Total Cost of Sales	166.80	10,00,800	159.43	12,75,400

Problem No. 2

The monthly budgets for manufacturing overhead of a concern for two levels of activity were as follows :

Capacity	60%	100%
Budgeted Production (units)	600	1,000
	`	`
Wages	1,200	2,000
Consumable Stores	900	1,500
Maintenance	1,100	1,500
Power and Fuel	1,600	2,000
Depreciation	4,000	4,000
Insurance	1,000	1,000
	9,800	12,000

You are required to :

(i) Indicate which of the items are fixed, variable and semi-variable;

(ii) Prepare a budget for 80% capacity; and

(iii) Find the total cost, both fixed and variable, per unit of output at 60%, 80% and 100% capacity.

Solution :

(i) Fixed – Depreciation and insurance.

Variable – Wages at ` 2.00 per unit

Consumable Stores at ` 1.50 per unit Semi-Variable Costs Maintenance = $\frac{`1,500 - `1,100}{400} = \frac{`400}{400}$ = ` 1 per unit variable and f 500 (i.e. ` 1,100 – ` 600) fixed.

Power and fuel = $\frac{` 2,000 - ` 1,600}{400} = \frac{` 400}{400}$ = ` 1 per unit variable and `1,000 (i.e. ` 1,600 – ` 600) fixed.

(ii) Budget for 80% Capacity (output 800 units)

Wages @ ` 2 per unit (800 × 2)	1,600
Consumable stores @ ` 1.50 per unit	1,200
Maintenance : ` 500 + ` 1 per unit for 800 units	1,300
Power and Fuel ` 1,000 + ` 1 per unit for 800 units	1,800
Depreciation	4,000
Insurance	1,000
Total cost	10,900

(iii) Capacity **60%** **80%** **100%**

Particulars	Total	Per unit	Total	Per unit	Total	Per unit
	`	`	`	`	`	`
Depreciation	4,000		4,000		4,000	
Insurance	1,000		1,000		1,000	
Maintenance	500		500		500	
Power and Fuel	1,000		1,000		1,000	
	6,500	10.83	6,500	8.125	6,500	6.50
Variable Costs						
Wages @2q2X per unit	1,200		1,600		2,000	
Consumable @ X 1.50 per unit	900		1,200		1,500	
Maintenance @ X 1 per unit	600		800		1,000	
Power and Fuel @ X 1 per unit	600		800		1,000	
	3,300	5.50	4,400	5.50	5,500	5.50
Total Cost	9,800	16.33	10,900	13.625	12,000	12.00

5.4 Different Types of Budgets

The budgets are usually classified according to their nature. The following are the types of budgets which are commonly used.

A) Classification According to Time

1. Long-term budgets.
2. Short-term budgets.
3. Current budgets.

B) Classification of the Basis of Functions

1. Operating Budgets
2. Financial Budgets
3. Master Budget

C) Classification on the Basis of Flexibility

1. Fixed budget.
2. Flexible budget

A) Classification According to Time

1. **Long Term Budgets :** The budgets are prepared to depict long term planning of the business. The period of long term budgets varies between five to ten years. The long term planning is done by the top level management; It is not generally known to lower levels of management. Long time budgets are prepared for some sectors of the concern such as capital expenditure, research and development, long term finances, etc. These budgets are useful for those industries where gestation period is long *i.e.*, machinery, electricity, engineering, etc.

2. **Short-term Budgets :** These budgets are generally for one or two years and are in the form of monetary terms. The consumers goods industries like sugar, cotton, textile, etc. use short-term budgets.

3. **Current Budgets :** The period of current budgets is generally of months and weeks. These budgets relate to the current activities of the business. According to I.C.W.A. London, "Current budget is a budget which is established for use over a short period of time and is related to current conditions".

B) Classification on the Basis of Functions

1. Operating Budgets

These budgets relate to the different activities or operations of a firm the number of such budgets depends upon the size and nature of business. The company used operating budgets are :

(a) Sales Budget

(b) Production Budget

(c) Production Cost Budget

(d) Purchase Budget

(e) Raw Material Budget

(f) Labour Budget

(g) Plant Utilisation Budget

(h) Manufacturing Expenses or Works Overhead Budget

(i) Administrative and Selling Expenses, Budget, etc.

2. Financial Budgets

Financial budgets are concerned with cash receipts and disbursements, working capital, capital expenditure, financial position and result of business operations. The commonly used financial budgets are :

(a) Cash Budget

(b) Working Capital Budget

(c) Capital Expenditure Budget

(d) Income statement Budget

(e) Statement of Retained Earnings Budget

(f) Budgeted Balance Sheet or position Statement Budget.

3. Master Budget : Various functional budgets are integrated into master budget. This budget is prepared by the ultimate integration of separate functional budgets. According to I.C.W.A. London, "The Master Budget is

the summary budget incorporating its functional budgets". Master budget is prepared by the budget officer and it remains with the top level management. This budget is used to coordinate the activities of various functional departments and also to help as a control device.

C) Classification on the Basis of Flexibility :

1. **Fixed Budget :** The fixed budgets are prepared for a given level of activity, the budget is prepared before the beginning of the financial year. If the financial year starts in January then the budget will be prepared a month or two earlier, *i.e.*, November or December. The changes in expenditure arising out of the anticipated changes will not be adjusted in the budget. There is a difference of about twelve months in the budgeted and actual figures. According to I.C.W.A. London, "Fixed budget is a budget which is designed to remain unchanged irrespective of the level of activity actually attained." Fixed budgets are suitable under static conditions. If sales, expenses and cost can be forecasted with greater accuracy then this budget can be advantageously used.

2. **Flexible Budgets :** A flexible budget consists of a series of budgets for different level of activity. It, therefore, varies with the level of activity attained. A flexible budget is prepared after taking into consideration unforeseen changes in the conditions of the business. A flexible budget is defined as a budget which by recognizing the difference between fixed, semi-fixed and variable cost is designed to change in relation to the level of activity.

   The flexible budgets will be useful where level of activity changes from time to time. When the forecasting of demand is uncertain and the undertaking operates under conditions of shortage of materials, labour etc., then this budget will be more suited.

5.5 SALES BUDGET

Sales budget is the most important budget and of primary importance. It forms the basis on which all the other budgets are built up. This budget is a forecast of quantities and values of sales to be achieved in a budget period. Every effort should be made to ensure that its figure is as accurate as possible because this is usually the starting budget.

The Sales Manager should be made directly responsible for the preparation and execution of the budget. The sales budget may be prepared according to products, sales territories, types of customers; salesmen etc. in the preparation of the sales budget, the sales manager should take into consideration the following factors:

a) **Past Sales Figures and Trends:** The Compiler of the sales budget should be assisted by graphs recording sales of the previous year and the general sales trend should be noticed from the graphs. The record of previous year's sales is the most reliable basis as to future sales as the past performance is based on actual business conditions. But in addition to past sales, other factors affecting future sales e.g., seasonal fluctuations, growth of market, trade cycle etc., should be considered in the preparation of the sales budget.

b) **Salesmen's Estimates:** In preparing the sales budget, the sales manager should consider the estimates of sales received from salesmen because they can make more accurate estimates, being in direct contact with the customers. However, it should be seen that salesmen's estimates should neither be over-optimistic nor too conservative.

c) **Plant Capacity:** The budget should be within the plant capacity available and should ensure proper utilization of plant facilities. Proposed plant extensions should be allowed for in the preparation of the sales budget.

d) **Availability of Raw Materials and Other Supplies:** Adequate supply of raw materials and other supplies should be ensured before preparing the sales estimates. Sales estimates should be adjusted according to the availability of raw material if the raw materials are in short supply.

e) **General Trade Prospects:** The probability of the sales going up or down depends on the general trade prospects. In this connection valuable information may be gathered from financial papers and magazines such as the Economic Times, the Financial Express, and The Commerce etc.

f) **Financial Aspect:** The sales budget should be within the financial capacity of the concern. Sales expansion usually requires an increase in capital outlay. Thus, if any big sales expansion is planned, it must be ensured that facilities are available to finance the operations.

g) Competition: The nature and degree of competition within the industry should be considered in the preparation of the sales budget to have a realistic sales budget capable of being achieved in the face of competition.

PROBLEMS ON SALES BUDEGT

Problem No. 1

Gemini steel ltd manufactures a single product for which market demand exist for additional quantity present sales of Rs. 60,000 per month utilisation only 60% of the capacity of the plant marketing managers assures that with the reduction of 10% in the price would be in position to increase the sales by about 25% to 30% the following information available.

1. Selling price → Rs. 10 per unit
2. Variable cost → Rs. 3 per unit
3. Semi variable cost Rs. 6000 + 50 PAISA per unit
4. Fixed cost Rs. 20,000 [It is Estimated to be Rs. 24,000 at 80% capacity]

You are required to prepare the statement showing operating profit at 60%, 70% and 80% at current selling price.

Solution :

FLEXIBLE BUDGET FOR THE YEAR ENDED

Particular		60%	70%	80%
I. Fixed		20,000	20,000	24,000
II. SEMI - VARIABLE		9,000	9,500	10,000
III. VARIABLE COST		18,000	21,000	24,500
TOTAL Cost	(A)	47,000	50,500	58,000
Less : Selling price	(B)	60,000	70,000	80,000
(A – B) Operating Profit		13,000	19,500	22,000

WORKING NOTES

Calculating No. of Units Produced and sold at 60% capacity

Given Amount of sales at 60% capacity Rs. 60,000 and selling price per unit Rs. 10.

$$\text{No. of units} = \frac{60,000}{10}$$

6,000 units

∴ **Units at 70%**

60 % — 6,000

70 % — ?

$$\frac{70 \times 6000}{60} = 7,000$$

Units at 80%

60 % — 6,000

80 % — ?

$$\frac{80 \times 6000}{60} = 8,000$$

Calculating Variable Cost

Given variable cost per unit Rs. 3.

∴ Variable cost at 60 % → 6000 × 3 = 18,000

Variable cost at 70 % → 7000 × 3 = 21,000

Variable cost at 80 % → 8000 × 3 = 24,000

SEMI - VARIABLE COST

Given Rs. 6000 + 0.50 Paisa per unit

At 60 %	6,000 + (0.50 × 6,000)
	6,000 + 3000
	Rs. 9,000
AT 70 %	6,000 + (0.50 × 7,000)
	6,000 + 3,500
	Rs. 9,500
AT 70 %	6000 + (0.50 × 8000)
	6000 + 4000
	Rs. 10,000

Calculating Amount of sales [Current sales]

Selling price per unit $\rightarrow$ Rs.10

$\therefore$ Sales At 60 % $\rightarrow$ 6,000 × 10 = 60,000

Sales At 70 % $\rightarrow$ 7,000 × 10 = 70,000

Sales At 80 % $\rightarrow$ 8,000 × 10 = 80,000

Problem No. 2

The following data are available in a manufacturing co. for yearly period.

A) FIXED EXPENSES	AMOUNT IN LAKHS.	
Wages and salaries	9.5	Lakhs
Rent, Rate and Taxes	6.6	Lakhs
Depreciation	7.4	Lakhs
Sundry Administration Expenses	6.5	Lakhs
B) SEMI – VARIABLE EXPENSES	at 50% capacity	
Repairs & Maintenance	3.5	Lakhs
Indirect labour	7.9	Lakhs
Sales Department Salaries	3.8	Lakhs
Sundry Administration Salaries	2.8	Lakhs
C) VARIABLE EXPENSES	AT 50% Capacity	
Material	21.7	Lakhs
Labour	20.4	Lakhs
Other Expenses	7.9	Lakhs
Total	**98**	

Assume that the fixed expenses remain constant for all levels of production.

Semi- Variable expenses remain constant between 45% and 65% of capacity, increase in by 10% between 65% to 80% capacity, and increase in by 20% between 80% and 100%. Capacity sales at various level are.

1. At 50% capacity Rs. 100 Lakhs
2. AT 60% capacity Rs. 120 Lakhs
3. At 75% capacity Rs. 150 Lakhs
4. At 90% capacity Rs. 180 Lakhs
5. At 100% capacity Rs. 200 Lakhs

Prepare a flexible Budget for the year and fore cost the profit at 50%, 60%, 75%, 90%, and 100%.

WORKING NOTES

SEMI – VARIABLE

45 % to 65 % → constant

65 % to 80 % → (+) 10 [Increase]

85 % to 100 % → (+) 20 (Increase).

A FLEXIBLE BUDGET FOR THE YEAR ENDED. [In Lakhs]

Particulars	50%	60%	75%	90%	100%
FIXED COST					
Wages and salaries	9.5	9.5	9.5	9.5	9.5
Rent, Rate and Taxes	6.6	6.6	6.6	6.6	6.6
Depreciation	7.4	7.4	7.4	7.4	7.4
Sundry Administration Expenses	6.5	6.5	6.5	6.5	6.5
SEMI – VARIABLE					
Repairs and Maintenance	3.5	3.5	3.85	4.2	4.2
Indirect Labour	7.9	7.9	8.69	9.48	9.48
Sales – Department salaries	3.8	3.8	4.18	4.56	4.56
Sundry Administration Expenses	2.8	2.8	3.08	3.36	3.36
VARIABLE EXPENSES					
Material	21.7	26.04	32.55	39.06	43.4
Labour	20.4	24.48	30.6	36.72	40.8
Other Expenses	7.9	9.48	11.85	14.22	15.8
TOTAL Cost [A]	98	108	124.8	141.60	151.6
Less : Sales [B]	100	120	150	180	200
Profit (B – A)	2	12	25.2	38.40	48.4

Problem No. 3

The expenses for budgeted production of 10,000 units in a factory are furnished below :

	Per Unit (Rs.)
Materials	70
Labour	25
Variable Overhead	20
Fixed Overheads (Rs. 1,00,000)	20
Variable Expenses (Direct)	10
Selling Expenses (10% Fixed)	5
Distribution Expenses (20 % Fixed)	13
Administration Expenses (Rs. 50,000)	7
Total Cost Per Unit (To make and sell)	5
Prepare a budget for production of :	155

(a) 8,000 units (b) 6,000 units and (c) indicate cost per unit at both the levels. Assume that administration expenses are fixed for all levels of production.

Solution :

FLEXIBLE BUDGET

Particulars	10,000 units		8,000 units		6,000 units	
	Per unit (Rs.)	Amount (Rs.)	Per unit (Rs.)	Amount (Rs.)	Per unit (Rs.)	Amount (Rs.)
Production Expenses :						
Materials	70	7,00,000	70	5,60,000	70	4,20,000
Labour	25	2,50,000	25	2,00,000	25	1,50,000
Overheads	20	2,00,000	20	1,60,000	20	1,20,000
Direct Variable Expenses	5	50,000	5	40,000	5	30,000
Fixed Overheads.						
(Rs. 1,00,000)	10	1,00,000	12.50	1,00,000	16.67	1,00,000
Selling Expenses :						
Fixed	1.30	13,000	1.63	13,000	2.17	13,000
Variable	11.70	1,17,000	11.70	93,600	11.70	70,200
Distribution Expenses :						
Fixed	1.40	14,000	1.75	14,000	2.34	14,000
Variable	5.60	56,000	5.60	44,800	5.60	33,600
Administration Expenses :	5.00	50,000	6.25	50,000	8.35	50,000
Total Cost to make and sell	155	15,50,000	189,42	12,75,400	166.80	10,00,800

Problem No. 4

A department of Company X attains sales of `6,00,000 at 80% of its normal capacity and its expenses are given below:

Administration Costs (Fixed)		**Selling Costs**	
Office Salaries	`90,000	Salaries	8 per cent of sales
General Expenses	2 per cent of sales	Trvelling Expenses	2 per cent of sales
Depreciation	7,500	Sales Office	1 per cent of sales
Rates and Taxes	8,750	General Expenses	1 per cent of sales

Distribution Costs

Wages (fixed)	15,000	
Rent		1 per cent of sales
Other Expenses		4 per cent of sales

Draw up flexible administration, selling and distribution costs budget, operating at 90 per cent, 100 per cent and 100 per cent of normal capacity.

Solution :

X Ltd

Flexible Budget of Department .....

Expenses	**Basis**	**80%** `	**90%** `	**100%** `	**110%** `
Sales		6,00,000	6,75,000	7,50,000	8,25,000
Administrative Costs :					
Office Salaries	Fixed	90,000	90,000	90,000	90,000
General Expenses	2% of Sales	12,000	13,500	15,000	16,500
Depreciation	Fixed	7,500	7,500	7,500	7,500
Rates & Taxes	Fixed	8,750	8,750	8,750	8,750
Total Administrative Costs		1,18,250	1,19,750	1,21,250	1,22,750
Selling Costs :					
Salaries	8% of Sales	48,000	54,000	60,000	66,000
Travelling Exp.	2% " "	12,000	13,500	15,000	16,500
Sales Office Exp.	1% " "	6,000	6,750	7,500	8,250
General Expenses	1% " "	6,000	6,750	7,500	8,250
Total Selling Costs		72,000	81,000	90,000	99,000
Distribution Costs :					
Wages	Fixed	15,000	15,000	15,000	15,000
Rent	1% of Sales	6,000	6,750	7,500	8,250
Other Expenses	4% of Sales	24,000	27,000	30,000	33,000
Total Adm., Selling & Dist. Costs		2,35,250	2,49,500	2,63,750	2,78,000

Problem No. 5

'X' Ltd Co provides you the following figures for year 2001.

Sales in units	Product A	Product A
Ist Quarter	2,000 Units	1,500 Units
2nd Quarter	2,200 Units	1,200 Units
3rd Quarter	1,000 Units	2,000 Units
4th Quarter	2,500 Units	1,800 Units
Selling price per unit	Rs. 30	Rs. 20

Targets for 2002

Sales Quantity Increased / Decreased 10% (5%)

Selling price Increased / Decrease (10%) 5%

Prepare Sales Budget for the year – 2002.

Sales Budget for the 2002

Particulars	Product 'A'			Product 'B'		
	Units	Selling price Per Unit	Sales Amount	Units	Selling Per Unit	Sales Amount
Q – 1	2,200	27	59,400	1,425	21	29,925
Q – 2	2,420	27	65,340	1,140	21	23,940
Q – 3	1,100	27	29,700	1,900	21	39,900
Q – 4	2,750	27	74,250	1,710	21	35,910
	8,470		2,28,690	6,175		1,29,675

Working Notes No.1

Product A (Increased by 10%) Sales Quantity

Q – I	Q – II	Q – III	Q – IV
2,000 + 10%	2,200 + 10%	1,000 + 10%	2,500 + 10%
2,000 + 200 → 2,200	2,200 + 220	1,000 + 100	2,500 + 250
→ 2,200	2,420	1,100	2,750

Product B Sales Quantity Decreased by 5 %.

Q_1	Q_2	Q_3	Q_4
1,500 — 5%	1200 — 5%	2,000 — 5%	1,800 — 5%
1,500 — 75	1,200 — 60	2,000 — 100	1,800 — 90
= 1425	= 1140	= 1900	= 1710

Working Notes No. 2

Calculating selling price

Product A → Rs. 30 — 10% Decreased

Rs. 30 — 3 → Rs. 27

Product B → Rs. 20 + 5 % Increased

20 + 1 = → 21.

5.6 CASH BUDGET

This budget gives an estimate of the anticipated receipts and payments of cash during the budget period. Therefore, this budget is divided into two parts, one showing the estimated cash receipts on account of cash sales, credit collections and miscellaneous receipts and the other showing the estimated disbursement on account of cash purchases, amount payable to creditors, wages payable to workers, indirect expenses payable, income tax payable, dividend payable, budgeted capital expenditure etc. In short, every factor which affects the receipts and payments of cash is taken into account in the preparation of this budget.

Cash budget makes a provision for a minimum cash balance which will be available at all times. In general, this balance should be equal to one month's operating expenses plus some provision for contingencies. The minimum balance of cash will help in tiding over adverse conditions of a minor nature. Meanwhile management can make alternative arrangement for additional cash.

This budget is prepared by the Chief Accountant for the guidance of the management so that arrangements may be made for he requirements of the organisation.

Advantages of Cash Budget

The following are the main advantages of preparing cash budget :

i) It provides an opportunity to review the cash flow for future periods as realistically as possible and make sure that cash is available for revenue and capital expenditure.

ii) Where adequate amount of cash is not likely to be available during certain periods e.g. when payment of bonus, dividend, tax etc. fall due the company can know in advance so that advance action can be taken to make available the required amount on the advantageous terms.

iii) If large surplus of cash is likely to result during certain periods then it will be possible to plan most profitable investment of these funds.

iv) Preparation of a cash budget by a company will help to plan its cash position in such a way that maximum seasonal discounts can be availed of.

v) Even for obtaining funds from financial institutions, the system of preparing cash budget helps to convince the bank or other financial institutions about the bonafides of the company's requirements.

vi) The importance of cash budget may be more in some trades than in others e.g. in trades where there are wide seasonal fluctuations or where long contracts are undertaken.

PROBLEM ON CASH BUDGET

Problem 1

Prepare a Cash Budget for the three months ending 30th June, 2011 from the information given below :

(a)

Month	Sales `	Materials `	Wages `	Overheads `
February	14,000	9,600	3,000	1,700
March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

(b) Credit terms are :

Sales/Debtors–10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month :

Creditors: Materials 2 months

Wages $\frac{1}{4}$ month

Overheads $\frac{1}{2}$ month

(c) Cash and Bank balance on 1st April, 2011 is expected to be ` 6,000.

(d) Other relevant informations are :

(i) Plant and Machinery will be installed in February, 2011 at a cost of ` 96,000. The monthly instalment of ` 2,000 is payable from April onward.

(ii) Dividend @ 5% on Preference Share Capital of ` 2,00,000 will be paid on 1st June.

(iii) Advance to be received for sale of vehicles ` 9,000 in June.

(iv) Dividends from investments amounting to ` 1,000 are expected to be received in June.

(v) Income-tax (advance) to be paid in June is ` 2,000

Solution :

Cash Budget (April/June 2011)

Particulars	April	May	June	Total
1. Balance	6,000	3,950	3,000	12,950
2. Receipts :				
Sales/Debtors	14,650	15,650	16,650	46,950
Dividend	–	–	1,000	1,000
Advance against Sale of Vehicle	–	–	9,000	9,000
Total receipts (1)	14,650	15,650	26,650	56,950
3. Payments				
Creditors for Materials (After 2 months)	9,600	9,000	9,200	27,800
Wages (2)	3,150	3,500	3,900	10,550
Overheads (3)	1,950	2,100	2,250	6,300
Capital Expenditure	2,000	2,000	2,000	6,000
Dividend on Pref. Shares :				
5% of ` 2,00,000	—	—	10,000	10,000
Income Tax Advance	—	—	2,000	2,000
Total Payments (2)	16,700	16,600	29,350	62,650
4. Surplus/(Deficit) (1 - 2)	(2,050)	(950)	(2,700)	(5,700)
Balance	3,950	3,000	300	7,250

Working Note :

Collection from Sales/Debtors

	April	May	June
	`	`	`
February (` 14,000 – 10% of ` 14,000) × 50%	6,300	–	–
March (` 15,000 – 10% of ` 15,000) x 50%	6,750	6,750	–
April (10% of ` 16,000)	1,600		
(` 16,000 – 10% of ` 16,000) x 50%	—	7,200	7,200
May (10% of ? 17,000)		1,700	
(` 17,000 – 10% of ` 17,000) x 50%			7,650
June 10% of` 18,000			1,800
	14,650	15,650	16,650

(2) Wages : 75% of the month + 25% of the previous month.

(3) Overheads : 50% of the month + 50% of the previous month

Problem No 2

From the following estimation of Income and expenditure account prepare a cash Budget for the 3 months beginning from 1st June, when the Bank Balance was Rs 100,000.

Month	Sales in Rs.	Purchase	wages	Factory exp	Administration
April	80, 000	41,000	5,600	3,900	10,000
May	76,500	40,500	5,400	4,200	14000
June	78,500	38,500	5,400	5,100	15,000
July	90,000	37,000	4,800	5,100	17,000
July	90,000	37,000	4,800	5,100	17,000
August	95,000	35,000	4,700	6,000	13,000

A sales commission of 5% on sales due 2 months after sales, is payable in addition to selling expenses plant valued at Rs 65000 will be purchased and paid in August and the dividends for the financial year Rs.15000 will be purchased and paid in August and the dividend for last financial year Rs. 15000 will be paid in July. There is 2 month credit period allowed to customers and received from suppliers. Wages, factory expenses. and Administration selling Expenses are paid in the following month.

Cash Budget for the ending 31st August

Particulars	JUNE	JULY	AUGUST
Opening Balance	1,00,000	1,11,400	1,03,075
ADD CASH RECEIPTS			
Collection from debtors (2 month credit)	80,000	76,500	78,500
Total of A →	1,80,000	1,87,900	1,81,575
Less: CASH PAYMENTS			
Cash paid to creditor (2 months)	41,000	40,500	38,500
Wages (1 month lag)	5,400	5,400	4,800
Factory exp (1 month)	4,200	5,100	5,100
Administration expenses	14,000	15,000	17,000
Commission	$\left(80,000 \times \frac{5}{100}\right)$ 4,000	$\left(76,500 \times \frac{5}{100}\right)$ 3,825	$\left(78,500 \times \frac{5}{100}\right)$ 3,925
Plant	NIL	NIL	65,000
Dividend	NIL	15,000	NIL
Total of B	68,600	84,825	1,34,325
Closing Balance (A-B)	**1,11,400**	**103,075**	**47,250**

Problem No. 3

Prepare a cash Budget of XY Ltd from march to July 1997.

Month	Sales	Selling Exp	Purchase	Wages	Factory	Administration
Jan	1,70,000	6,000	80,000	15,000	10,000	5,000
Feb	1,60,000	7,500	84,000	16,000	11,000	5,500
March	1,82,000	6,500	83,000	16,800	8,000	4,50
April	1,55,000	6,800	83,000	12,000	10,500	4,750
May	1,65,000	7,400	7,600	18,000	12,000	5,400
June	2,00,000	7,000	67,000	16,000	9,600	5,700
July	1,80,000	6,000	70,000	17,000	8,000	5,000
August	2,20,000	5,500	58,000	16,500	9,600	5,500

Additional information

1. Opening Balance allowed as on 1-3-97 Rs, 20,000
2. Period of credit allowed to customers and by supplies is one month .
3. Delay in payment of factory expenses, wages, Administration expenses and selling expenses is one month
4. Machinery purchase Rs. 30,000 in march, Amount paid in April.
5. Building purchased in April for Rs. 150,000 paid in 2 equal Installments in May and July.
6. 5% commission on sales payable 2 month after sales.

CASH BUDGET FOR THE ENDING 31ST AUGUST

Particulars	March	April	May	June	July	August
Opening Balance of Cash	20,000	47,500	72,700	26,550	–10,000	75,450
ADD : Cash Receipts						
Sales (1 month)	1,60,000	1,82,000	1,55,000	1,65,000	2,00,000	1,80,000
Total of A	1,80,000	2,29,500	2,27,700	1,91,550	1,90,000	2,55,540
LESS: CASH PAYMENT						
Selling Exp	7,500	6,500	6,800	7,400	7,000	6,000
Payment to creditors	84,000	83,000	83,000	76,000	68,000	70,000
Wages	16,000	16,800	12,000	18,000	16,000	17,000
Factory Exp	11,000	8,000	10,500	12,000	9,600	8,000
Administration Exp	5,500	4,500	4,750	5,400	5,700	5,000
Purchase of machinery	–	30,000	–	–	–	–
Building purchase	–	–	75,000	75,000	–	–
5% Commission on sales	8,500	8,000	9,100	7,750	8,250	10,000
Total of B	1,32,500	1,56,800	2,01,150	2,01,550	1,14,550	1,16,000
Closing Balance (A – B)	47,500	72,700	26,550	–10,000	75,450	1,39,450

Problem No. 4

Prepare a cash Budget of XYZ Ltd on the basis of the following information for the 6 months commencing 1989.

1. Cash sales are 25% of the total sales and the balance 75% will be credit sales.
2. 60% of credit sales are collected in the month following sales.
   Balance 30% and 10% in the 2 following months their after. No bad debts are anticipated.
3. Sales fore cost are as follows

January 1989	→	1200,000	June	→	800,000
February	→	1400,000	July	→	1200,000
March	→	1600,000	August	→	10,00,000
April	→	600,000	Sept	→	800,000
May	→	800,000	Oct	→	1200,000

4. Anticipated purchases April Rs 640,000 may 640,000 June 960,000, July 800,000, August 640,000 September 960,000.
5. Wages and salaries to be paid April Rs 120,000 may 160,000, June 200,000 July Rs 200,000 August Rs 160,000, September Rs 140,000.
6. Interest at 6% on Debentures of Rs 20,00,000 is paid quartely and payable in June and September 89.
7. Excise deposit due in July 89 Rs 200,000.
8. Capital Expenditure for the plant and machinery planned for September 89. Rs 120,000
9. Company has a cash Balance of Rs 400,000 is a minimum cash balance to be maintained deficits have to be met by borrowings.
10. Rent is Rs 8000 per month.

Solution :

1. Calculating Collection from Debtors

Particular	Jan	Feb	March	April	May	June	July
Total Sales	1200,000	1400,000	1600,000	600,000	800,000	800,000	1200,00
Cash Sales 25%	300,000	350,000	400,000	150,000	200,000	200,000	300,000
Credit Sales 75%	900,000	10,50,000	1200,000	450,000	600,000	600,000	900,000

Total Sales	August	September
Cash Sales 25%	250,000	600,000
Credit sales 75%	750,000	600,000

Calculating collection from Debtors

Particulars	Jan	Feb	Mar	April	May	June	July	Aug	Sep
Cash sales	-	-	-	150,000	200,000	200,000	300,000	250,000	200,000
Add 10% credit				90,000	105,000	120,000	45000	60,000	60,000
				Month					
				(Jan)	(Feb	(Mar)	(Apr)	(May)	(June)
Add:30%credit	-	-	-	315,000	360,000	135000	180,000	180,000	70,000
				(Feb)	(Mar)	(Apr)	(May)	(June)	(July)
Add:60%credit	-	-	-	720,000	270,000	360,000	360,000	540,000	50,000
				(March)	(Apr)	(May)	(June)	(July)	(Aug)
collection from Debtors				12,75,000	935000	8,15,000	885000	10,30,000	980,000

2. Interest on Debentures (3 months)

= → 30,000

Cash Budget for Month End.ing 30th September

Particulars	April	May	June	July	August	Sept.
Opening cash Balance	400,000	907000	10,34000	6,51,000	400,000	550,000
Add : Cash Receipts						
Collection from Debtors	1275000	935000	815000	885000	10,30,000	980,000
Borrowed Amount (Wor. Notes)	-	-	-	72000 (W.notes)	-	128000 (W.notes)
Total of A →	1675000	18,42,000	1849000	16,08,000	14,30,000	16,58,000
Less : Cash Payments						
Repayment of Borrowed	-	-	-	-	72,000	-
Paid for Purchase	640,000	640,000	960,000	800,000	640,000	960,000
Wages & Salaries	120,000	160,000	200,000	200,000	160,000	140,000
Interest on Debentures	-	-	30,000	-	-	30,000
Excise Department	-	-	-	200,000	-	-
Plant and Machinery	-	-	-	-	-	120,000
Rent paid	8000	8000	8000	8000	8000	8000
Total of B →	768000	808000	11,98,000	12,08,000	880000	12,58000
Closing Balance (A–B)	907000	10,34,000	6,51,000	400,000	550,000	400,000

WORKING NOTES

JULY

Total Cash Receipts → 15,36,000
Less : Total Cashpayments → 12,08,000
Balance → 3,28,000
∴ Amount to borrow → 400,000 – 328000 = 72000
Aug : Total cash Receipts → 14,30,000
Less : Total cash Payments → 8,08,000
Balance → 622,000
∴ The balance is much more than the minimum Balance
∴ The company repay the Borrowed Amount

WORKING NOTES

September

Total cash Receipts → 15,30,000
Less : Cash payment → 12,58,000
Balance → 2,72,000
Amount to be borrow → 400,000 (–)272000 → 128000

5.7 PRODUCTION BUDGET

Production budget is a forecast of the total output of the whole organisation broken down into estimates of output of each type of product with a scheduling of operations to be performed and a forecast of the closing finished stock. This budget may be expressed in quantitative or financial units or both. This budget is prepared after taking it into consideration the estimate opening stock, the estimated sales and the desired closing finished stock of each product.

Suppose if the estimated opening sock of product X is 2,000 units and the estimated sales is 15,000 units and the closing stock of the product is 2,500 units the estimated production will be 15,000 + 2,500 – 2,000 (Sales + Closing stock – Opening stock) = 15,500 units. The works manager is responsible for the total production budget and the departmental managers are responsible for the departmental production budget.

In preparing the production budget, the following factors are considered :

a) The time lag between the production in the factory and sales to the customer should be considered so as to allow for the time required for the dispatch of goods from the factory to the place of the customers.
b) The stock of goods to be maintained both at the factory's godown and at the sales centers.
c) The level of production needed to meet the sales programme. Monthly production targets should be fixed and it should be seen that production is kept more or less at a uniform level throughout year.

Proforma of Production Budget

Particulars	January	February	March	April	June
No. of units sold	xxx	xxx	xxx	xxx	xxx
Add : Closing Stock	xxx	xxx	xxx	xxx	xxx
	xxx	xxx	xxx	xxx	xxx
Less: Opening Stock	xxx	xxx	xxx	xxx	xxx
No. of units produced	xxx	xxx	xxx	xxx	xxx

PROBLEMS ON PRODUCTION BUDGET

Problem No. 1

A Company plans to sell 108000 units of a certain products in first quarter.

120,000 units in second Quarters

132,000 units in Third Quarter

156,000 units in Fourth Quarter

138,000 units in Fifth Quarter

At the beginning of the first Quarter of the Current year. There are 18,000 units in the stock. At the end of each Quarter, the company plans to have an Inventory equal to 1/6 of the sale for the next Quarter. How many units must we manufactured in each Quarter of the current year.

Solution :

Production in units = Estimated sales in units + Closing stock in units – opening stock in units.

PRODUCTION BUDGET

Particulars	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Estimated Sales	1,08,000	1,20,000	1,32,000	1,56,000
ADD : Closing stock	20,000	22,000	26,000	23,000
	1,28,000	1,42,000	1,58,000	1,79,000
LESS : Opening stock	18,000	20,000	22,000	26,000
Production in units	**1,10,000**	**1,22,000**	**1,36,000**	**1,53,000**

Working notes

1. Calculating closing stock in units

First Quarter = 120,000 × $\frac{1}{6}$ = 20,000

Second Quarter = 132,000 × $\frac{1}{6}$ = 22,000

Third Quarter = 156,000 × $\frac{1}{6}$ = 26,000

Fourth Quarter = 138,000 × $\frac{1}{6}$ = 23,000.

Problem No. 2

A company manufactures A and B. A fore cost for the number of units will be sold in the first four months is given below.

Particulars	Product A	Product - B
January	3000 units	6000 units
February	3400 units	6000 units
March	4200 units	5200 units
April	5000 units	4400 units.

It is anticipated that

1. There will be no work in progress at the end of any month.
2. Finished units equal to 50% of the sales for the next month will be in stock at the end of each month (including previous December) prepare production budget for the three months.

Solution :

Product – 'A' [PRODUCTION – BUDGET]

Particulars	January	February	March
Estimated sales	3,000	3,400	4,200
Add : Closing stock	1,700	2,100	2,500
	4,700	5,500	6,700
Less : Opening stock	1,500	1,700	2,100
Production in Units	**3,200**	**3,800**	**4,600**

Product – 'B'

Particulars	January	February	March
Estimated sales	6,000	6,400	5,200
Add : Closing stock	3,000	2,600	2,200
	9,000	8,600	7,400
Less : Opening	3,000	3,000	2,600
Production in Units	**6,000**	**5,600**	**4,800**

Working Notes

1. Calculating closing stock in units $\rightarrow$ 50% of subsequent month.

	Product – 'A'	Product – 'B'
January	$3,400 \times \frac{50}{100} = 1,700$	$6,000 \times \frac{50}{100} = 3,000$
February	$4,200 \times \frac{50}{100} = 2,100$	$5,200 \times \frac{50}{100} = 2,600$
March	$5,000 \times \frac{50}{100} = 2,500$	$4,400 \times \frac{50}{100} = 2,200$

2. Calculating opening stock in units.

	Product – 'A'	Product – 'B'
January	$3,000 \times \frac{50}{100} = 1,500$	$6,000 \times \frac{50}{100} = 3,000$
February	$3,400 \times \frac{50}{100} = 1,700$	$6,000 \times \frac{50}{100} = 3,000$
March	$4,200 \times \frac{50}{100} = 2,100$	$5,200 \times \frac{50}{100} = 2,600$

Problem No. 3

The following information has been made available from the records of Srujan Tools limited for the six months of 1989. (And only the sales of Jan 90) in respect of Product "X".

1. The units to be sold in different months :

   1989 July : 1,100 units
   Aug : 1,100 units
   Sep : 1,700 units
   Oct : 1,900 units
   Nov : 2,500 units
   Dec : 2,300 units

   1990 : January = 2000 units.

2. There will be no work - in - progress at the end of any month.
3. Finished units equal to half the sales of the next month will be in stock at the end of every month [including June - 1989].
4. Budgeted production and production cost for the year ending 31st Dec 1989 as are under.

   Production in units = 22,000
   Direct material cost per unit = 10/-
   Direct wages per unit Rs. 4/-

   Total factory over heads Rs. 88000 it is required to prepare.

   (a) Production Budget for each of 6 months of 1989.
   (b) A summarised production cost budget for the same period.

Solution :

PRODUCTION BUDGET

Particulars	July	August	Sep	October	November	Dec	Total Production
Estimated	1,100	1,100	1,700	1,900	2,500	2,300	10,600
Add : Closing stock	550	850	950	1.250	1,150	1,000	5,750
	1,650	1,950	2,650	3,150	3,650	3,300	16,350
Less : opening stock	550	550	850	950	1,250	1,150	5,300
Product in units	1,100	1,400	1,800	2,200	2,400	2,150	11,050

PRODUCTION COST BUDGET

Particulars		Cost per unit	Unit	Cost Amount
Material		10	1,1050	1,10,500
Labour cost		4	1,1050	44,200
Factory over heads	4[11,050 × 4]	4	1,1050	44,200
	22,000 units – 8,8000			
	11,050 —— ?			
Production cost				1,98,900

PRODUCTION BUDGET

Particular	April	May	June	July	Aug	Sep	Total
Material required for Budgeted year	25,000	22,000	17,000	18,000	22,000	26,000	130,000
Add : Closing stock	22,000	17,000	18,000	22,000	26,000	26,000	131,000
	47,000	39,000	35,000	40,000	48,000	52,000	261,000
Less : Opening stocks	25,000	22,000	17,000	18,000	22,000	26,000	130,000
	22,000	17,000	18,000	22,000	26,000	26,000	131,000
Material cost [per unit Rs. 5]	110,000	85,000	90,000	110,000	130,000	130,000	655,000

Working Notes

Material

April Month

for 1 unit — 2 kgs

12500 — ?

$\frac{12500 \times 2}{1}$ = 25,000

May Month

1 unit —— 2kgs

11,000 —— ?

$\frac{11000 \times 2}{1}$ = 22,000

June Month

1 unit —— 2 kgs

8500 —— ?

$$\frac{8500 \times 2}{1} = 17000$$

July Month

1 Unit — 2kgs

9000 — ?

$\frac{9000 \times 2}{1}$ = Rs. 18,000

August month

Unit — 2kgs

for 11,000 — ? $\frac{11,000 \times 1}{1}$

= 22,000.

Problem No. 4

Nestle ltd has prepared the following budget for the fist five months of 1998.

Month	Budgeted sales (units)
Jan	10,800
Feb	15,600
March	12,200
April	10,400
May	9,800

Inventory of finished goods at the end of every month is to be equal to 25% of sales estimate for the next month on 1st Jan 98 the is were 27000 units of production on hand. There is no work in progress at the end of every month. Every unit of product required 2-Types of materials required material

A = 4kg B = 5kg.

Materials = 50% of the required of next month production are to be in hand at the end of every month. This requirement was meant on 1st Jan 98.

Prepare the budget for the quarter ending 31 may 90.

1. Production Budget
2. Material purchase budget.

Solution :

PRODUCTION BUDGET

Particulars	Jan	Feb	Mar	April	Total
Estimated sales	10,800	15,600	12,200	10,400	49,000
Add : Closing stock (25%)	3,900	3,050	2,600	2,450	12,000
	14,700	18,650	14,800	12,850	61,000
Less: Opening stock (25%)	2,700	3,900	3,050	2,600	12,250
Production	**12,000**	**14,750**	**11,750**	**10,250**	**48,750**

5.8 MASTER BUDGET

The Master Budget is consolidated summary of the various functional budgets. It has been defined as "a summary of the budget schedules in capsule from made for the purpose of presenting, in one report, the highlights of the budget forecast". The definition of this budget given by the Chartered Institute of Management Accountant, England, is as follows:

"The summary budget incorporating its component on the basis of co-ordinated functional budgets and becomes the target for the company during the budget period when it is finally approved by the committee. This budget summarises functional budgets to produce a Budgeted Profit and Loss Account and a Budgeted Balance Sheet as at the end of the budget period.

Advantages of Master Budget

Following are the main advantages of master budget :

1. A summary of all functional budgets in capsule from is available in one report.
2. The accuracy of all the functional budgets is checked because the summarized information of all functional budgets should agree with the information given in the master budget.

3. It gives an overall estimated profit position of the ogranisation for the budget period.
4. Information relating to forecast balance sheet is available in the master budget.

This budget is very useful for the top management because it is usually interested in the summarized meaningful information provided by this budget

5.9 PERFORMANCE BUDGET

Performance based budgeting has been defined as a system wherein managers are provided with the flexibility to utilize agency resources as required, in return for their commitment to achieve certain performance results. Performance budgeting is a system of planning, budgeting, and evaluation that emphasizes the relationship between money budgeted and results expected.

Performance Budgeting

- **Focuses on results:** Departments are held accountable to certain performance standards. There is a greater awareness of what services taxpayers are receiving for their tax dollars.
- **Is flexible:** Money is often allocated in lumpsums rather than line-item budgets, giving managers the flexibility to determine how best to achieve results.
- **Is inclusive:** It involves policymakers, managers, and often citizens in the budget "discussion" through the development of strategic plans, identification of spending priorities, and evaluation of performance.
- **Has a long-term perspective**: By recognizing the relationship between strategic planning and resource allocation, performance budgeting focuses more attention on longer time horizons.

Characteristics of performance budgets

- Agency identification of mission, goals, and objectives;
- Linkage of strategic planning information with the budget;
- Development and integration of performance measures into the budget; and
- Disaggregation of expenditures into very broad areas (such as personnel, operating expenses, and capital outlays) rather than more specific line-items.

Uses of Performance Budgeting

- Connects plans, measures, and budgets;
- Forces departments and policymakers to think about the big picture;
- Provides better information about the impact of budget decisions on people;
- Gives departments increased budgetary flexibility and incentives for generating budget savings;
- Allows for ongoing monitoring to see if agencies are moving in the right direction;
- Strengthens legislative decision making and oversight;
- Enhances financial accountability to citizens, decision makers, and governmental monitoring agencies; and
- Supports better management and evaluation.

5.10 Requisites for a Successful Budgetary Control System

For making a budgetary control system successful, following requisites are required:

1. **Clarifying objectives :** The budgets are used to realize objectives of the business. The objectives must be clearly spell out so that budgets are properly prepared. In the absence of clear goals, the budgets will also be unrealistic.
2. **Proper Delegation of Authority and Responsibility :** Budget preparation and control is done at every level of management. Even though budget are finalized at top level but involvement of persons from lower levels of management is essential for their success. This necessitates proper delegation of authority and responsibility.
3. **Proper Communication System :** An effective system of communication is required for a successful budgetary control. The flow of information regarding budgets should be quick so that these are implemented. The upward communication will help in knowing the difficulties in implementation of budget. The performance reports of various levels will help top management in budgetary control.
4. **Budget Education :** The employees should be properly educated about the benefits of budgeting system. They should be educated about their role in the success of this systems. Budgetary control may not be taken only as a control device by the employees but is should be used as a tool to improve their efficiency.

5. **Participation of All Employees :** Budgeting is done for every segment of the business. It will also require the active participation and involvement of all employees. In practice the budgets are to be executed at lower levels of management. Those for whom the budgets are framed should be actively associated with their preparation and execution. The employees, on the basis of their past experience, may give more practical and useful suggestions. The success of budgetary control system depends upon the participation of all employees of the organisation.

6. **Flexibility :** Flexibility in budgets is required to make them suitable under changed circumstances. Budgets are prepared for the future, which is always uncertain. Even though budgets are prepared by considering the future possibilities but still some occurrences later on may necessitate certain adjustments. Flexibility will make the budgets more appropriate and realistic.

7. **Motivation :** Budgets are to be implemented by human beings. Their successful implementation will depend upon the interest shown by the employees. All persons should be motivated to improved their working so that budgeting is successful. A proper system of motivation should be introduced for making this system a success.

5.11 ZERO BASE BUDGET

This budget is the preparation of budget starting from Zero or from a clean state. As a new technique it was proposed by peter Payal of Texas Instruments Inc., U.S.A. This technique was introduced in the budgeting in the state of Gorgia by Mr. Jimmy Carter who was then the Governor of that state. When Mr. Carter later on became President of the U.S.A., ZBB was tried in federal budgeting as a means of controlling state expenditure. The use of zero-base budgeting (ZBB) as a managerial tool has become increasingly popular since the early 1970s. It is steadily gaining acceptance in the business world because it is proving its utility as a tool integrating the managerial function of planning and control.

Conventional Budgets are prepared mainly on past performance and actual costs. Thus a conventional budget represents a quantification of the firm's objectives and the efficiency of budgeting as a planning and control in activities which are directly related to the final output of the activities. Thus, a more accurate budget can be framed once the relationship between inputs and outputs is legal staff and the personnel office. A more accurate budget cannot be developed for such activities because the tasks assigned and resources allocated to such activities are not directly related to the firm's output and it is difficult to develop and use standard cost for such activities.

Zero-base budgeting is most appropriate in controlling these staff and support areas, (i.e, non-manufacturing overhead).

CIMA has defined it "as a method of budgeting whereby all activities are revaluated each time a budget is set. Discrete levels of each activity are valued and a combination chosen to match funds available". In short an elaborate practice of having a manager justify activities from the ground up as though they ware being launched for the first time.

Steps in ZBB

The important steps in ZBB are :

i) Identification of decision units in order to justify each item of expenditure in their propose budget.

ii) Preparation of Decision Packages. Each package is a separate and identifiable activity. These packages are linked with corporate objectives.

iii) Ranking of decision packages based on cost benefit analysis.

iv) Allotment of funds based on the above resulting by following pyramid ranking system to ensure optimum results.

Decision packages are self contained modules or proposals seeking funds. Each decision package will clearly explain the activity, the need for the item, the amount involved, the benefit of implementing the proposal, the loss that may be incurred, if it is not done etc.

Advantages of ZBB

ZBB is a revolutionary concept and is relatively a new management tool for planning and control of activities. It involves people at all levels in the organisation and promotes team spirit. The plans and budgets based upon ZBB are much improved than those based upon traditional budgeting . There are a number of benefits that arise from zero-base budgeting. Some of the important advantages of ZBB are enumerated below :

1) It enables management to allocate funds according to the jurisdiction of the programme. The priority can be fixed for various activities and their implementation will be in the same order.

2) Zero-base budgeting improves efficiency of the management. Every manager will have to justify the demand for resources. Only those activities will be undertaken which will have justification and will be essential for the business.

3) Zero-base budgeting will help in identifying economical and wasteful areas. Emphasis will be given to economical activities and alternative courses of action will also be studied.

4) The management will be able to make optimum use of resources. The expenditure will be undertaken only when it will have justification. A list of priorities is prepared and cost-benefit analysis will be the guiding principle in fixing the priority.

5) Zero-base budgeting will be appropriate for those areas whose output is not related to production. It becomes difficult to evaluate the performance of those sides which are not directly related to production but undertake other activities. This technique will be helpful in determining the utility of each and every activity of the business

6) Budgeting will be related to organisational goals. Something will not be allowed on the plea that it was done in the past. Only those things will be allowed which will help in realising organisational goals.

Limitations of ZBB

Inspite of many advantages, there are a number of limitations arising mainly from difficulties in operating of ZBB. Some of the important limitations are as below :

1. Computation of cost benefit analysis, which is essential for ZBB, is not possible in respect of non-financial matters.
2. Difficulties in formulation and ranking of decision padages as every manager may not have the necessary expertise.
3. The system of zero-base budgeting has no scope of adjust for the changes and, thus, flexible budgeting is not possible.
4. It involves a lot of time and cost of operating ZBB is also very high.

5.12 Introduction to Cost Audit

Audit

The term audit means examination of books of accounts and vouchers so as to establish their accuracy. It is defined as a "systematic examination of financial statements, records and related operations to determine adherence to generally accepted accounting principles, management policies or stated requirements."

Cost Audit

Cost audit has been defined by Chartered Institute of Management Accountants, London as "the verification of cost accounts and a check on the adherence to the cost accounting plan."

Cost audit is mainly a preventive measure, a guide for management policy and decision, in addition to being a barometer of performance.

Functions of Cost Audit

The main functions of cost audit are as follows :

a) to verify that the cost accounts are correctly kept in accordance with the principles of costing employed in the industry

b) to ensure that the cost accounting rules laid down by the business is properly carried out

c) to detect errors and prevent frauds and possible misappropriation

Cost audit is rightly called efficiency audit because it is concerned with audit and appraisal of the extent of efficiency of utilization of factors of production.

Appointing Authorities of Cost Audit

A cost auditor may be appointed by :

- Internal authorities i.e., by the same management to conduct cost audit as an aid to management.
- By external authorities such as by :
  - Government to conduct audit on behalf of government.
  - Customer to carry out cost audit on behalf of customer
  - Trade association or tribunal to facilitate cost audit on behalf of trade association or tribunal.

Types of Cost Audit

The following are the types of cost audit :

1. **Cost audit to assist management :** The main object of this type of cost audit is to make available accurate, relevant and prompt information to management to assist it in taking important managerial decisions. The function of this audit is to ensure management the accuracy of cost accounts. In this type of audit, a cost auditor suggests ways to reduce the cost of production and to make an improvement in the cost accounting plan.

2. **Cost audit on behalf of the government :** The government may appoint a cost auditor to conduct cost audit where it is necessary -
   a) To do so in the opinion of the government under section 233 – B of the Companies Act, 1956;
   b) To ascertain correct cost of contract given to private firms under 'cost plus' basis
   c) To fix reasonable prices of certain items of production so as to prevent undue profiteering.
3. **Cost audit on behalf of a customer :** Sometimes, cost audit may be conducted on behalf of a customer when he agrees to pay price for a certain product on 'cost plus' basis. The customer in such a case gets cost accounts of the product concerned audited to establish correct cost so that he may be able to pay price on the basis of correct cost plus an agreed margin of profit.
4. **Cost Audit on behalf of Trade Association :** Sometimes, a trade association may appoint a cost auditor to conduct cost audit -
   a) To ascertain comparative profitability of its members.
   b) To determine minimum price to avoid cut throat competition among its members.
   c) To maintain prices at a price level so as to prevent undue profiteering.
5. **Cost Audit on behalf of tribunals :** Sometimes, labour tribunals may direct the audit of cost accounts to settle trade disputes for more wages, shares in profits etc. Similarly Income Tax Tribunals may direct the audit of cost accounts to assess correct profit for assessment purposes.
6. **Cost audit under Statute :** The central government may under section 233 – B of the companies Act, 1956 order that classes of companies which are required to maintain proper records regarding materials consumed, labour and other expenses under section 209 are required to get their cost accounts audited. The aim of such type of audit is that the government wants to ascertain the relationship of costs and prices.

Objectives of Cost Audit

The broad objectives of cost audit may be as follows :

1. To examine and verify the cost accounting records maintained by a company.
2. To ensure that principles of cost accountancy have been fully applied in maintaining cost records properly.

3. To ensure that cost accounting procedures and routines as predetermined or planned by the management are properly followed.
4. To detect and prevent errors, frauds or misappropriations.
5. To see how far the existing procedure of cost accounts is helpful to the management for taking decisions.
6. To bring forth the deficiencies in the use of material labour and other resources.
7. To determine the adequacy of costing system, procedure, routines, reports and statements followed by the company.
8. To reflect a true and fair view of the cost of production as far as possible.
9. To ensure the integration of cost accounting system into the total system of the organization and to provide for reconciliation of cost and financial accounts.

Advantages of Cost Audit

The following are the main advantages of cost audit to management, cost accountant, shareholders, tax-pars, government and consumers :

1. Cost audit will establish the accuracy of cost accounts and will assist in prevention of errors and frauds. It will also help to improve cost accounting methods and techniques to facilitate prompt reliable information to management. It creates cost consciousness, results in improved cost accounting methods and helps to have better internal control.
2. It will help management in taking important decisions because prompt, accurate and reliable information is made available to management with the help of cost audit.
3. It will help in reducing cost of production because a close check will be maintained on all wastages relating to materials, labour and overheads. Wastages will be promptly reported to management so that there may not be recurrence of those wastages.
4. It will bring more reliability on the costing data and hence can be more effectively used for interfirm comparison.
5. Management by exception is possible since cost audit separates efficient from inefficient operations and fixes individual responsibility for inefficient operations.
6. Cost audit reveals whether fund invested by shareholders are being profitably used in the business. Thus, shareholders are assured of a fair return on their investment.

7. If collaboration is to be sought with an enterprise, cost audit report on the working of the enterprise gives valuable information for deciding on such collaboration.
8. Cost audit reports raise the status of cost accountant. Being external, it helps in improving costing methods and can solve specific problems which ultimately raise the status of costing department.
9. It provides information relating to weak, inefficient or mismanaged units for taking proper corrective action. It also helps to identify the symptoms of sickness in a unit.
10. The existence of cost audit has a great moral influence on the employees, as a result of which the efficiency is increased.
11. Cost audit will promote better understanding between persons at the helm of affairs and persons at the bottom. The cost data audited by the cost auditor will prove useful for settling trade disputes for wages, bonus, and share in profit etc.
12. Cost audit helps the management in inter-unit comparison which will be helpful in improving the performance of inefficient units.
13. The government and the trade associations may require cost audit for the purpose of fixing selling prices to prevent excessive profit making. The government also requires cost audit to give protection to certain industries in public interest. It contributes to the betterment of the economy by increasing productivity and performance.
14. Cost audit enables the government decide whether protection should be given in favour of certain industries or not.
15. Consumers are saved from unreasonable price increase because price increase by the industry is not allowed without proper justification as to increase in cost of production. Thus, consumers are saved from exploitation.
16. Cost audit will b helpful in implementing the system of budgetary control and standard costing because cost audit lays emphasis on the verification of cost accounts and a check on the adherence to the cost accounting plan.

5.13 MANAGEMENT AUDIT

The auditors are generally expected to detect errors and omissions in the books of accounts. They concentrate in finding out whether a concern has maintained proper books of accounts or not and the Balance Sheets depict the real financial position or not. The statutory auditor never goes into the question whether the polices and programmes laid down by the management are properly carried out or not.

Management audit is concerned with management process as a whole. It covers review and appraisal of managerial policies and plans in comparison to predetermined standards.

Definitions

1. A comprehensive and constructive examination of an organizational structure of a company, institution or branch of government, or of any component thereof, such as division or department, and its use of human and physical facilities.

– William P. Leonard

2. Management audit is an investigation of business from the highest level downwards in order to ascertain whether sound management prevails throughout, thus facilitating the most effective relationship with the outside world and the most efficient organization and smooth running internally.

– Leslie R. Howard

Objective of Management Audit

The main objective of management audit is to find out whether the work at all levels is undertaken efficiently or not and also to make recommendations for its improvement, if necessary.

The following are some of the objectives of management audit :

1. The first objective of management audit is to see whether the business is managed efficiently or not. The management at all levels, from top to lower levels, is reviewed.
2. If there is a need to make improvements or management is not done effectively then suitable recommendations are made to tone it up.
3. Whether the plans and programmes are executed properly or not.
4. It suggests ways and means of increasing managerial efficiency.
5. It also aims to help management at all levels in the effective and efficient discharge of duties and responsibilities.
6. The organizational structure is also reviewed to assess whether it can achieve overall business objectives or not. If there are deficiencies then changes in organization are suggested.

Scope of Management Audit

The primary purpose of management audit is to find out the efficiency of every segment, from top to bottom, of business. So it requires the study of each and every aspect of the enterprise. The following aspects from the scope of management audit.

1. The present organizational structure is reviewed in relation to current and prospective demand of the business. The study of organization should be undertaken in relation to the aims and objectives of the enterprise.
2. It will include the study of present return on investor's capital. Whether the return is adequate, fair or poor should be determined by the management auditor.
3. Management audit also requires the study of relationship of the business with the shareholders and investing public in general.
4. The performance of the concern should be compared with that of other firms in the same field. The ratios like operating returns on sales and return on capital should be compared to find out the comparative position of the business.
5. The aims, objectives and duties of the management should be studied by management auditor. This exercise should be undertaken by Board of Directors level.
6. The study of financial planning and control also forms the part of management audit. The efficacy of sources finance and the use of funds for capital and other expenditure should be evaluated to determine the efficiency in raising and utilizing the funds.
7. The review of production and sales function is also an important aspect of management audit. Whether the production is undertaken efficiently or not ? This can be assessed by comparing with that of other concerns. Similarly, the performance of sales department should be judged by looking at its past performance of sales department should be judged by looking at its past performance and future possibilities. The sales should be quick and efficient and distribution channels should be as economical as possible.

Need for Management Audit

The management of business at present is becoming more and more complex. The use of specialized techniques such as operation research, statistical sampling, electronic data processing, production control etc. requires the services of experts. The Boards of Directors are at the helm of affairs in company form of organization. The directors are not experts in every field of management. If anything goes wrong then directors have to face the criticism. This has necessitated the need for management consultancy.

The management auditors are often called upon to advise the firm as to how to maximize the production of quality goods. Management audit or consultancy helps in improving the operations of the business. The benefits derived from this service are far more than the cost incurred on it.

PROBLEMS ON DIRECT LABOUR BUDGET

Problem No. 1

A factory works 8 Hours a day, 6 days in a week. and Budget period is one year and during each quarter, lost Hours due to live, Holidays and etc. estimated to be 124 Hours.

Particulars	Product A	Product B
Direct labour per unit		
In Department P	2 Hours @ Rs.1 per hour	1 Hours @ 2 per hour
In Department Q	1 Hours @ 3 per hour	1 hour @ Rs. 3 hour
Units to be produced as per production budget	10,000 unit	4,000 unit

Required

1. Prepare Man power Budget showing Direct labour hours and No of works.
2. Prepare Man power Budget showing labour cost

Working Notes

1. Calculating direct labour hours required

PRODUCT – A

Labour hours required = Budgeted production units × Direct labour hours per unit

IN DEPARTMENT P

Hours → 10,000 × 2 = 20,000 hours.

DEPARTMENT Q

→ 10,000 × 1 = 10,000 HOURS.

PRODUCT – B

In Department –– P

Budgeted production units × Direct labour hour per unit

4,000 × 1 = 4,000 Hours.

In Department –– Q

4,000 × 1 = 4,000 Hours.

2. Calculating net available hours

Total hours during the year		
8 hours × 6 days × 52 weeks	2,496	hours
Less : hours due to holidays etc. 124 × 4 quarter	496	hours
Net available Hours	2,000	hours

Man Power Budget Showing Direct Labour & No. Of Worker Required

Particulars	Department P	Department 'Q'
A. Hours required		
Product A	20,000 hrs	10,000 hrs
Product B	4,000 hrs	4,000 hrs
B. The total Hour Required [Direct labour]	24,000 hrs	14,000 hrs
C. Net available Hours	2,000 hrs	2,000 hour
No.of workers required [B/C]	12 worker	7 worker

Man Power Budget Showing direct Labour Cost

Particulars	Department 'P'			Department 'Q'		
	Hours	Rate per Hour	Cost in Rs.	Hours	Rate per Hour	Cost in Rs.
Product 'A'	20,000	1 = 00	20,000	10,000	3	30,000
Product 'B'	4,000	2 = 00	8,000	4,000	3	12,000
	24,000		28,000	14,000		42,000

Problem No. 2

A factory works 8 hours per day 6 days in a week and budget period is one year and during the year ideal hours due to holidays, leaves etc. 496 hours.

Particulars Direct labour per unit	product A	product 'B'	Product 'C'
In Department "X"	3 hours @ 2 per Hour	1 hour @ 1 per hour	1 hour @ 1.50
In Department 'Y'	1 hour @ 3 per hours	1 hours @ 3 per hour	1 hour @ 0.50 per hour
In Department 'Z'	1 hour @ 3 per hour	1 hour @ 3per hour	1 hour @ 2 per hour
Units to be produced as per production Budget	10,000 units	5,000 units	4,000 units

1. Prepare man power Budget showing Direct labour hours and no. of workers required.
2. Man power Budget showing labour cost.

Working Notes

1. Calculating direct labour hour Required.

Product – 'A

Labour hour required = Budgeted production units × Direct labour hour per unit.

IN DEPARTMENT : 'X'

10,000 × 3 = 30,000 hours [30,000]

In Department : 'Y'

10,000 × 1 = 10,000 hours

In Department 'Z'

10,000 × 1 = 10,000 hours.

Product 'B'

In Department 'X' = 5000 × 1 = 5000

In Department 'Y' = 5000 × 1 = 5000

In Department 'Z' = 5000 × 1 = 5000

Product 'C'

In Department 'X' = 4000 × 1 = 4000

In Department 'Y' = 4000 × 1 = 4000

In Department 'Z' = 4000 × 1 = 4000

2. Calculating Net available Hours

Total hours = during the year	2,496
8 Hours × 6 days × 52 weeks	
Less : Hours due to holidays, leaves etc.	496
Net Available Hours	2,000

MAIN POWER BUDGET SHOWING DIRECT LABOUR AND NO. OF WORKERS REQUIRED

Particulars	Department x	Department y	Department 'z'
A. Hours Required			
Product A	30,000	10,000	10,000
Product B	5,000	5,000	5,000
Product C	4,000	4,000	4,000
B. The Total hours required [Direct labour]	39,000	19,000	19,000
C. Net Available hours	2,000	2,000	2,000
No.of workers required $\left[\frac{B}{C}\right]$	20	10	10

MAIN POWER BUDGET SHOWING DIRECT LABOUR COST

	Department 'X'			Department 'Y'			Department – 2		
Particulars	Hours	Rate per hour	cost in Rs	Hours	Rate per hour	cost in Rs.	hours	Rate per hour	cost in Rs.
Product – A	30,000	2	60,000	10,000	3	30,000	10,000	3	30,000
Product – B	5,000	1	5,000	5,000	3	15,000	5,000	3	15,000
Product – C	4,000	1.50	6,000	4,000	0.5	2,000	4,000	2	8,000
			71,000			47,000			53,000

5.14 STANDARD COST

The success of standard costing rests on setting the standards. It is essential that the standards set as accurate and reliable as possible. Usually the cost accountant is responsible for setting the standards but he will be required to cooperate with many personnel.

Example

Time and motion study of engineers, production engineers and buyers. It is necessary to consider standards of performance usage of material, cost rates and many other factors before fixing standards.

Standard cost must be fixed for each of the following elements of cost :

- **Direct material**

  A standard price is settled, having referred to the current rates and those expected in the immediate future quantities and qualities of materials are shown on the specification for production are considered and allowance is made for normal scrap or waste.

- **Direct labour**

  The detailed operations both for machine and hand labour are settled and a labour cost is fixed for each operation. This may be based on piece work rates, bonus rates or on standard time rates, settled by test or experience.

- **Variable overhead**

  It is assumed that variable overhead costs are proportional to the output achieved; therefore a standard cost per unit or per hour will be set.

- **Fixed overhead**

  It is assumed that fixed overhead costs are more or less constant, with in reasonable limits irrespective of the levels of output.

In setting a standard cost, it is necessary to consider :

- The total fixed overhead costs for the period.
- The budgeted production for the period.
- The expected number of working hours during the period.

5.15 STANDARD COSTING

Standard costing is not a method of costing just as process costing or unit costing. It is a system or technique of cost accounting which can be used in conjunction with process or operating costing without any difficulty. The system of standard costing can

be employed in all types of industries, though it is commonly used in industries producing standardized products which are repetitive in nature like Engineering process industries, textiles, electrical, chemical industries etc.

Where work is not repetitive, like construction work, contract work, ship building and erection work etc., it is difficult to set standards. Therefore standard costing is not suitable to them. But in certain cases, it can be applied partially, though not fully, at least to some advantage of the business concerns.

The technique of using standard costs for the purpose of cost is known as standard costing. It is a system of cost accounting which is designed to find out how much should be the cost of a product under the existing conditions.

Definition

The terminology of cost accountancy defines standard costing as the preparation and use of standard costs, their comparison with actual costs, and the analysis of variance to their causes and points of incidence.

Standard costing ascertains before hand what should be the cost of a product and controls the cost of such a product by facilitating the comparison of actual cost with the predetermined standard cost. The difference between the two costs is called variance. The main object of standard costing is to eliminate the wastes and increase the efficiency of performances through setting up standards for production expenses and production performances. Standard costing system is not widely used today because sit serves as an effective tool for management control.

Essentials for an Effective System of Standard Costing

1. Standards must be designed to give costs of operation or process rather than products, so that variances may be traced tot heir source without laborious investigation.
2. Technical processes of operations should be according to plans.
3. Standards must be properly set. Management and personnel should have confidence in them.
4. The system of record-keeping must be as simple as possible.

5. Management must take interest in controlling costs and be aware of advantages offered by standard costs and use of variance reports.
6. Reports must be prepared and placed at the disposal of various levels of management.

Steps Involved in Standard Costing

Standard costing is a very important system of costs. It is a technique which is complimentary for the actual costing. It aims of eliminating the wastes and increasing efficiency in performances through setting up standards for production expenses and production performances. The standard costing involves the determination of cost before hand.

Standard costing involves the following steps

1. Ascertainment of standard cost.
2. Recording of actual cost.
3. Comparison between standard cost and actual cost.
4. Finding out of variance.
5. Analysis of variances for the purpose of ascertainment of reasons from remedial measures.

Advantages of Standard Costing

- **Measuring efficiency**

  Standard costs provide a yard stick for measuring actual performance and comparing it with the standard. By watching for deviations of actual performance from standard, management observes inefficiencies and is able to correct them. Similarly, it can detect and reward exceptional efficiency.

- **Determination of variance**

  Standard costing enables to discover the cause for any variance between the actual costs and standard costs and to take remedial steps immediately.

- **Formulation of price and production policies**

  Standard costing acts as a valuable guide to management in the formulation of price and production policies. It helps the management in pricing, production, profit planning etc.

- **Economy**

  Standard costing provide :

  – Economy of calculation

  – Early availability of cost information and

  – The availability of anticipate changed condition.

- **Management by exception**

  The management by exception is ensured because the efficient operations ad processes are separated from the inefficient. In other words management does not spend time and effort searching unnecessary information, but can concentrate on important matters.

- **Increased productivity**

  The setting of standards involves the effective utilization of men, materials and machines and thus may lead to economics and increased productivity in all business activity.

- **Cost Consciousness**

  Standard costing creates an atmosphere of cost consciousness among executives, foremen and event he workers. It also provides incentives for efficient work.

- **Aid to inventory costing**

  Standard costing provides the accuracy of product cost at various stages and is an aid to inventory costing and cost reporting.

- **Assists in preparing tenders and estimates**

  Standard cost adjusted in line with current conditions provides an excellent basis for the preparation of estimates and may be used in preparing tenders or in fixing selling prices etc.

- **Full use of financial resources**

  Standard costing enables to make fullest use of the financial resources of the business concern and avoids the losses due to under or over capitalization.

- **Preparation of P& L A/c**

  It enables the preparation of profit and loss account at short intervals in an year and to forecast the profits during the remaining periods in such a year.

- **Helps in taking important decisions**

  Standard costing provides useful cost data to the management in taking important decisions. The problem raised by inflation, rising prices etc., can be tackled effectively with the help of standard costing.

Limitations of Standard Costing

- **Difficult to set up reliable standards**

  It is difficult to set up reliable and workable standards. Unless the standards are correctly fixed, the control the study of variances will not be effective.

- **Expensive**

  Revision of standards in the light of changed circumstances, become expensive. If the standards are not revised, they become out dated. Such standards are not reliable.

- **High degree of technical skill**

  Establishment of standards may be costly and may require high degree of technical skill.

- **Fixing responsibilities is a difficult task**

  For fixing responsibilities for an adverse variance, the controllable and uncontrollable portions of the variances should be segregated. This is a difficult task.

- **Adverse psychological effects**

  Sometimes, standards create adverse psychological effects. If the standard is set a high-level, its non-achievement will lead to frustration and resistance. This acts as a discouragement rather than an incentive for better efficiency.

- **Unsuitable**

  Due to unsuitable for jobbing type of industry, fixation of standards for each job becomes difficult and expensive. Non suitable for small industries: Installation of standard costing is an expensive affair. Hence small business concerns do not show much interest in installing standard costing.

5.15.1 Standard Costing Vs Budgetary Control

Budgetary control denotes a system of management and accounting control by which all operations and output over a period of time are forecast and the actual results when known are compared with the budget estimates. Usually budgetary control is operated with a system of standard costing because both are interrelated though they are not interdependent.

Standard costing is complementary to budgetary control. If is difficult to operate a system of budgetary control unless the cost of production of each unit is kept strictly under control.

The following are the main differences between standard costing and budgetary control :

Standard costing	Budgetary control
Standard costs are compiled by classifying, recording and appropriately allocating expenses. Control in affected by comparing sales and production unit valued at standards costs with actual performances.	Budgets are compiled for different functions of business and expenses are classified as shown in the financial accounts of the concern. Control is exercised by comparing expenses incurred with those budgeted.
It is more intensive for controlling expenses included in the elements of costs.	Budgetary control is more extensive as it relates to the operations of the business as a whole. It covers capital sales and financial expenses, in addition to production.
It is concerned with the disposition of costs.	Budgetary control is concerned with the origin of expenditure.
It is the projection of cost accounts.	It is the projection of financial accounts.
Variances are revealed through different accounts.	Variances are normally not revealed through the accounts.
This system cannot be possible to be operated in parts. All items of expenditure included in the cost or to be accounted for.	It is possible even in parts of expenses according to the attitude of the management. Ex :- Advertising expenses, research.
This system is far more technically improved system by which various causes can be analyzed in minutest details.	Budgeting and control of expenses are more elemental in nature.

5.15.2 Standard Costing vs Estimated Costing

Estimated Costing	Standard Costing
1. Estimated cost can be used in any business which is running under historical costing system	1. Standard cost can be applied in a business under standard costing system.
2. Compilation of estimated cost may be made at any time for any specific purpose. The costs may reflect approximations or less accuracy. It doesn't matter much.	2 Calculation on scientific basic are to be made for arriving at standard costs
3. The use of estimated costs is as statistical data only	3. Standard costs are used as a regular system of accounts form which variances are found out.
4. The primary emphasis under estimation is on the ascertainment of costs and such cost depends on expected actual or average of past performance.	4. The cost control is the main aspect involved under this system. Standard costs serve as yardsticks for measurement of performance
5. Estimated costs can be ascertained for a particular purpose.	5. Standard costs are to be fixed in respect of every element of cost and therefore, it incorporates whole of the manufacturing process.

5.15.3 Standard Costing Vs Marginal Costing

Standard Costing	Marginal Costing
1. Standard costing is a control technique which compares standard costs and revenues with actual results to obtain variances which are used to stimulate improved performance	1. Marginal costing is technique which divides costs into two categories, but of a somewhat different nature. In this case costs are identified as being either fixed or variable, relative to the quantity of output.
2. Standard costing stops at a point when engineered costs, which have a specific relationship with, output, under a controlled situation are scientifically	2. Marginal costing begins after costs are identified as either variable or fixed.

3. Standard costs only explain the relationship between the cost of resources with the value of output with a view to compare the actual costs with the standard cost for the purpose of cost control	3. The marginal costing does not aim at controlling the costs. Its main objective is judicious use of resources so that the profitability increases. Profit planning is the main concern and not cost control.
4. Standard costing which assumes a stable labour force and a certain volume of production of a limited variety of services is more appropriate for specialist business.	4. Marginal costing, which distinguishes the prime cost incurred on a site from the contribution that a contract make to the general overhead of the organization.
5. Though scientifically developed standards for variable costs improve the profit planning exercise, the standards is not the precondition for the marginal costing application.	5. Marginal costing can use approximation and still guide the company's profit planning exercise.

5.16 Analysis of Variances

Standard costing is a technique of cost ascertainment and cost control. The most important managerial use of standard costing is the analysis of variances. Standard costing establishes the predetermined estimates based on management standards of efficient operation. The actual cost can be ascertained only when production is under taken. The predetermined cost is compared with the actual cost. If there is any variance (difference) it enables the management to take necessary corrective measures. Standard costing system is meaningful to management only when the variances are computed and analyzed properly.

The difference between the actual cost and standard cost is variance. In other words, a variance in standard costing refers to the divergence of actual cost from standard cost. If actual cost is less than standard cost, this is a sign of efficiency and the difference is termed as Favorable Variance or Positive variance. If the actual cost is more than standard cost this is a sign of inefficiency and the difference is termed as Unfavorable Variance or Negative variance. The favorable and unfavorable variances are also known as credit and debit variances respectively. Variances of different items of cost provide the key to cost control because they disclose whether and to what extent standards set have been achieved.

Variance Analysis – Definition

Variance Analysis is the process of analyzing variances by sub-dividing the total variance in such a way that the management can assign responsibility for off standard performance. It is a continuous process. It must be followed by intelligence and actual interpretation.

Analysis of variances involves the segregation of total cost variances into different elements in such a way as to indicate or locate clearly the causes of such variances and persons held responsible for them.

Variance Analysis is defined by I.C.M.A. London as "that part of the variance accounting which relates to the analysis into constituent parts of variances between planned and actual performance."

Objectives of Variance Analysis

- To evaluate individual performance by highlighting the difference in terms of costs between attained performance and desired performances
- To assign the responsibilities to individuals to motivate them to achieve the performance targets.

Advantages of Variance Analysis

- Variance analysis is an important tool of cost control and cost reduction.
- It helps the management to apply the principle of management by exception.
- Variance analysis reveals the efficiency of performance of the business concern.
- It helps the management to maximize the profit by analyzing the variances taking corrective steps.
- Variance analysis helps in preparing business plans for various periods.
- It creates consciousness among the staff and develops team spirit among them.
- By controlling costs, variance analysis boosts the profits of the organization.

5.17 CLASSIFICATION OF VARIANCES

Variances indicate the extent to which a desired level of performance as defined by management has been attained. Thy may be segregated by management, by cost and by elements of costs e.g., price and quality. Different variances are used in different industries.

Broadly the variances may be classified into the following categories.

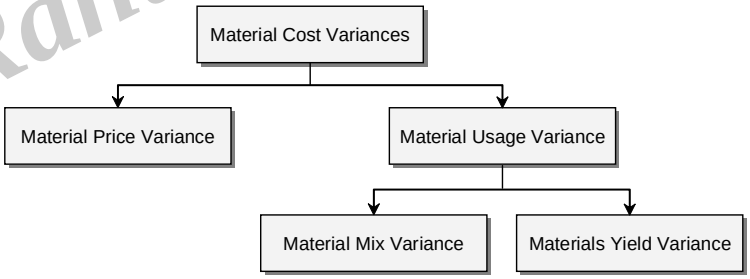
1. Direct Material Variances
2. Direct Labour Variances
3. Overhead Cost Variances
4. Sales or Profit Variances

5.17.1 Direct Material Variances

They are also known as material cost variances. The material cost variances are the difference between the standard cost of materials on the basis of actual production and the actual cost of materials. It comprises of

1. Material Price Variance
2. Material Usage Variance

Material usage variance may further subdivided into material mix variance and material yield variance.



Material variances are thus divided into :-

1. Material Cost Variance
2. Material Price Variance
3. Material Usage Variance
4. Material Mix Variance
5. Material Yield Variance

1. Material Cost Variance

The difference between actual cost of materials and standard cost of materials is known as material cost variance. It arises due to change in price of materials and variations in quality of materials. It is also known as total variance. It is calculated by using the following formula:

$$MCV = (SP \times SQ) - (AP \times AQ)$$

or

Material cost variance = Standard material cost – Actual Material cost

$$MCV = SC - AC$$

Note :

- Standard material cost = Standard quantity of materials (SQ) $\times$ Standard price performance unit
- Actual materials cost = Actual quantity of materials (AQ) $\times$ Actual price performance unit (AP)

  If standard cost is more than actual cost the variance will be favorable. If the actual cost is more than standard cost the variance will be unfavorable or adverse.

2. Material Price Variance

It is that part of material cost variance which is due to difference the actual price paid and the standard price specified for the material. It represents the difference between the standard cost of materials used and the actual cost of material used.

Material Price Variance = Actual Quantity $\times$ Standard Price – Actual Price

or

$$MPV = AQ (SP - AP)$$

Note :

- Here actual quantity of materials used is taken. So, the price of materials is taken performance unit.
- If the standard price is more than the actual price, the variance would be favorable.
- If actual price is more than the standard price the variance would be adverse.

Material price variance may arise due to the following reasons :

1. Fluctuating in market price.
2. Inefficiency in buying
3. Changes in price policies.
4. Emergency purchase leading to rise in prices.
5. Untimely purchase
6. Carelessness in use of materials
7. Changes in methods of production.
8. In correct of setting standards
9. Changes in basic prices of materials.
10. Failure to purchase materials at proper time
11. Failure to get discount on purchases
12. Loss due to pilferage
13. Use of material mix other than standard mix.

3. Material Usage Variance

It is also known as quantity variance. It is that part of material cost variance which is due to difference between the standard quantity specified for output and the actual quantity of materials used. The difference between standard quantity and actual quantity is multiplied by standard price of materials and the resulting figure will be material usage variance.

This variance is calculated as follows :

Material usage variance = Standard rate $\times$ (Standard quantity – Actual quantity)

or

$= SR \times (SQ - AQ)$

Cause for Variance

1. Carelessness in the use of materials handled by workers and other production personnel.
2. Loss due to pilferage.

3. Use of material mix other than the standard mix.
4. Inefficient inspection of raw- materials.
5. Defective production necessitating the use of additional materials.
6. Accounting errors.
7. Non-standards substitutes used.
8. Defective equipments and tools.
9. Excessive wastage, scrap, spoilage, leakage etc.
10. Change in product mix or composition used in the process.
11. Actual yield different from standard yield.
12. Changes in working methodology not yet incorporated in standard.

PROBLEMS ON MATERIAL COST VARIANCE

Problem No. 1

Your given a data of standard and actual material cost of a product.

Standard cost of 200 units of output

Actual cost of 500 units of output.

Standard cost of 200 unit of output			Actual cost of 500 units of output		
Material input	**SQ**	**S.Rate per kg**	**Material input**	**AQ**	**Rate per kg**
X	60 k.g	Rs 20	X	180 kgs	15
Y	40 k.g	Rs 10	Y	90 kgs	12
Z	42 kg	Rs 22	Z	105 kgs	16

Calculate material price variance.

Solution :

Material 'X'

MPV = AQ × (SP – AP)

= 180 × (20 – 15)

= 180 × 5

= 900 (F)

Material 'Y'

MPV = AQ × (SP – AP)

= 90 × (10 – 12)

= 90 × (–2)

= 180 (UF)

Material 'Z'

MPV = AQ × (SP – AP)

= 105 × (22 – 16)

= 105 × (6)

= 630 [Favourable]

Problem No. 2

From the following particulars calculate : (i) Total Material Cost Variance; (ii) Material Price Variance ; and (iii) Material Usage Variance.

Materials	Standard		Actual	
	Units	Price (`)	Units	Price (`)
A	1,010	1.0	1,080	1.2
B	410	1.5	380	1.8
C	350	2.0	380	1.9

Solution:

Workings

Material	Standard Cost			Actual Cost		
	Units	Price (`)	Total (`)	Units	Price (`)	Total (`)
A	1,010	1.0	1,010	1,080	1.2	1,296
B	410	1.5	615	380	1.8	684
C	350	2	700	380	1.9	722
			2,325			2,702

(i) Material Cost Variance

Standard Cost of Materials – Actual Cost of Materials

or St. Quantity × St. Unit Cost – Actual Quantity × Actual Unit Cost.

Materials Cost Variance = ` 2,325 – ` 2,702 = ` 377 Adverse.

(ii) Material Price Variance

Actual Quantity (St. Unit Price - Actual Unit Price)

Materials A : 1,080 Units (` 1 – `1.20) = ` 216 Adverse

Materials B : 380 Units (` 1.5 – ` 1.80) = ` 114 Adverse

Materials C : 380 Units (` 2.0 – ` 1.90) = ` 38 Favourable

Total Material Price Variance = ` 292 Adverse

(iii) Material Usage Variance

St. Price Per Unit (St. Quantity - Actual Quantity)

Materials A : ` 1 (1,010 Units – 1,080 Units) = ` 70 Adverse

Materials B : ` 1.5 (410 Units – 380 Units) = ` 45 Favourable

Materials C : ` 2 (350 Units – 380 Units) = ` 60 Adverse

Total Material Usage Variance = ` 85 Adverse

Verification

Materials Cost Variance = Material Price Variance + Material Usage Variance

` 377 (Adverse) = – ` 292 – ` 85

` 377 (Adverse) = ` 377 (Adverse).

Problem No. 3

Following the data of a manufacturing concern, from the figures given below calculate material cost variance, material price variance, material usage variance.

The standard quantity materials required for producing 1 ton of out put is 40 units. A standard price per unit of material is Rs 3/-. During a particular period 90 tonnes of output was under taken. The materials required for actual production were 4000 units. An amount of Rs. 14000 was spent on purchasing the material.

1. Material cost variance

MCV = (SP × SQ) – (AP × AQ)

AQ = 4000 ; AP = $\frac{14000}{4000} = 3.5$; SP = Rs 3/-

SQ = for 1 Ton of output 40

1 – 40 $\quad \frac{90 \times 40}{40} = 3,600$

90 – ?

MCV = (SP × SQ) – (AP × AQ)

= (3 × 3600) – (3.5 × 4000)

= 10,800 – 14000

= 3200 (UF)

Material price variance

MPV = AQ × (SP – AP)

= 4000 (3 – 3.5)

= 4000 (– 0.5)

= 2000 (UF)

Material usage variance

MUV = MCV – MPV

= (– 3200) – (–2000)

= 1200 (UF)

(OR)

MUV = SP (SQ – Q)

= 3 (3600 – 4000)

= 3 (–400)

= 1200

Problem No. 4

From the data given below calculate material cost variance, material price variance, material usage variance.

Products	SQ (in units)	SP (per unit)	AQ (in units)	AP (per unit)
A	1050	Rs 2	1100	Rs 2.25 ps
B	1500	Rs 3.25	1400	Rs 3.50 ps
C	2100	Rs 3.50	2000	Rs 3.75 ps.

Solution :

Material cost variance

Product - A

MCV = (SP × SQ) – (AP × AQ)

= (2 × 1050) – (2.25 × 1100)

= 2100 – 2475

MCV = 375 (UF)

Material Price variance

MPV = AQ (SP – SQ)

= 1100 (2 – 2.25)

= 1100 (–0.25)

= (275) (UF)

Material usage variance.

SP (SQ – AQ)

2 (1050 – 1100)

2 (–50)

= 100 (UF)

Product – B

MCV = (SP × SQ) – (AP × AQ)

= (3.25 × 1500) – (3.50 × 1400)

= 4875 – 4900

= 25 (UF)

MPV = AQ (SP – SQ)

= 1400 (3.25 – 3.5)

= 1400 (– 0.75)

= 350 (UF)

MUV = SP (SQ – AQ)

= 3.25 (1500 – 1400)

= 3.25 (100)

= 325 (UF)

Product - C

MCV = (SP × SQ) – (AP × AQ)

= (3.5 × 2100) – (3.75 × 2000)

= 7350 – 7500 = MCV ® 150 (UF)

MPV = AQ (SP – AP)

= 2000 (3.5 – 3.75) = – 500 (UF)

MUV = SP (AQ – AQ)

= 3.5 (2100 – 2000) = 3.5 (100)

= 350 (F)

Product	MCV	MPV	MUV
A	– 375	– 375	– 100
B	–25	–350	325
C	– 150	–500	350
	unfavourable – 550	unfavourable – 1125	575 Favourable

Verification

MCV = MPV + MUV

550 (A) = 1125 A + 575 F

550 (A) = 550 (A)

4) Material Mix Variance

It the sub-variance of material usage variance. It arises if a different blend of mix of material is used than specified. When two or more materials are used in the manufacture of a product, the difference between the standard composition and the actual composition of material mix is the material mix variance. In other words any difference between materials actually used and those specified by the formula constitutes material mix variance.

Causes for Variance

1. Using expensive/cheaper substitutes.
2. Short supply of material .
3. In efficiency of production department in mixing the materials.
4. Change in the quality of the product.

Calculation of Material Mix Variance

It is calculated din the following two situations :

1. When the actual weight of mix is equal to standard weight of mix :-
   Material mix variance = Standard cost of standard mix – Standard cost of actual mix

   or

   = (Standard price $\times$ Standard quantity) – (Standard Price $\times$ Actual quantity)

   In case standard quantity is revised due to shortage of one material, the formula will be Standard unit cost (revised standard quantity – actual quantity)
2. When actual weight of mix is different from standard weight of mix :-
   When quantities of actual material mix and standard material mix are different the following formula is used to calculate material mix variance :
   Material mix variance

$$= \frac{\text{Total weight of actual mix}}{\text{Total weight of standard mix}} \times \text{Standard cost of standard mix}$$

   = Standard cost of actual mix

   In case the standard is revised due to shortage of one material then revised standard will be used instead of standard, the formula will become :
   Material mix variance

$$= \frac{\text{Total weight of actual mix}}{\text{Total weight of revised standard mix}} \times \frac{\text{Standard cost of revised}}{\text{standard mix}}$$

PROBLEMS ON MATERIAL MIX VARIANCE

Problem No. 1

From the following information, calculate the materials mix variance.

Materials	Standard	Actual
A	200 units @ ` 12	160 Units @ ` 13
B	100 units @ ` 10	140 Units @ ` 10

Due to shortage of material A, it was decided to reduce consumption of A by 15% and increase that of material B by 30%.

Solution :

Revised Standard Mix is :

Material A : 200 units – 15% of 200 = 170 units

B : 100 units + 30% of 100 = 130 units

Materials Mix Variance

Standard Unit Cost (Revised Standard Quantity – Actual Quantity)

Material A : ` 12 (170 units – 160 units) = ` 120 Favourable

Material B : ` 10 (130 units – 140 units) = ` 100 Adverse

Material Mix Variance = ` 20 Favourable

(ii) When actual weight of mix difference from the standard weight of mix. In such a case, material mix variance is calculated as follows:

$$\left[\frac{\text{Total Weight of Acutal Mix}}{\text{Total Weight of (Revised) St. Mix}} \times \text{St. Cost of (Revised) St. Mix}\right]$$

– St. Cost of Actual Mix

This formula is necessitated to adjust the total weight of standard mix to the total weight of actual mix which is more or less than the weight of standard mix.

Problem No. 2

From the following Information calculate material mix variance.

Material	Standard		Actual	
	Qty (unit)	Price (per unit)	Qty (unit)	Price (per unit)
A	40	10	50	12
B	60	5	50	8

MMV = SP (SQ – AQ)

Standard material mix = 40 + 60 = 100 units

Actual material mix = 50 + 50 = 100 units

∴ Standard material mix = Actual material mix

MMV = SP (SQ – AQ)

Material - A

= 10 (40 – 50)

= 10 (–10)

= 100 (UF)

Material - B

MMV = 5 (60 – 50)

= 5 (10)

= 50 favarable

Material = A ® –100

Material = B ® 50

MMV = 50 (UF)

Problem No. 3

Calculate material mix variance from the data given below.

Material	Standard		Actual	
	Qty	Price	Qty	Price
A	50	2	60	2.25
B	100	1.20	90	1.75

Due to shortage of material A the use of material A was reduced by 10% and that of material 'B' Increased by 5%.

Solution :

Calculating Revised Standard Quantities (RSQ'S)

Material A $\rightarrow$ 50 – 10% $\Rightarrow$ 45

Material B $\rightarrow$ 100 + 5% = 105.

Revised standard material mix = 45 + 105 = 150 units

Actual material mix = (60 + 90) = 150 units.

$\therefore$ Standard mix = Actual mix.

MMV = SP (RSQ – AQ)

Material - A

MMV = 2 (45 – 60)

= 2 (–15) = – 30 (UF)

Material - B

MMV = SP (RSQ – AQ)
= 1.20 (105 – 90)
= 1.20 (15)
= 18 (F)

Material A → –30
Material B → 18
– 12 unfavourable

Material cost variance

Material - A

MCV = (SP × SQ) – (AP × AQ)
= (2 × 45) – (2.25 × 60)
= 90 – 135
= 45 (UF)

MPV = AQ (SP – AP)
= 60 (2 – 2.25)
= 60 (– 0.25)
= 15 (UF)

MUV = SP (SQ – AQ)
= 2 (45 – 60)
= 2 (–15) = 30 (UF)

Material - B

MCV = (SP × SQ) – (AP × AQ)
= (1.20 × 105) – (1.75 × 90)
= 126 – 157.5
= 31.5 (UF)

MPV = AQ (SP – AP)
= 90 (1.20 – 1.75)
= 90 (– 0.55)
= 49.5 (UF)

MUV = SP (SQ – AQ)
= 1.2 (105 – 90)
= 1.2 (15) = 18 (F).

Verification

MCV = MPV + MUV

31.5 (VF) = 49.5 UF + 18 F

31.5 (VF) = 31.5 (UF)

Problem No. 4

From the following data calculate material mix, variance, material cost variance, MPV and MUV.

Material	Standard		Actual	
	Qty	Price	Qty	Price
A	80	Rs. 8	90	Rs. 750
B	70	Rs. 3	80	Rs. 4

Solution :

Standard mix of material = 80 + 70 = 150 units

Actual mix of material = 90 + 80 = 170 units

∴ Standard mix is not equal to actual mix of material.

Step No : 1

Calculating standard cost of standard mix (SSM)

SSM = SP × SQ

Material A → 8 × 80 = 640

Material B → 3 × 70 = 210

850

Step No : 2

Calculating standard cost of Actual mix (SAM)

SAM = SP × AQ

Material A → 8 × 90 → 720

Material B → 3 × 80 → 240

960

Step No : 3

Calculating material mix variance (MMV)

$$MMV = \left[\frac{\text{TOTAL WEIGHT OF ACTUAL MIX}}{\text{TOTAL WEIGHT OF STANDARD MIX}} \times SSM\right] - [SAM]$$

$$MMV = \left[\frac{170}{150} \times 850\right] - 960$$

MMV = 963.33 – 960

∴ MMV = 3.33 (UF).

Problem No. 5

From the following information, compute different direct material variance

Material	Standard			Actual		
	Qty [kgs]	Unit price	Total	Qty [kgs]	Unit price	Total
A Material	10	2	20	5	3	15
B Material	20	3	60	10	6	60
C Material	20	6	120	15	5	75
Total	50	4	200	30	5	150

Solution :

1. Material Mix Variance

Standard mix of material = 10 + 20 + 20 = 50 units

Actual mix of material = 5 + 10 + 15 = 30 units

$\therefore$ Standard mix is not equal to actual mix of material.

Step No : 1

Calculating standard cost of standard mix (SSM)

SSM = SP × SQ

Material A $\rightarrow$ 2 × 10 = 20

Material B $\rightarrow$ 3 × 20 = 60

Material C $\rightarrow$ 6 × 20 = 120

200

Step No : 2

Calculating standard cost of Actual mix (SAM)

SAM = SP × AQ

Material A $\rightarrow$ 2 × 5 $\rightarrow$ 10

Material B $\rightarrow$ 3 × 10 $\rightarrow$ 30

Material C $\rightarrow$ 6 × 15 $\rightarrow$ 90

130

Step No : 3

Calculating material mix variance

$$MMV = \left[\frac{\text{TOTAL WEIGHT OF ACTUAL MIX}}{\text{TOTAL WEIGHT OF STANDARD MIX}} \times SSM\right] - [SSM]$$

$$= \left[\frac{30}{50} \times 200\right] - 130$$

$$= 120 - 130$$

$\therefore$ MMV = 10 (UF)

2. Calculating material cost variance

MCV = (SP × SQ) – (AP × AQ)

Material A $\Rightarrow$ (2 × 10) – (3 × 5)

= 20 – 15 = 5

$\therefore$ MCV = 5 (F)

Material B

MCV = (SP × SQ) – (AP × AQ)

= (3 × 20) – (6 × 10)

= 60 – 60

= 0

Material C

MCV = (SP × SQ) – (AP × AQ)

= (6 × 20) – (5 × 15)

= 120 – 75

MCV = 45 (F)

3. Calculating material price variance

Material A $\rightarrow$ AQ (SP – AP)

MPV $\rightarrow$ 5 (2 – 3)

$\rightarrow$ 5 (–1)

MPV = 5 (UF)

Material B → AQ (SP – AP)

MPV → 10 (3 – 6)

→ 10 (–3)

MPV → 30 (UF)

Material C

MPV = AQ (SP – AP)

= 15 (6 – 5)

= 15 (1)

= 15 (F)

4. Calculating material usage variance

Material A → SP (SQ – AQ)

MUV → 2 (10 – 5)

= 2 (5)

MUV = 10 (F)

Material B → SP (SQ – AQ)

MUV → 3 (20 – 10)

3 (10)

∴ MUV → 30 (F)

Material C → SP (SQ – AQ)

→ 6 (20 – 15)

∴ MUV → 6 (5)

MUV → 30 (F).

5. Material Yield Variance

It is the difference between actual yield and standard yield. This is the sub variance of material usage variance. This variance measures the abnormal loss or saving materials. This variance is particularly important in the use of process industries where certain percentage of loss of materials is inevitable. If the actual loss of materials differs from standard loss of materials yield variance will arise.

Causes of Variance

1. Lower yield due to non-standard material
2. Use of inferior quality materials

3. Pilferage of materials
4. Failure to return excess materials to the stores
5. Accounting errors
6. Rigid inspecting, resulting more rejections requiring additional materials
7. Increased rate of scrap than anticipated
8. Inefficient production methods
9. Inaccurate standards
10. Substandard equipment and tools

It is calculated as follows :

1. When the actual mix and standard mix are the same :-

$$\text{Material yield variance} = \frac{\text{Standard cost of standard mix}}{\text{Net standard output i.e. (Gross output - standard loss)}}$$

2. When the actual mix and standard mix differ from each other :-

$$\text{Material yield variance standard rate} = \frac{\text{Standard cost of revised standard mix}}{\text{Net standard output}}$$

In this variance it should be remembered that when actual yield is more than the standard yield, the variance is favorable.

PROBLEMS ON MATERIAL YIELD VARIANCE

Problem No. 1

From the following data, calculate materials yield variance:

Particulars	Standard Mix	Actual Mix
Material A	200 units @ ` 12	160 units @ ` 13
Material B	100 units @ ` 10	140 units @ ` 10

Standard loss allowed is 10% of input. Actual output is 275 units.

Solution :

In this case standard and actual mix do not differ. So there is no need of calculating revised standard mix.

	Standard Mix		Actual Mix	
Materials A	200 units @	` 12 = ` 2,400	160 units @	` 13 = ` 2,080
Materials B	100 units @	` 10 = ` 1,000	140 units @	` 10 = ` 1,400
	300 units	` 3,400	300 units	` 3,480
Less : Loss (10%)	30 units	–	25 units	–
Output	270 units	` 3,400	275 units	` 3,480

Standard Cost per unit = ` $\frac{3,400}{270}$ = ` 12.593

Yield Variance = Standard Rate (Actual yield – Standard Yield)
= ` 12.593 (275 units – 270 units)
= ` 12.593 × 5 = ` 62.965 Favourable

Problem No. 2

From the following data, calculate material yield variance:

Particulars	Standard Mix	Actual Mix
Material A	60 units costing ` 3,000	300 units costing ` 15,300
Material B	40 units costing ` 1,200	200 units costing ` 5,600

Standard loss allowed is 10% of input and standard rate of scrap realisation is ` 6 per unit. Actual output is 440 units.

Solution :

Particulars	Standard Mix		Actual Mix
	Units	Amount	Units
Material A	60	` 3,000	300
Material B	40	` 1,200	200
	100	` 4,200	500
Std. loss (10%) (100 × 10%)	10	(Scrap of 10 units @ `6 per)	60
Output	90	` 4,140	440

Standard cost per unit = $\frac{` 4,140}{90}$ = ` 46

Yield Variance = St. Cost per unit (Actual Yield – St. Yield) = ` 46 (440 units – 450 units)

= ` 460 Adverse

Standard Yield = Actual Material Mix – 10% of Actual Material Mix

$$= (300 \text{ units of A} + 200 \text{ units of B}) - \frac{10}{100} \times 500$$

= 500 – 50 = 450 units

PROBLEM ON ALL MATERIAL VARIANCES

Problem No. 1

The standard cost of a chemical mixture is as under:

8 tons of material A at ` 40 per ton.

12 tons of material B at ` 60 per ton.

Standard yield is 90% of input.

Actual cost for a period is as under :

10 tons of material A at ` 30 per ton

20 tons of material B at ` 68 per ton

Actual Yield is 26.5 tons.

Compute all materials variances.

Solution :

Workings

Raw Materials	Standard Cost			Actual Cost			Revised Standard Cost			Standard Cost of
	Units	Rate	Total	Units	Rate	Total	Units	Rate	Total	Actual Mix
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(3) × (5)
		`	`		`	`		`	`	`
A	8	40	320	10	30	300	12	40	480	400
B	12	60	720	20	68	1,360	18	60	1,080	1,200
	20		1,040	30		1,660	30		1,560	
Loss	2		–	3.5		–	3		–	
	18		1,040	26.5		1,660	27		1,560	1,600

(a) Materials Cost Variance

Standard Cost of Materials – Actual Cost of Actual Materials

$$= \frac{` 1,040}{18} \times 26.5 - ` 1,660 = ` 1,531 - ` 1,660 = ` 129 \text{ (A)}$$

(b) Materials Price Variance

Actual Usage (St. Price – Actual Price)

Materials A : 10 tons (` 40 – ` 30) = ` 100 (F)

Materials B : 20 tons (` 60 – ` 68) = ` 160 (A)

Materials Price Variance = ` 60 (A)

(c) Materials Usage Variance

Standard Price (Standard Usage – Actual Usage)

Material A : ` 40 $\left(\frac{8}{18} \times 26.5 \text{ tonnes} - 10 \text{ tons}\right)$ = ` 71 (F)

Material B : ` 60 $\left(\frac{12}{18} \times 26.5 \text{ tons} - 20 \text{ tons}\right)$ = ` 140 (A)

` 69 (A)

(d) Materials Mix Variance

= Standard Cost of Revised Standard Mix – Standard Cost of Actual Mix

= `1,560 – `1,600 = `40 (A)

(e) Yield Variance

Standard Rate Per Unit (Actual Yield – Standard Yield)

= ` $\frac{1,560}{27}$ (26.5 tons – 27 tons) = ` 29 (A)

Verification

MCV = MPV + MUV

129 (A) = 60 A + 69 (A)

129 (A) = 129 (A)

Materials Usage Variance = Materials Mix Variance + Materials Yield Variance

`69 Unfavourable = ` – 40 – `29 = `69 Unfavourable.

5.17.2 Direct Labour Variances

Labour variances are also called as labour cost variance or direct wage variance. It is compute like material cost variance. Labour variance arise because of

i) difference in actual rates and standard rates of labour and

ii) the variation in actual time taken by worker and the standard time allotted to them for performing a job.

The various labour variances can be analyzed as follows :

a) labour cost variance
b) labour rate variance
c) labour efficiency variance
d) labour idle time variance
e) labour mix variance or gang composition variance

Labour variances can be analyzed as follows :

a) Labour cost variance : It is the difference between the standard cost of labour allowed (as per standard laid down) for the actual output achieved and the actual cost of labour employed. It is also known as wages variance.

Labour cost variance = Standard cost of labour – Actual cost of labour

b) Labour rate variance : It is that portion of the labour cost variance, which arises due to the difference between the standard rate specified and the actual rate paid.

It is calculated as follows :

Rate of pay variance = actual time taken (standard rate – actual rate)

c) Total labour efficiency variance : It is that part of labour cost variance which arises due to the difference between standard labour cost of standard time for actual output and standard cost of actual time paid for.

It is calculated as follows :

Total labour efficiency variance = Standard rate (standard time for actual output – actual time paid for)

d) Labour efficiency variance : It is that portion of labour cost variance which arises due to the difference between standard labour hours specified for the output achieved and the actual labour hours spent.

Labour efficiency variance = Standard rate (standard time for actual output – actual time worked)

e) Labour idle time variance : It is calculated only when there is abnormal idle time. It is the portion of labour cost variance, which is due to the abnormal idle time of workers. While calculating labour efficiency variance abnormal idle time is deducted from actual time expended to ascertain the real efficiency of the workers.

Labour idle time variance is expressed as :

Idle time variance = abnormal idle time $\times$ standard rate.

Total labour cost variance = labour rate of pay variance + total labour efficiency variance

PROBLEMS ON LABOUR RATE VARIANCE

Problem No. 1

The information regarding the composition and the weekly wage rate of labour force engaged on a job scheduled to be completed in 30 weeks are as follows.

Standard

Skilled → 75 worker Rs 60 per week per worker

Semi - Skilled → 45 workers Rs 40 per week per worker

Un. Skilled Worker – 60 worker Rs 30 per week per worker.

Actual

Skilled = 70 worker Rs 70 per week per worker

Semi-skilled = 30 worker Rs 50 per week per worker

unskilled = 80 worker Rs 20 per week per worker

the work was completed in 32 weeks. Calculate LCV, LRV and LEV.

Solution :

Calculating Labour Cost Variance

LCV = (SH for AO × SR) – (AH × AR)

Skilled = (30 × 60 × 75) – (32 × 70 × 70)

= 135000 – 156,800

= 21,800 (A)

SEMI - SKILLED

(30 × 45 × 40) – (32 × 30 × 50)

= 54,000 – 48,000

= 6,000 (F)

UN - SKILLED

(30 × 60 × 30) – (32 × 80 × 20)

= 54000 – 51200

= 2800 (F)

CALCULATION OF LABOUR RATE VARIANCE

Calculating Actual Hours. (AH)

Skilled = 70 × 32 = 2240

Semi -Skilled = 30 × 32 = 960

un skilled = 80 × 32 = 2560

Calculating standard Hour (SH)

Skilled →	75 × 30	→	2250
Semi-Skilled →	45 × 30	→	1350
Un-skilled →	60 × 30	→	1800
			5400

LRV → AH (SR – AR)

SKILLED

2240 (60 – 70)

2240 (– 10)

22,400 (A)

SEMI SKILLED

960 (40 – 50)

960 (– 10)

= 9600 (A)

UN-SKILLED

= 2560 (30 – 20)

= 2560 (10)

= 25,600 (F)

∴ **Labour Rate Variance**

Skilled + Semi Skilled + Un-skilled

(A)22400 + 9600 (A) + 25600 (F)

= 6400 (A)

Calculating labour Efficiency variance

LEV = SR (SH – AH)

Material A → 60 (2250 – 2240)

60 (10)

LEV = 600 (F)

Material B → 40 (1350 – 960)

→ 40 (390)

LEV = 15,600 (F)

Material C → 30 (1800 – 2560)

30 (– 760)

LEV = 22,800 (A)

Problem No. 2

The information regarding the composition and weekly wage Rates of labour force engaged on specific job scheduled to be completed in 48 hours.

Worker	Standard		Actual	
	No. of worker	Rate per hour	No. of worker	Rate per hour
Skilled	40	Rs 10	50	Rs 12
Un Skilled	20	Rs 8	30	Rs 6

The work was competed in 54 hours calculate labour cost, labour rate variance, labour efficiency.

Solution :

Calculation of Labour cost variance

LCV = (SH × SR) – (AH × AR)

Skilled = (40 × 10) – (50 × 12)

= 400 – 600 = 200 (A)

Un-Skilled = [20 × 8] – [30 × 6] = 160 – 180 = 20 (A)

Calculation of Labour rate variance

LRV = AH (SR – AR)

Skilled = 50 (10 – 12) = 50 (–2) = 100 (A)

Un-skilled : 30 (8 – 6) = 30 (2) = 60 (F)

Calculation of Labour efficiency variance

LEV = SR (SH – AH)

Skilled : 10 (40 – 50) = 10 (–10) = 100 (A)

Un-skilled : 8 (20 – 30) = 8 (–10) = 80(A)

Problem No. 3

In a manufacturing concern, the following data is taken out.

Budget labour composition for producing = 100 articles

20 men at 1.20 paisa per hour for 25 hours.

30 women at 1.10 paisa per hour for 30 hours

Actual labour composition for producing 100 articles.

25 men at 1.50 paisa per hour for 24 hours.

25 woman at 1.20 paisa per hour for 25 hours

Calculate labour cost variance, labour rate variance and labour efficient various.

Solution :

Calculating 7 standard hours

Given standard out put = 100 articles

Actual out put = 100 Articles

∴ Given men standard hours = 20 × 25 = 500

Standard hours for women = 30 × 30 = 900

Actual hours for men 25 × 24 = 600

Actual hours for woman 25 × 25 = 625

Calculation of labour cost variance

LCV = (SH for AO × SR) – (AH × AR)

men = (500 × 1.20) – (600 × 1.50)

= 600 – 90

= 300 (A)

women = (900 × 1.10) – (625 × 1.2)
= 990 – 750 = 240 (f)
∴ LCV = men = 300 (A)
women = 240 (f)
60 (A)

Calculation of labour rate variance

LRV = AH (SR – AR)
men = 600 (1.2 – 1.5) = 600 (– 0.3) = 180 (F)
Women = 625 (1.10 – 1.20) = 625 (– 0.10) = 62.5 (A)
∴ Total LRV mix
men = 180 (A)
woman = 62.5 (A)
242.5 (A)

LEV = SR (SH – AH)
men = 1.5 (500 – 600)
= 1.5 (– 100) = 150 (A)
woman = 1.2 (900 – 625)
= 1.2 (275) = 330 (F).

Problem No. 4

The standard cost card shows the following information.

Labour Rate = 0.50 per hour

Hours set up = per unit of production 10 hours

Actual data Are given below

Units produced = 500

Hours worked = 6000

Actual labour cost = Rs 2400

Idle time due to power failure = 50 hours

Calculate : i) Labour cost variance ii) Labour rate variance

iii) Labour efficiency variance iv) Labour idle time variance

Solution :

Calculating Standard Hours

1 –– 10 hours

500 –– ? $\frac{500 \times 10}{1} = 5000$ hours.

$\therefore$ SH = 5000

AH = 6000

SR = 0.50

AR = $\frac{2400}{6000} = 0.4$

LCV = (SH × SR) – (AH × AR) = (5000 × 0.5) – (6000 × 0.4)

= 2500 – 2400 = 100 (F)

LEV = SR (SH – AH) = 0.50 (5000 – 6000)

0.50 (– 1000) = 500 (A)

LRV = AH (SR – AR)

= 6000 (0.5 – 0.4)

= 6000 (0.1) = 600 (F)

Labour Idle Time variance = Idle hour × Standard Rate

= 50 × 0.5 = 25 (A)

Note : SR = Standard Rate AP = Actual price

SP = Standard price AQ = Actual Quantity

SQ = Standard Quantity SY = Standard yield

AY = Actual yield.

Problem No. 5

Calculate variances from the following data :

Particulars	Standard	Actual
Number of men employed	100	90
Output in units	5,000	4,800
Number of working days in a month	20	18
Average wages per man per month	` 200	` 198

Solution:

First, we calculate standard rate, actual rate, standard time and actual time which are not directly given in the question.

Standard wages per man per month = ` 200

Standard working days in a month = 20

∴ Standard rate per day = ` $\frac{200}{20}$ = ` 10

Actual wages per man per month = ` 198

Actual working days in a month = 18

∴ Actual rate per day = ` $\frac{198}{18}$ = ` 11

Standard man days for an output of 5,000 units = 100 × 20 = 2,000 man days

∴ Standard man days for the actual output of 4,800 units = $\frac{2,000}{5,000}$ × 4,800 = 1,920 man days.

Actual man days = men x working days = 90 × 18 = 1,620 man days.

(a) Labour Cost Variance

Labour Cost Variance = Standard Cost of Labour – Actual Cost of Labour.

For. 5,000 units Standard cost of labour = 100 workers @ ` 200 = ` 20,000.

∴ For the actual output of 4,800 units, Standard cost of labour

= $\frac{2,000}{5,000}$ × 4,800

= `19,200.

Actual Cost of Labour = 90 workers @ ` 198 = ` 17,820.

∴ Labour Cost Variance = ` 19,200 – ` 17,820 = ` 1,380 (F)

(b) Rate of Pay Variance

Actual Time (Standard Rate – Actual Rate)

1,620 man days (` 10 – ` 11) = ` 1,620 (A)

(c) Labour Efficiency Variance

Standard Rate (Standard Time – Actual time)

` 10 (1,920 man days – 1,620 man days) = ` 3,000 (F)

Verification = LCV = LRV + LEV

1380 (F) = 1620 (A) + 3000 (F)

1380 (F) = 1380 (F)

Problem No. 6

Using the following information, calculate labour variances :

Gross direct wages = ` 3,000

Standard hours produced = 1,600

Standard rate per hour = ` 1.50

Actual hours paid 1,500 hours, out of which hours not worked (abnormal idle time) are 50.

Solution

(a) Labour Cost Variance

Standard Cost of Labour – Actual Cost of Labour or

or Standard Hours × Standard Rate – Actual Hours × Actual Rate

1,600 × ` 1.50 – 1,500 × ` 2 = ` 600 (Adverse)

$$\left(\text{Actual Rate} = \frac{\text{Gross Direct Wages}}{\text{Actual Time}} = \text{`} \frac{3,000}{1,500 \text{ hours}} = \text{`} 2 \text{ per hour} \right)$$

(b) Labour Rate of Pay Variance

Actual Time (Standard Rate – Actual Rate)

= 1,500 hours (` 1.50 – ` 2) = ` 750 (Adverse)

(c) Total Labour Efficiency Variance

= SR (ST for AO – AT paid for)

= ` 1.50 (1,600 Hours – 1,500 Hours) = ` 150 (F)

(d) Labour Efficiency Variance

Standard Rate (Standard Time – Actual Time Worked)

` 1.50 (1,600 Hours – 1,450 Hours) = ` 225 Favourable

(Actual Time = Actual Hours Paid - Idle Hours i.e. 1,500 – 50 = 1,450 Hours)

(e) Idle Time Variance

Abnormal Idle Time × Standard Rate

50 Hours × ` 1.50 = ` 75 Adverse

Verification

Labour Cost Variance = Rate of Pay Variance + Efficiency Variance
+ Idle Time Variance f 600 Adverse

= – ` 750 + ` 225 – ` 75 = ` 600 Adverse.

f) Labour Mix variance or Gang composition variance

It is like materials mix variance and is a part of labour efficiency variance. This variance shows to the management as to how much of the labour cost variance is due to the change in the composition of labour force.

It is calculated as follows :

i) If there is no change in the standard composition labour force and total time expended is equal to the total standard time, the formula is :

Labour mix variance = standard cost of standard composition (for actual time taken) – standard cost of actual composition (for actual time worked)

ii) If the standard composition of labour force is revised due to shortage of a particular type of labour and total time expended is equal to the total standard time, the formula is :

Labour Mix variance = standard cost of revised standard composition (for actual time taken) – standard cost of actual composition (for actual time worked)

iii) If the total actual time of labour differs from the total standard time of labour, the formula is :

$$\frac{\text{Total time of actual labour composition}}{\text{Total time of standard labour composition}} \times \frac{(\text{Standard cost of standard composition}) - (\text{Standard cost of actual composition})}{}$$

iv) If the standard is revised and the total actual time of labour differs from the total standard time of labour, the formula for the calculation of labour mix is :

Labour mix variance =

$$\frac{\text{Total time of actual labour composition}}{\text{Total time of revised standard labour composition}} \times \begin{matrix}(\text{Standard cost of revised standard composition}) \\ -(\text{Standard cost of actual composition})\end{matrix}$$

PROBLEMS ON LABOUR EFFICIENCY VARIANCE

Problem No. 1

Trishul Industries turns out only one article, the prime cost standards for which have been established as follows :

	Per Completed Piece
Material – 5 lbs. @ ` 4.20	` 21
Labour – 3 hours @ ` 3	` 9

The production schedule for the month of July, 2010 required completion of 5,000 pieces. However, 5,120 pieces were actually completed.

Purchases for the month of July 2010 amounted to 30,000 lbs. of material at the total invoice price of ` 1,35,000.

Production records for the month of July, 2010 showed the following actual results.

Materials requisitioned and used 25,700 lbs.

Direct labour – 15,150 hours ` 48,480

Calculate appropriate material and labour variances.

Solution :

(a) Material Cost Variance

Standard Unit Cost of Material × Actual Output – Actual Cost of Material

$$` 21 \times 5{,}120 \text{ pieces} - \frac{` 1,35,000}{30,000 \text{ lbs.}} \times 25{,}700 \text{ lbs.}$$

= ` 1,07,520 – ` 1,15,650 = ` 8,130 Adverse

(b) Material Price Variance

Actual Usage (Standard Unit Price – Actual Unit Price)

$$= 25{,}700 \text{ lbs.} \left[` 4.20 - \frac{` 1,35,000}{30,000} \right]$$

= 25,700 lbs. (` 4.20 – ` 4.50) = ` 7,710 Adverse

(c) Material Usage Variance

Standard Unit Price (Standard Usage - Actual Usage)

` 4.20 (5,120 × 5 lbs. – 25,700 lbs.)

= ` 4.20 (25,600 lbs. – 25,700 lbs.) = ` 420 Adverse

Verification

MCV = MPV + MUV

8130 (A) = 7710 (A) + 420 (A)

8130 (A) = 8130 (A)

(d) Labour Cost Variance

Standard Labour Cost per unit × Actual Output – Actual Cost of Labour

` 9 × 5,120 pieces – ` 48,480

= ` 46,080 – ` 48,480 = ` 2,400 Adverse

(e) Labour Rate of Pay Variance

Actual Time (Standard Rate – Actual Rate)

$15{,}150 \text{ hours} \left[` 3 - \frac{` 48{,}480}{15{,}150} \right]$ = ` 45,450 – ` 48,480 = ` 3,030 Adverse

(f) Labour Efficiency Variance

Standard Rate (Standard Time – Actual Time)

` 3(5,120 × 3 hours – 15,150 hours) = ` 3 (15,360 – 15,150)

= ` 630 Favourable.

Verification

LCV = LRV + LEV

2400 (A) = 3030(A) + 630(F)

2400 (A) = 2400 (A)

Problem No. 2

In a factory the budgeted and actual figures of the cost of materials and direct labour incurred in the production during the month of January are as under :

Particulars	**Actual**	**Budgeted**
Units of Finished Goods Produced	90,000	1,00,000
Materials :		
Units	1,82,000	2,00,000
Cost of Materials per unit	` 0.52	` 0.50
Total Cost of Materials	` 94,640	` 1,00,000
Direct Labour Hours	47,000	50,000
(2 units of finished goods in one hour)		
Wages	`2.10 per hour	` 2.00 per hour
Total Direct Labour Cost	` 98,700	` 1,00,000

You are required to calculate the material and labour variances.

Solution :

Material Price Variance

Actual Usage (Standard Unit Price – Actual Unit Price)

1,82,000 Units (` 0.50 – ` 0.52) = ` 3,640 (A)

Material Usage Variance

Standard Unit Price (Standard Usage – Actual Usage)

` 0.50 (90,000 Units @ 2 units of material – 1,82,000 units)

= ` 0.50 (1,80,000 Units – 1,82,000 units) = ` 1,000 (A)

Note:

Budgeted units of materials for 1,00,000 budgeted units of finished product are 2,00,000 units, so budgeted units of material for 1 unit of finished product are $2 \left(\text{i.e.,} \frac{2,00,000}{1,00,000} \right)$

Labour Rate of Pay Variance

Actual Time (Standard Rate – Actual Rate)

47,000 hours (` 2.00 – ` 2.10) = ` 4,700 (A)

Labour Efficiency Variance

Standard Rate (Standard Time – Actual Time)

$` 2 \left( \frac{90,000}{2} \text{ hours} - 47,000 \text{ hours} \right) = ` 4,000 (A)$

Verification

Standard cost for 90,000 units of actual output:	`
Material cost for 90,000 units @ 2 units of material per unit of finished product @ ` 0.50 per unit of material	90,000
Labour cost for 90,000 units @ 2 units of finished goods in one hour i.e., 45,000 hours @ ` 2 per labour hour	90,000
Total Standard Cost	1,80,000

Variances

	`	
Material Price Variance	3,640 (A)	
Material Usage Variance	1,000 (A)	
Labour Rate of Pay Variance	4,700 (A)	
Labour Efficiency Variance	4,000 (A)	
		13,340
Actual Cost of Material and Labour (` 94,640 + ` 98, 700)		1,93,340

Problem No. 3

Following standards have been sent to manufacture a product by a company:

Direct Material :	`
Units of 'A' @ ` 4 per unit	8.00
Units of 'B' @ ` per unit	9.00
15 units of 'C' @ ` 1 per unit	15.00
Direct Labour :	
3 labour hours @ ` 8 per labour hour	24.00
Total Standard Prime Cost	56.00

The company had manufactured and sold 6,000 units of the product during the year. Direct material costs incurred were as follows:

12,500 units of 'A' @ ` 4.40 per unit

18,000 units of 'B' @ ` 2.80 per unit

88,500 units of 'C' @ ` 1.20 per unit

The company worked for 17,500 direct labour hours during the year. For 2,500 of these labour hours, the company paid @ ` 12 per labour hour, while for the remaining labour hours, it paid a the standard rate. You are required to calculate:

(i) Material price, Usage, Mixture and Yield variances;

(ii) Labour rate and Efficiency variances.

Solution :

Particulars	Standard for 6,000 units			Actual		
	Qty.	Rate (`)	Amount (`)	Qty.	Rate (`)	Amount (`)
A	12,000	4	48,000	12,500	4.40	55.000
B	18,000	3	54,000	18,000	2.80	50,400
C	90,000	1	90,000	88,500	1.20	1,06,200
Total	1,20,00		1,92,00	1,19,00		2,11,600

(i) 1. Material Price Variance = (SP – AP) × AQ

A = (4 – 4.40) × 12,500 = ` 5,000 (A)

B = (3 – 2.80) × 18,000 = ` 3,600 (A)

C = (1 – 1.20) × 88,500 = ` 17,700 (A)

MPV = ` 19,100 (A)

2. Material Usage Variance = (SQ – AQ) × SP

A = (12,000 – 12,500) × 4 = ` 2,000 (A)

B = (18,000 – 18,000) × 3 = ` Nil

C = (90,000 – 88,500) × 1 = ` 1,500 (F)

MPV = ` 500 (A)

3. Material Mix Variance = (RSQ – AQ) × SP

$$A = \left(1,19,000 \times \frac{12,000}{1,20,000} - 12,500\right) \times 4 = ` \quad 2,400 \text{ (A)}$$

$$B = \left(1,19,000 \times \frac{18,000}{1,20,000} - 18,000\right) \times 3 = ` \quad 450 \text{ (A)}$$

$$C = \left(1,19,000 \times \frac{90,000}{1,20,000} - 88,500\right) \times 1 = ` \quad 750 \text{ (A)}$$

MPV = ` 2,100 (A)

4. Material Yield Variance = (Actual Yield – St. Yield) × SP

$$MYV = (6,000 - 5,950^*) \times \frac{`1,92,000}{6,000 \text{ units}} = 5,950 \text{ units}$$

$$^*\text{St. Yield} = 6,000 \text{ units} \times \frac{1,19,000}{1,20,000} = 5,950 \text{ units}$$

(ii) Labour Variance

Standard Labour Cost = 18,000 hrs. × ` 8 = ` 1,44,000

Actual Cost = (2,500 × ` 12) + (15,000 × ` 8) = ` 1,50,000

Labour Rate Variance = (SR – AR) × AH

= (8 – 12) × 2,500 + (8 – 8) × 1,500 = ` 10,000 (A)

Labour Efficiency Variance = (SH – AH) × SR

= (18,000 – 17,500) × 8 = ` 4,000 (F)

5.17.3 Sales Variance

The analysis of variances will be complete only when the difference between the actual profit and standard profit is fully analysed. It is necessary to make an analysis of sales variances to have a complete analysis of profit variance because profit is the difference between sales and cost. Thus, in addition to the analysis of cost variances, i.e., materials cost variance, labour cost variance and overheads cost variance, an analysis of sales variances should be made. Sales variances may be calculated in two different ways. These may be computed so as to show the effect on profit or these may be calculated to show the effect on sales value. The first method of calculating sales variances is profit method of calculating sales variances and the second is known as value method of calculating sales variances. Sales variances showing the effect on profit are more meaningful, so these would be considered first.

A) Profit Method of Calculating Sales Variances

The sales variances according to this method can be analysed as :

1. Total Sales Margin Variance (TSMV)

Actual Profit – Budgeted Profit

or Actual Quantity of Sales × Actual Profit per unit – Budgeted Quantity of Sales × Budgeted Profit per unit

2. Sales Margin Variance (SMV) due to Selling Price

It is that portion of total sales margin variance which is due to the difference between the actual price of quantity of sales effected and the standard price of those sales. It is calculated as :

Actual Quantity of Sales (Actual Selling Price per unit - Standard Selling Price per unit).

3. Sales Margin Variance (SMV) due to Volume

It is that portion of total sales margin variance which arises due to the number of articles sold being more or less than the budgeted quantity of sales. It is calculated as :

Standard Profit per unit (Actual Quantity of Sales - Budgeted Quantity of Sales)

Sales margin variance due to volume can be divided into two parts as given below :

i) Sales margin variance due to sales mixture.

ii) Sales margin variance due to sales quantities.

Sales Margin Variance (SMV) due to Sales Mixture (SM)

It is that portion of sales margin variance due to volume which arises because of different proportion of actual sales mix. It is taken as the difference between the actual and budgeted quantities of each product of which the sales mixture is composed, valuing the difference of quantities at standard profit. It is calculated as given below :

Standard Profit per unit (Actual quantity of sales - Standard proportion for actual sales) or Standard Profit – Revised Standard Profit.

Sales Margin Variance (SMV) due to Sales Quantities (SQ)

It is that portion of sales margin variance due to volume which arises due to the difference between the actual and budgeted quantity sold of each product. It is calculated as :

Standard Profit per unit (Standard proportion for actual sales - Budgeted quantity of sales) or Revised Standard Profit - Budgeted Profit.

B) Value Method of Calculating Sales Variances

Sales variances calculated according to value method show the effect on sales value and enable the sales manager to know the effect of the various sales efforts on his overall sales value figures. Sales variances according to this method may be as follows:

1. **Sales Value Variance (SW):** It is the difference between the standard value and the actual value of sales effected during a period. It is calculated as :

   Sales Value Variance = Actual Value of Sales - Budgeted Value of Sales.

   Sales value variance arises due to one or more of the following reasons :

   (i) Actual selling price may be higher or lower than the standard price. This is expressed in sales price variance.

   (ii) Actual quantity of goods sold may be more or less than the budgeted quantity of sales. This is expressed in sales volume variance.

   (iii) Actual mix of various varieties sold may differ from the standard mix. This is expressed in sales mix variance.

   (iv) Revised standard sales quantity may be more or less than the budgeted quantity of sales. This is expressed in sales quantity variance.

2. **Sales Price Variance (SPV):** It is that portion of sales value variance which arises due to the difference between actual price and standard price specified. The formula for the calculation of this variance is :

   Sales Price Variance = Actual Quantity Sold (Actual Price - Standard Price)

3. **Sales Volume Variance (S.Vol. V):** It is that portion of the sales value variance which arises due to difference between actual quantity of sales and standard quantity of sales. The variance is calculated as :

   Sales Volume Variance = Standard Price (Actual Quantity of Sales - Budgeted Quantity of Sales)

   Sales volume variance can be divided into two parts as follows :

   (a) Sales Mix Variance (SMV): It is a part of sales volume variance and arises due to the difference in the proportion in which various articles are sold and the standard proportion in which various articles were to be sold. It is calculated as :

   Sales Mix Variance = Standard Value of Actual Mix - Standard Value of Revised Standard Mix.

(b) Sales Quantity Variance (SQV). It is that part of sales volume variance which arises due to the difference between revised standard sales quantity and budgeted sales quantity. It is calculated as :

Standard Selling Price (Revised Standard Sales Quantity - Budgeted Sales Quantity).

Problem No. 1

From the following particulars calculate all sales variances according to (A) Profit Method and (B) Value Method.

Product	Standard			Actual		
	Quantity units	Cost per unit	Price per unit	Quantity units	Cost per unit	Price per unit
X	3,000	` 10	` 12	3,200	` 10.50	` 13
Y	2,000	` 15	` 18	3,200	` 10.50	` 17

Solution

(A) Profit Method

1. Total Sales Margin Variance = Actual Profit – Budgeted Profit

= ` 12,800 – ` 12,000 = ` 800 (F)

2. Sales Margin Variance due to Selling Price

= Actual Qty. of Sales (Actual sale price per unit – Budget sales price per cent)

X = 3,200 (` 13 – ` 12) = ` 3,200 (F)

Y = 1,600 (` 17 – ` 18) = ` 1,600 (A)

1,600 (F)

3. Sales Margin Variances due to Volume

= Standard Profit per unit (Actual Quantity of Sales – Budgeted Quantity of Sales)

X = ` 2 (3,200 – 3,000) = ` 400 (F)

Y = ` 3 (1,600 – 2,000) = ` 1.200(A)

800 (A)

4. Sale Margin Variance due to Sales Mix

= Standard Profit per unit (Actual Qty. of Sales - Standard Proportion for Actual Sales)

X = ` 2 (3,200 – 2,880) = ` 640 (F)

Y = ` 3 (1,600 – 1,920) = ` 960 (A)

320 (A)

5. Sales Margin Variance due to Sales Quantity

= Standard Profit per unit (Standard Proportion for Actual sales - Budgeted Quantity of Sales)

X = ` 2 (2,880 – 3,000) = ` 240 (A)

Y = ` 3 (1,920 – 2,000) = ` 240 (A)

` 480 (A)

(B) Value Method

1. Sales Value Variance = Actual Value of Sales - Budgeted Value of Sales)

= ` 68,800 – ` 72,000 = ` 3,200 (A)

2. Sales Price Variance = Actual Quantity of Sales (Actual Price - Budgeted Price)

X = 3,200 (` 13 – ` 12) = ` 3,200 (F)

Y = 1,600 (` 17 – ` 18) = ` 1,600 (A)

1,600 (F)

3. Sales Volume Variance = Standard Price (Actual Qty. of Sales – Budgeted Qty. Sales)

X = ` 12 (3,200 – 3,000) = ` 2,400 (F)

Y = ` 18 (1,600 – 2,000) = ` 7,200 (A)

4,800 (A)

4. Sales Mix Variance = Standard Value of Actual Mix – Standard Value of Revised Standard Mix

= 67,200 – 69,120 = 1920 (A)

5. Sales Quantity Variance = Standard Selling Price (Revised Sales Qty. – Budgeted Qty. of Sales)

X = `12 (2,880 – 3,000) = ` 1,440 (A)

Y = `18 (1,920 – 2,000) = ` 1,440 (A)

` 2,880 (A)

WORKING TABLE

Product	Budgeted						Actual						Std. Proportion for Actual Sales	Std. Value of Actual Mix	Std. Value of Revised Std. Mix
	Qty. (Units)	Price	Value	Cost	Profit	Total Profit	Qty. (units)	Price	Value	Cost	Profit per unit	Total Profit			
		₹	₹	₹	₹	₹		₹	₹	₹	₹	₹	Units	₹	₹
X	3,000	12	36,000	10	2	6,000	3,200	13	41,600	10.50	2.50	8,000	2,880 $\left(4{,}800 \times \frac{3}{5}\right)$	38,400 (3,200 × 12)	34,560 (2,880 × ₹ 12)
Y	2,000	18	36,000	15	3	6,000	1,600	17	27,200	14.00	3.00	4,800	1,920 $\left(4{,}800 \times \frac{2}{5}\right)$	28,800 (1,600 × 18)	34,560 (1,920 × ₹ 18)
	5,000		72,000			12,000	4,800		68,800			12,800	4,800	67,200	69,120

Problem No. 2

Ultra Modern Cassette Ltd. had the following budgeted sales and actual sales for March, 2010.

Cassette	Budgeted		Actual		Cost price
	Units	Price `	Units	Price `	per unit `
A	1,100	50	1,300	55	45
B	950	100	1,000	95	85
C	1,250	80	1,200	78	70

Compute the various sales variances by following :

(i) Profit Method and

(ii) Value Method.

Solution

(i) According to Profit Method

(a) TSMV = Actual Profit – Budgeted Profit

= ` 32,600 – ` 32,250 = ` 350 (F)

(b) SMV due to Selling Price = AQ of Sales (Actual SP - Budgeted SP)

A = ` 1,300 (55 – 50) = ` 6,500 (F)

B = ` 1,000 (95 – 100) = ` 5,000 (A)

C = ` 1,200 (78 – 80) = ` 2,400 (A)

` 900 (A)

(c) SMV due to Volume = Standard Profit Per Unit (AQ of Sales – Budgeted Qty. of Sales)

A = ` 5(1,300 – 1,100) = 1,000 (F)

B = ` 15 (1,000 – 950) = ` 750 (F)

C = `10 (1,200 – 1,250) = ` 500 (A)

` 1,250 (F)

(d) SMV due to Sales Mix = Standard Profit per unit (AQ of Sales - Standard Proportion for Actual Sales)

A = ` 5 (1,300 – 1,167) = ` 665 (F)

B = ` 15 (1,000 – 1,008) = ` 120 (A)

C = ` 10 (1,200 – 1,325) = ` 1,250 (A)

` 705 (A)

(e) SMV due to Sales Qty. = Std. Profit per unit (Std. Proportion for Actual Sales - BQ of Sales)

A = ` 5(1,167 – 1,100) = ` 335 (F)

B = ` 15 (1,008 – 950) = ` 870 (F)

C = ` 10 (1,325 – 1,250) = ` 750 (F)

` 1,955 (F)

PROFIT AND LOSS STATEMENT

Particulars	A `	B `	C `
Budgeted Sales	55,000	95,000	1,00,000
Less : Budgeted Cost	49,500	80,750	87,500
Budgeted Profit	5,500	14,250	12,500
Variances			
SMV due to SP	6.500(F)	5.000(A)	2.400(A)
SMV due to SM	665 (F)	120(A)	1.250(A)
SMV due to SQty.	335 (F)	870 (F)	750 (F)
Actual Profit	13,000	10,000	9,600

WORKING TABLE

Cassette	Budgeted						Actual						Std. Proportion for Actual Sales	Std. Value of Actual Mix (3 × 8)	Std. Value of Revised Mix (3 × 14)
	Units	Price	Amt.	Cost	Profit	Total Profit	Units	Price	Value	Cost	Profit	Total Profit			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		₹	₹	₹	₹	₹		₹	₹	₹	₹	₹	Units	₹	₹
A	1,100	50	55,000	45	5	5,500	1,300	55	71,500	45	10	13,000	1,167	65,000	58,350
B	950	100	95,000	85	15	14,250	1,000	95	95,000	85	10	10,000	1,008	1,00,000	1,00,800
C	1,250	80	1,00,000	70	10	12,500	1,200	78	93,600	70	8	9,600	1,325	96,000	1,06,000
	3,300		2,50,000			32,250	3,500		2,60,100			32,600	3,500	2,61,000	2,65,150

Standard proportion for actual sales has been calculated as follows :

$$A : \frac{1,100}{3,300} \times 3,500 = 1,167$$

$$B : \frac{950}{3,300} \times 3,500 = 1,008$$

$$C : \frac{1,250}{3,300} \times 3,500 = 1,325$$

(ii) According to Value Method

(a) SVV = Actual Value of Sales - Budgeted Value of Sales

= ` 2,60,100 – ` 2,50,000

= ` 10,100 (F)

(b) SPV = AQ of Sales (AP – SP) `

A = 1,300 (` 55 – ` 50) = 6,500 (F)

B = 1,000 (` 95 – ` 100) = 5,000 (A)

C = 1,200 (` 78 – ` 80) = 2,400 (A)

` 900 (A)

(c) SVV = SP (AQ of Sales – BQ of Sales)

A = ` 50 (1,300 – 1,100) = ` 10.000 (F)

B = ` 100(1,000 – 950) = ` 5,000 (F)

C = ` 80 (1,200 – 1,250) = ` 4,000 (A)

` 11,000 (F)

(d) SMV = Std. Value of AM – Std. Value of RSM

= ` 2,61,000 – ` 2,65,150 = ` 4,150 (A)

(e) SQV = Std. Price per unit (RSQ – BSQ)

A = ` 50 (1,167 – 1,100) = ` 3,350 (F)

B = ` 100 (1,008 – 950) = ` 5,800 (F)

C = ` 80 (1,325 – 1,250) = ` 6,000 (F)

` 15,150 (F)

5.17.4 Profit and Loss Variance

Profit or Loss variance is defined as the difference between the budgeted profit or (Loss) and the actual profit or loss this will include the total of variances appropriate to standard cost of sales, the sales margin variances and variances due to any changes which have not been included in standard cost of production.

Problem No. 1

The Summarised budget and actual working results of GEMCO LTD. for the year 2009-10 are given below :

Details	Budget Products			Actual Products		
	A `	B `	C `	A `	B `	C `
Selling Price per Unit	12	16	25	13	16	27
Cost per Unit	9	11	20	10	12	21
Sales (Units)	40,000	32,000	24,000	42,000	40,000	22,000

Analyses the results and calculate the following :

(i) Budgeted profit, actual profit and variance in profit.

(ii) Analysis of the variance in profit into the following :

(1) Price variance.

(2) Cost variance.

(3) Sales margin volume variance.

(4) Sales margin mix variance.

(5) Sales margin quantity variance.

Solution :

(i) Budged Profit = [40,000 × ` 3 + 32,000 × ` 5 + 24,000 ` ` 5] `

[` 1,20,000 + `1,60,000 + `1,20,000] 4,00,000

Actual Profit = (42,000 × ` 3 + 40,000 × ` 4 + 22,000 × ` 6)

[` 26,000 + ` 1,60,000 + ` 1,32,000] 4,18,000

Variance in Profit 18,000 (P)

(ii) Analysis of Variance in Profit

(a) Cost Variance = Actual No. of Units (Standard Cost per unit – Actual Cost per unit)

A = 42,000 (` 9 – ` 10) = ` 42,000 (A)

B = 40,000 (` 11 – ` 12) = ` 40,000 (A)

C = 22,000 (` 20 – ` 21) = ` 22.000(A)

` 104,000 (A)

(b) Price Variance = Actual No. of Units (Actual Price per unit – St. Price per unit)

A = 42,000 (` 13 – `12) = ` 42,000 (F)

B = 40,000 (` 16 – ` 16) = Nil

C = 22,000 (` 27 – ` 25) = ` 44,000 (F)

` 86,000 (F)

(c) Sales Margin Volume Variance = Standard Profit (Actual Volume - Standard Volume)

A = ` 3 (42,000 – 40,000) = ` 6.000 (F)

B = ` 5 (40,000 – 32,000) = ` 40,000 (F)

C = ` 5 (22,000 – 24,000) = ` 10,000 (A)

` 36,000 (F)

Reconciliation Profit = Cost Variance + Price Variance + Volume Variance

= ` 1,04,000 (A) + ` 86,000 (F) + ` 36,000 (F) = ` 18,000 (F)

(d) Sales Margin Mix Variance = Std. Profit (Actual Quantity - Revised Std. Quantity)

$$A = ` 3 \left(42,000 - \frac{40}{96} \times 1,04,000\right) = ` 4,000 \text{ (A)}$$

$$B = ` 5 \left(40,000 - \frac{32}{96} \times 1,04,000\right) = ` 26,667 \text{ (F)}$$

$$C = ` 5 \left(22,000 - \frac{24}{96} \times 1,04,000\right) = ` 20,000 \text{ (A)}$$

` 2,667 (F)

(e) Sales Margin Quantity Variance = Std. Profit (Revised Std. Quantity - Standard Quantity)

$$A = ` 3 \left(\frac{40}{96} \times 1,04,000 - 40,000\right) = ` 10,000 \text{ (F)}$$

$$B = ` 5 \left(\frac{32}{96} \times 1,04,000 - 32,000\right) = ` 13,333 \text{ (F)}$$

$$C = ` 5 \left(\frac{24}{96} \times 1,04,000 - 32,000\right) = ` 10,000 \text{ (F)}$$

` 33,333 (F)

Reconciliation: `

Sales Margin Mix Variance	2,667 (F)
Sales Margin Qty. Variance	33,333 (F)
Sales Margin Volume Variance	36,000 (F)

Short Question and Answers

Q1. Budgetary Control

Ans :

Budgetary control is applied to a system of management and accounting control by which all operations and output are forecasted as far ahead as possible and actual results when known are compared with budget estimates. CIMA, London defines budgetary control as the establishment of the budgets relating to the responsibilities of executives to the requirements of a policy and the continuous comparison of actual with budgeted result either to secure by individual action the objectives of that policy or to provide a firm basis for its revision.

Q2. Flexible Budget

Ans :

A flexible budget, or "flex" budget, incorporates different expense levels into the budget, depending upon changes in the amount of actual revenue generated. This approach varies from the more common static budget, which contains nothing but fixed expense amounts that do not vary with actual revenue levels.

Q3. Fixed Budget

Ans :

The fixed budgets are prepared for a given level of activity, the budget is prepared before the beginning of the financial year. If the financial year starts in January then the budget will be prepared a month or two earlier, *i.e.*, November or December. The changes in expenditure arising out of the anticipated changes will not be adjusted in the budget. There is a difference of about twelve months in the budgeted and actual figures. According to I.C.W.A. London, "Fixed budget is a budget which is designed to remain unchanged irrespective of the level of activity actually attained." Fixed budgets are suitable under static conditions. If sales, expenses and cost can be forecasted with greater accuracy then this budget can be advantageously used.

Q4. Flexible Budgets

Ans :

A flexible budget consists of a series of budgets for different level of activity. It, therefore, varies with the level of activity attained. A flexible budget is prepared after taking into consideration unforeseen changes in the conditions of the business. A flexible budget is defined as a budget which by recognizing the difference between fixed, semi-fixed and variable cost is designed to change in relation to the level of activity.

Q5. Cash Budget

Ans :

This budget gives an estimate of the anticipated receipts and payments of cash during the budget period. Therefore, this budget is divided into two parts, one showing the estimated cash receipts on account of cash sales, credit collections and miscellaneous receipts and the other showing the estimated disbursement on account of cash purchases, amount payable to creditors, wages payable to workers, indirect expenses payable, income tax payable, dividend payable, budgeted capital expenditure etc. In short, every factor which affects the receipts and payments of cash is taken into account in the preparation of this budget.

Cash budget makes a provision for a minimum cash balance which will be available at all times. In general, this balance should be equal to one month's operating expenses plus some provision for contingencies. The minimum balance of cash will help in tiding over adverse conditions of a minor nature. Meanwhile management can make alternative arrangement for additional cash.

Q6. Production Budget

Ans :

Production budget is a forecast of the total output of the whole organisation broken down into estimates of output of each type of product with a scheduling of operations to be performed and a forecast of the closing finished stock. This budget may be expressed in quantitative or financial units or both. This budget is prepared after taking it into consideration the estimate opening stock, the estimated sales and the desired closing finished stock of each product.

Q7. Master Budget

Ans :

The Master Budget is consolidated summary of the various functional budgets. It has been defined as "a summary of the budget schedules in capsule from made for the purpose of presenting, in one report, the highlights of the budget forecast". The definition of this budget given by the Chartered Institute of Management Accountant, England, is as follows:

"The summary budget incorporating its component on the basis of co-ordinated functional budgets and becomes the target for the company during the budget period when it is finally approved by the committee. This budget summarises functional budgets to produce a Budgeted Profit and Loss Account and a Budgeted Balance Sheet as at the end of the budget period.

Q8. Performance Budget

Ans :

Performance based budgeting has been defined as a system wherein managers are provided with the flexibility to utilize agency resources as required, in return for their commitment to achieve certain performance results. Performance budgeting is a system of planning, budgeting, and evaluation that emphasizes the relationship between money budgeted and results expected.

Q9. Zero Base Budget

Ans :

This budget is the preparation of budget starting from Zero or from a clean state. As a new technique it was proposed by peter Payal of Texas Instruments Inc., U.S.A. This technique was introduced in the budgeting in the state of Gorgia by Mr. Jimmy Carter who was then the Governor of that state. When Mr. Carter later on became President of the U.S.A., ZBB was tried in federal budgeting as a means of controlling state expenditure. The use of zero-base budgeting (ZBB) as a managerial tool has become increasingly popular since the early 1970s. It is steadily gaining acceptance in the business world because it is proving its utility as a tool integrating the managerial function of planning and control.

Q10. Introduction to Cost Audit

Ans :

Audit

The term audit means examination of books of accounts and vouchers so as to establish their accuracy. It is defined as a "systematic examination of financial statements, records and related operations to determine adherence to generally accepted accounting principles, management policies or stated requirements."

Cost Audit

Cost audit has been defined by Chartered Institute of Management Accountants, London as "the verification of cost accounts and a check on the adherence to the cost accounting plan."

Cost audit is mainly a preventive measure, a guide for management policy and decision, in addition to being a barometer of performance.

Q11. Management Audit

Ans :

The auditors are generally expected to detect errors and omissions in the books of accounts. They concentrate in finding out whether a concern has maintained proper books of accounts or not and the Balance Sheets depict the real financial position or

not. The statutory auditor never goes into the question whether the polices and programmes laid down by the management are properly carried out or not.

Management audit is concerned with management process as a whole. It covers review and appraisal of managerial policies and plans in comparison to predetermined standards.

Q12. Standard Costing

Ans :

Standard costing is not a method of costing just as process costing or unit costing. It is a system or technique of cost accounting which can be used in conjunction with process or operating costing without any difficulty. The system of standard costing can be employed in all types of industries, though it is commonly used in industries producing standardized products which are repetitive in nature like Engineering process industries, textiles, electrical, chemical industries etc.

Q13. Standard Costing Vs Budgetary Control

Ans :

Budgetary control denotes a system of management and accounting control by which all operations and output over a period of time are forecast and the actual results when known are compared with the budget estimates. Usually budgetary control is operated with a system of standard costing because both are interrelated though they are not interdependent.

Standard costing is complementary to budgetary control. If is difficult to operate a system of budgetary control unless the cost of production of each unit is kept strictly under control.

Q14. Variance Analysis – Definition

Ans :

Variance Analysis is the process of analyzing variances by sub-dividing the total variance in such a way that the management can assign responsibility for off standard performance. It is a continuous process. It must be followed by intelligence and actual interpretation.

Analysis of variances involves the segregation of total cost variances into different elements in such a way as to indicate or locate clearly the causes of such variances and persons held responsible for them.

Variance Analysis is defined by I.C.M.A. London as “that part of the variance accounting which relates to the analysis into constituent parts of variances between planned and actual performance.”

Q15. Classification of Variances

Ans :

Variances indicate the extent to which a desired level of performance as defined by management has been attained. Thy may be segregated by management, by cost and by elements of costs e.g., price and quality. Different variances are used in different industries.

Broadly the variances may be classified into the following categories.

1. Direct Material Variances
2. Direct Labour Variances
3. Overhead Cost Variances
4. Sales or Profit Variances

Q16. Material Usage Variance

Ans :

It is also known as quantity variance. It is that part of material cost variance which is due to difference between the standard quantity specified for output and the actual quantity of materials used. The difference between standard quantity and actual quantity is multiplied by standard price of materials and the resulting figure will be material usage variance.

This variance is calculated as follows :

Material usage variance = Standard rate $\times$ (Standard quantity – Actual quantity)

or

$= SR \times (SQ - AQ)$

Q17. Material Mix Variance

Ans :

It the sub-variance of material usage variance. It arises if a different blend of mix of material is used than specified. When two or more materials are used in the manufacture of a product, the difference between the standard composition and the actual composition of material mix is the material mix variance. In other words any difference between materials actually used and those specified by the formula constitutes material mix variance.

Causes for Variance

1. Using expensive/cheaper substitutes.
2. Short supply of material .
3. In efficiency of production department in mixing the materials.
4. Change in the quality of the product.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERBAD

M.B.A III - Semester Examination

R17

October / November - 2020

STRATEGIC MANAGEMENT ACCOUNTING

Time : 2 Hours] [Max. Marks : 75

Note : Answer any five questions
All questions carry equal marks

ANSWERS

1. Management Accounting differs from financial accounting in many ways, justify with suitable examples.

(Unit - I, Topic.15.)

2. For each of the following activities, identify the main role the accountant is performing - problem solving, score, keeping (or) attention directing

   (a) Interpreting differences between actual results and budgeted amounts on a shipping manager's performance report at a Maruti distribution center. **– Score keeping**

   (b) Preparing a report showing the benefits from leasing motor vehicles rather than owning them **– Score keeping**

   (c) Preparing journal entries for depreciation on the personel manager's office equipment at Citibank **– Attention directing**

   (d) Preparing a customer's monthly statement for a Ranbaxy store. **– Score keeping**

   (e) Processing the weekly payroll for the Bombay University Maintenance Department **– Score keeping**

   (f) Analyzing the costs of different ways to blend materials in the foundry of a TISCO plant **– Problem solving**

   (g) Tallying sales, by branches, for the Vice President of Hindustan Levers, sales **– Attention directing**

   (h) Analyzing, for the President of Microsoft, the impact of a contemplated new product on the net income

   – Attention directing

   (i) Interpreting why an IBM sales district did not meet its sales quot ? **– Problem solving**

3. Prepare a cost sheet based on the following information
Number of Plates per day 30

Direct Material	Amount	Factory Over Heads	Amount
Chicken	Rs. 98,000	Electricity	10,000
Butter	4,800	Water Supply	2,000
Spices	3,000	Utensils	15,000
Onion	25,000	**Administrative Over Heads**	
Cream	500	Manager's Salary	13,800
Salt	100	Waiter Salary	3,500
Garlic	400	**Selling Distributive Over head**	
Ginger	200	Advertising Expenses	15,000
Direct Labour			
Chef's Salary	6,000		
Direct Expense			
LPG	700		

Sol :

Cost Sheet

Particulars		Amount Rs.	Amount Rs.
Direct Materials :			
Chicken		98,000	
Buffer		4,800	
Spices		3,000	
Onions		5,000	
Cream		500	
Salt		100	
Garlic		400	
Ginger		200	
	Direct Materials	1,32,000	
Direct Labour :			
Chef's Salary		6,000	
Direct expenses :			
LPG		700	
	Prime Cost		1,38,700

Factory Overhead			
Electricity		10,000	
Water		2,000	
Utensils		15,000	
			27,000
	Works Cost		1,65,700
Add			
Adminstrative Overheads			
Manager's Salary		13,000	
Waiter Salary		3,500	
			17,300
	Cost of Production		183,000
Add			
Selling Distribution Overheads			
Advertising Expenses		15,000	
	Cost of Sale		1,98,000

4. There are number of contemporary cost techniques that have dominated by the management accounting scenario, Elaborate on the contemporary cost techniques with examples.

Ans :

The general fundamental principles of ascertaining costs are the same in every system of cost accounting, but the methods of analysis and presenting the costs vary from industry to industry. Different methods are used because business enterprises vary in their nature and in the type of products or services they produce or render.

(i) Job Costing

It refers to a system of costing in which costs are ascertained in terms of specific jobs or orders which are not comparable with each other. Industries where this method of costing is generally applied are printing press, automobile garage, repair shop, ship-building, house building, engine and machine construction, etc.

(ii) Contract Costing

Although contract costing does not differ in principle from job costing, it is convenient to treat contract cost accounts separately. The term is usually applied to the costing method adopted where large scale contracts at different sites are carried out, as in the case of building construction.

(iii) Batch Costing

This method is also a type of job costing. A batch of similar products is regarded as one job and the cost of this complete batch is ascertained. It is then used to determine the unit cost of the articles produced. It should, however, be noted that the articles produced should not lose their identity in manufacturing operations.

(iv) Terminal Costing

This method is also a type of job costing. This method emphasises the essential nature of job costing, i.e. the cost can be properly terminated at some point and related to a particular job.

(v) Operation Costing

This method is adopted when it is desired to ascertain the cost of carrying out an operation in a department, for example, welding. For large undertakings, it is frequently necessary to ascertain the cost of various operations.

(vi) Process Costing

Where a product passes through distinct stages or processes, the output of one process being the input of the subsequent process, it is frequently desired to ascertain the cost of each stage or process of production. This is known as process costing. This method is used where it is difficult to trade the item of prime cost to a particular order because its identity is lost in volume of continuous production. Process costing is generally adopted in textile industries, chemical industries, oil refineries, soap manufacturing, paper manufacturing, tanneries, etc.

(vii) Unit or Single or Output or Single-output Costing

This method is used where a single article is produced or service is rendered by continuous manufacturing activity. The cost of whole production-cycle is ascertained as a process or series of processes and the cost per unit is arrived at by dividing the total cost by the number of units produced. The unit of costing is chosen according to the nature of the product. Cost statements or cost sheets are prepared under which various items of expenses are classified and the total expenditure is divided by total quantity produced in order to arrive at unit cost of production. This method is suitable in industries like brick-making, collieries, flour mills, cement manufacturing, etc. This method is useful for the assembly department in a factory producing a mechanical article e.g., bicycle.

(viii) Operating Costing

This method is applicable where services are rendered rather than goods produced. The procedure is same as in the case of single output costing. The total expenses of the operation are divided by the units and cost per unit of service is arrived at. This method is employed in railways, road transport, water supply undertakings, telephone services, electricity companies, hospital services, municipal services, etc.

5. It is often said that variable cost be separated with unit of production but separating fixed cost is quite difficult. Justify your answer and bring out the techniques that are available for separating fixed cost and variable cost from the mixed cost component.

Ans :

Management usually needs to know what fixed and variable costs are included in mixed costs. This is required for budgeting and planning purposes, among others. Using the total costs and the associated activity level, it is possible to break out the fixed and variable components. There are three methods for separating a mixed cost into its fixed and variable components:

(i) High-low method

(ii) Scatter-graph method

(iii) Method of least squares

(i) High-low method

When using the high-low method, the highest point and the lowest point are used to create the cost formula. The high point is defined as the point with the highest activity and the low point is defined as the point with the lowest activity. Using the lowest and highest activity levels, it is possible to estimate the variable cost per unit and the fixed cost component of mixed cost

(ii) Scatter-graph method

The scatter graph method (also called scatter plot or scatter chart method) involves estimating the fixed and variable elements of a mixed cost visually on a graph.

The scatter-graph method requires that all recent, normal data observations be plotted on a cost (Y-axis) versus activity (X-axis) graph. The vertical axis of the graph represents the total costs and the horizontal axis shows the volume of related activity.

(iii) Method of least squares

The most robust method of separating mixed costs is the least-squares regression method. This method requires the use of 30 or more past data observations for both the activity level (in units) and the total costs. The method of least squares identifies the line that best fits the data points (the sum of the squared deviations is minimized). This method is the most sophisticated and provides the user with a measure of the goodness of fit, which can be used to assess the usefulness of the cost formula.

6. Read the following and prepare a cash budget. A firm adopts a six monthly time span, subdivide into monthly intervals for its cash budget, the following information is available in respect of its operations for six months

Rs. in Lakhs

Particulars	Jan	Feb	March	April	May	June
Sales	40	50	60	60	60	60
Purchases	1	1.50	2	2	2	1
Direct labour	6	7	8	8	8	6
Manufacturing Overheads	13	13.50	14	14	14	13
Adminstrative Expenses	2	2	2	2	2	2
Distribution Expenses	2	3	4	4	4	2
Raw Material (30 days credit)	14	15	16	16	16	15

Assume the following financial inflows :

Inflows :

1. Interest in January and June Rs. 1,00,000 each
2. Dividend received during March and June Rs. 2,00,000 each
3. Sales of Shares in June Rs. 160 Lakhs.

Outflows :

1. Interest paid during January, Rs. 0.4 Lakhs
2. Dividend is Paid during January and April Rs. 2,00,000 each
3. Installment payment on machine in June Rs.20,00,000
4. Repayment of loan in June Rs.80,00,000

Assume that 10 percent of each month's sales are for cash the balance 90 percent on credit the terms and credit experience of the firm are :

(a) No cast discount

(b) 1 percent of credit sales is returned by the customer

(c) 1 percent of total accounts receivable is bad debts

(d) 50 percent of all accounts that are going to pay, to do so within 30 days

(e) 100 percent of all accounts that are going to pay, to do so within 60 days

Sol :

Cash budget for Six Months

Particulars	Jan	Feb	March	April	May	June
(A) Cash inflows						
Cash sales (10% of total)	4.00	5.00	6.00	6.00	6.00	6.00
Recievables collection	–	17.64	39.68	48.11	52.92	52.92
Interest recived	1.00	–	–	–	–	1.00
Divedends received	–	–	2.00	–	–	2.00
Sale of shares	–	–	–	–	–	160.00
Total (A)	5.00	22.64	47.68	54.50	58.92	221.92
(B) Cash Outflows						
Purchases	1.00	1.50	2.00	2.00	2.00	1.00
Labour	6.00	7.00	8.00	8.00	8.00	6.00
Manufacturing overheads	13.00	13.50	14.00	14.00	14.00	13.00
Administrative expenses	2.00	2.00	2.00	2.00	2.00	2.00
Distribution charges	2.00	3.00	4.00	4.00	4.00	2.00
Raw materials (30 days credit)	–	14.00	15.00	16.00	16.00	16.00
Interest paid	0.40	–	–	–	–	–
Dividend paid	2.00	–	–	2.00	–	–
Instalment of machine	–	–	–	–	–	20.00
Repayment of loan	–	–	–	–	–	80.00
Total (B)	26.40	41.00	45.00	48.00	46.00	140.00
Net Receipts / Payment (A – B)	(21.40)	(18.36)	2.68	6.50	12.92	81.92

7. Discuss the Objectives Advantages and Limitation of Standard Costing.

8. Explain the concept of Inter-firm Comparisons. Discuss the need for inter-firm comparisions and eleborate the types of comparisons.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERBAD

M.B.A III - Semester Examination

December - 2018

STRATEGIC MANAGEMENT ACCOUNTING

Time : 3 Hours] [Max. Marks : 75

Note : This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part - A.
Part - B contains of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART - A (5 × 5 = 25 Marks)

ANSWERS

1. (a) What is financial accounting ?
   (b) Explain normal losses and abnormal losses.
   (c) Discuss profit planning.
   (d) What is the need for inter-firm comparison ?
   (e) Explain material variance.

PART - B (5 × 10 = 50 Marks)

(Essay Type Questions)

2. Explain various differences between financial accounting and cost accounting.

(OR)

3. What do you mean by management accounting ? How it is useful for managers ?
4. What do you mean by cost ? Explain various elements of cost.

(OR)

5. What do you mean by elements of cost ? Explain in detail and how these element are presented in the form of a cost sheet.
6. Explain the applications of Marginal costing in terms of cost control.

(OR)

7. A radio manufacturing company finds that while it costs Rs. 6.25 to make a component the same is available at market for 5.75 with an assurance of continued supply. The break cost is

	Rs.
Material	2.75
Labour	1.75
Variable expenses	0.50
Fixed Expenses	1.25
Total	**6.25**

(a) Should you make/buy? Give reasons.

(b) What would be your decision if the supplier offered the component at Rs. 4.85 each ?

8. "The method of costing depends on the nature of product, production methods an specific business conditions". Explain this statement.

(OR)

9. What do you understand by the term break even analysis and how does this help i business decisions ?

10. Define standard costing ? Describe the limitations of standard costing ?

(OR)

11. Calculate all labour variances with the help of following information :

- Standard

Number in standard gang	Men 20	Women 10
Standard wages rate per hour	9.00 Rs.	8.00 Rs.
Standard gang hours in a week		40 hours
Standard output per gand hour		50 units

- Actual

Number in actual gang	Men 16	Women 14
Actual wages rate per hour	10.00 Rs.	5.00 Rs.
Actual gang hours paid for		40 hours
Actual gang hours worked		39 hours
Abnormal Idle time		1 hour

Actual output 2400 units

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERBAD

M.B.A III - Semester Examination

R17

FEBRUARY - 2017

STRATEGIC MANAGEMENT ACCOUNTING

Time : 3 Hours] [Max. Marks : 60

Note : This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 8 marks and may have a, b, c as sub questions.

PART - A **(5 × 4 = 20 Marks)**

1. (a) Profit and Cost Centers

Ans :

Refer to Unit - I, Page No. 18, Topic No. 1.7

(b) Methods of Costing

Ans :

Refer to Unit - II, Page No. 215, Short Notes - 1, 2

(c) Key or limiting Factor

Ans :

Refer to Unit - III, Page No. 250, Topic No. 3.5

(d) Sunk Costs and Imputed Costs

Ans :

Sunk Costs

In economics and business decision-making, sunk cost refers to the cost that has already been incurred and cannot be recovered. Sunk costs (also known as retrospective costs) are sometimes contrasted with prospective costs, which are future costs that may be incurred or changed if an action is taken.

Imputed Costs

An imputed cost is a cost that is incurred by virtue of using an asset instead of investing it or undertaking an alternative course of action. An imputed cost is an invisible cost that is not incurred directly, as opposed to an explicit cost, which is incurred directly.

(e) Different Types of Budgets

Ans :

Refer to Unit - V, Page No. 305, Topic No. 5.4

PART - B **(5 × 8 = 40 Marks)**

2. (a) Compare and contrast, Financial accounting and Cost accounting.

Ans :

Refer to Unit - I, Page No. 16, Topic No. 1.5

(b) How is 'Machine Hour Rate' computed ?

Ans :

Refer to Unit - I, Page No. 40, Topic No. 1.13.1

OR

3. The progressive company has four departments Alpha, Beta, Gama and Delta. The actual costs are as follows

Rent	10,000	Supervision	15,000
Depreciation of Plant	4,500	Reparis to plant	6,000
Fire Insurance in respect of stock	5,000	Power	9,000
Employer's liability of insurance	1,500	Light	1,200

The following information is available in respect of four departments

PARTICULARS	DEPARTMENTS			
	ALPHA	BETA	GAMA	DELTA
Area (Sw. Meters)	1500	1100	900	500
Number of Employees	20	15	10	5
Total Wages (Rupees)	6000	4000	3000	2000
Value of Plant (Rupees)	24000	18000	12000	6000
Value of Stock (Rupees)	15000	9000	6000	-
H.P. of Plant	24	18	12	6

You are required to apportion the costs to the four departments on most equitable basis

Ans :

	Item	Basis of Apportionment	Total Amt.	Alpha	Beta	Gama	Delta
1.	Rent	Floor Area (0.25 pu metre)	10,000	3,750	2,750	2,250	1,250
2.	Repairs to plant	Plant value (1 paise per rupee)	6,000	2,400	1,800	1,200	600
3.	Depreciation	Plant value (0.75 paise per rupee)	4,500	1,800	1,350	900	450
4.	Light	Floor area (3 paise per sq. metre)	1,200	450	330	270	150
5.	Power	H.P. of plant (15 per H.P)	9,000	3,600	2,700	1,800	900
6.	Supervision	No. of employee (30 per employees)	15,000	6,000	4,500	3,000	1,500
7.	Fire Insurance	Stock value ($\frac{1}{60}$ of value of stock)	5,000	2,500	1,500	1,000	–
8.	Employer's Liability for Insurance	No. of employers (3 per employee)	1,500	600	450	300	150
	Total		52,200	21,100	15,380	10,720	5,000

4. Alaknanda products pvt Ltd produces product 'EXA', which passes through two processes, before it is completed, and transferred to finished stock. The following data relative to January 2017.

(Amount in Rupees)

	Process (I)	Process (II)	Finished Stock
Opening Stock	7500	9000	22500
Direct Materials	15000	15750	
Direct Wages	11200	11250	
Factory Overheads	10500	4500	
Closing Stock	3700	4500	11250
Inter process profit included in opening stock		1500	8250

Additional information:

Output of process (I) is transferred to process (II) at 25% profit on the transfer price.

Output of process (II) is transferred to finished stock at 20% profit on the transfer price.

Stock in process is valued at prime cost.

Finished stock is valued at the price at which it is received from process (I)

Sales during the period are Rs. 140000

Prepare Process cost accounts and finished goods account showing the profit element at each stage.

Sol :

Dr. Process - I A/c Cr.

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To Opening stock	7,500	7,500		By Transfer to	50,625	40,500	10,125
To Material	15,000	15,000		Process - II A/c			
To Direct Wages	11,200	11,200					
	33,700	33,700					
(–) Closing stock	3,700	3,700					
	30,000	30,000					
(+) Factors O.H	10,500	10,500					
Total Cost	40,500	40,500					
Add : Profit (40,500 × 25%)	10,125	–	10,125				
	50,625	40,500	10,125		50,625	40,500	10,125

Dr. **Process - II A/c** **Cr.**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To Opening stock	9,000	9,000	1,500	By Transfer	1,03,950	77,300	28,150
To Process-I A/c	50,625	40,500	10,125	To Finished goods			
To Direct material	15,750	15,750	–				
To Direct wages	11,125	11,250	–				
	86,625	76,500	11,625				
(–) Closing stock	4,500	3,700	800				
Prime cost	82,125	72,800	10,825				
(+) Overheads	4,500	4,500	–				
Total cost	86,625	77,300	10,325				
Add : Profit	17,325		17,325				
	1,03,950	77,300	28,150		1,03,950	77,300	28,150

Dr. **Finished Stock A/c** **Cr.**

Particulars	Total	Cost	Profit	Particulars	Total	Cost	Profit
To Opening stock	22,500	22,500	8,250	By Sales	1,40,000	90,910	57,960
To Process - II A/c	1,03,950	77,300	28,150				
	1,26,450	99,800	36,400				
(–) Closing stock	11,250	8,890	3,240				
	1,15,200	90,910	33,160				
(–) Overheads	–	–	–				
Total cost	1,15,200	90,910	33,160				
(+) Profit	24,800	–	24,800				
	1,40,000	90,910	57,960		1,40,000	90,910	57,960

OR

5. The following information is obtained from the cost records of M/s Aviral industries Pvt Ltd for the year ending 31.03.2016

Opening stock of raw material	Rs.12500
Purchases of raw material	Rs.1,36,000
Closing stock of raw material	Rs.8,500
Direct wages	Rs.54,000
Direct expenses	Rs.12,000
Factory overheads	100% of Direct Wages
Office and Administrative overheads	20% of works cost
Selling and distribution overheads	Rs.26,000
Cost of Opening stock of finished goods	Rs.12,000
Cost of Closing stock of finished goods	Rs.15,000
Profit on cost	20%

Prepare a Cost sheet for the period ending 31.03.2016

Sol :

Cost Sheet

Particulars	**Amt.**	**Amt.**
Opening stock of material		12,500
(+) Purchases		1,36,000
(–) Closing stock of material		(8,500)
		1,40,000
(+) Direct wages	54,000	
(+) Direct expenses	12,000	66,000
Prime cost		2,06,000
(+) Factory overheads		54,000
Factory Cost		2,60,000
(+) Office & Administrative expenses		52,000
Office cost		3,12,000

(+) Opening stock of finished goods		12,000
(–) Closing stock of finished goods		(15,000)
Cost of productions		3,09,000
(+) Selling & distribution expenses		26,000
Cost of sales		3,35,000
(+) Proft		67,000
Sales		4,02,000

6. The following is the standard cost data per unit product, X, manufactured by Universal Industries Ltd.

Selling price	Rs.40
COSTS	
Direct Material	Rs.8
Direct Labour	Rs.5
Variable production overheads	Rs.2
Fixed production overheads (Based on a budgeted normal output of 36000 units per annum	Rs.5
Variable Selling overheads	Rs.6
Fixed Selling expenses per annum	Rs.120000

During a particular month, the company produced 2000 units of the product and sold 1500 units of the same. There is no opening stock

Prepare the profit statement under Marginal costing method.

Ans :

Marginal cost statement

Particualrs	**Amt.**	**Amt.**
Sales (1500 × 40)		
Less : Cost of goods sold		
Direct material	16,000	
Direct labour	10,000	

	Variable production OH	4,000	
	Fixed production OH	10,000	
		40,000	
(–)	Closing stock $\left(\frac{500}{2000} \times 40,000\right)$	10,000	
	Gross Profit		30,000
Less :	Variable selling OH	12,000	
	Fixed selling OH	12,000	24,000
	Net Profit		6,000

OR

7. What is marginal costing? Name the important areas where managerial problems are simplified by the use of marginal costing? Illustrate a make or buy decisions model with assigned data by using marginal costing method ?

Ans :

Refer to Unit - III, Page No. 219, 245, Topic No. 3.1.1, 3.4

8. A company manufactures machine spare parts. The following information is available from the books of the company.

Sales turn over (50,000 units	Rs. 5,00,000
Variable Cost (50,000 units)	Rs. 3,00,000
Fixed-Cost	Rs.1,20,000
Net Profit	Rs. 80,000

Due to competition, the company proposes to reduce the selling price. If the present level of profit is to be maintained, indicate the number of units to be sold, if the proposed reduction in the selling price is a) 5%, b)10% and c) 15%

Sol :

When the selling price reduced by 5%

SPU = ` 10

5% Decrease in SPU = 10 – 5% of 10

= ` 9.5

Variable cost per unit = ` 6

Contribution per unit = 9.5 – 6 = 3.5

$$BEP_{(units)} = \frac{1,20,000}{3.5} = 34,286 \text{ units}$$

When the selling price reduced by 10%

$$BEP_{(units)} = \frac{1,20,000}{3} = 40,000$$

When selling price reduced by 15%

$$BEP_{(units)} = \frac{1,20,000}{2.5} = 48,000$$

OR

9. (a) Ascertain profit, when sales are Rs. 200000 Fixed cost is Rs. 40000 and Break even sales are Rs.160000

Sol :

Margin of safety = Total sales – Break even sales

= 2,00,000 – 1,60,000

= 40,000

$$BEP_{(sales)} = \frac{\text{Fixed Cost}}{P/V \text{ ratio}}$$

$$1,60,000 = \frac{40,000}{P/V \text{ ratio}}$$

$P/_V$ ratio $= \frac{40,000}{1,60,000} = 0.25$

$P/_V$ raio $= \frac{Sales - V.C}{Sales} \times 100$

$0.25 = \frac{2,00,000 - V.C}{2,00,000}$

50,000 = 2,00,000 – V.C

V.C = 1,50,000

Sales	2,00,000
(–) Variable cost	1,50,000
	50,000
(–) Fixed cost	40,000
Profit	10,000

9. (b) Ascertain the sales when, fixed cost is Rs 20000, Profit is Rs. 10000 and Breakeven sales are Rs. 40000

Sol :

Sales – Variable Cost = Fixed Cost + Profit

$BEP_{(sales)} = \frac{Fixed\ Cost}{P/_V\ ratio} = 40,000 = \frac{20,000}{P/_V\ ratio}$

$P/_V$ ratio = 0.5

$P/_V$ ratio $= \frac{S - V.C}{S} = 0.5 = \frac{Fixed\ Cost + Profit}{Sales}$

Sales $= \frac{20,000 + 10,000}{0.5} = 60,000$

10. What is Budgetary control ? What are the steps involved in it? Explain its uses ?

Ans :

Refer to Unit - V, Page No. 295, 296, Topic No. 5.2, 5.2.1

OR

11. Using the following information, calculate various labour variances.

Gross Direct Wages	Rs.3,000
Standard Hours produced	1600
Standard rate per hour	Rs.1.50
Actual /Hours paid	1500 hours
Abnormal idle time in the actual hours paid	50 hours

Sol :

(a) Labour cost variance = 1,600 × 1.5 – 1,500 × 2

= 600 (A)

(b) Labour rate variance = 1,500 (1.5 – 2) = 750 (A)

(c) Labour efficiency variance = 1.5 (1,600 – 1,500) = 150 (F)

(d) Idle time variance = 50 × 1.5 = 75 (A)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

M.B.A III - Semester Examination R19

Model Paper - I

STRATEGIC MANAGEMENT ACCOUNTING

Time : 3 Hours] [Max. Marks : 75

PART - A (5 × 5 = 25 Marks)
[Short Answer type]

ANSWERS

1. (a) Cost accountancy **(Unit - I, S.A.- 1)**
   (b) By product costing **(Unit - II, S.A.- 9)**
   (c) Make (or) Buy Decision **(Unit - III, S.A.- 5)**
   (d) Assumption of BEP **(Unit - IV, S.A.- 4)**
   (e) Productions of Budget **(Unit - V, S.A.- 6)**

PART - B (10 × 5 = 50 Marks)
[Essay Answer type]

2. Difference between financial accounting and cost accountings **(Unit - I, Topic -1.5)**

(OR)

3. A machine costing Rs. 10,000 is expected to run for 10 years at the end of which period the scrap value is likely to be Rs. 900. Repairs during the whole life of the machine are expected to be Rs. 1800 and the machine is expected to run 4380 hours per year on an average. Its electricity consumption is 15 units per hour, the rate per unit being 5 paise.

   The machine occupies one fourth of the area of the department and has two points over of a total of ten for lighting the foreman has to denote about one sixth of his time to the machine. The monthly rent of the department is Rs. 300 and the lighting charges amount to Rs. 80 per month.

The foreman is paid a monthly salary of Rs. 960. Insurance os 1% per annum of the machine value. Consumable stores Rs. 9/- per month. Compute machine hour rate.

(Unit - I, Pg.61, Problem -12)

4 Following data are available pertaining to a product after passing through two processes A and B :

Output transferred to process C from process B 9,120 units for ` 49,263.

Expenses incurred in Process C :

Sundry materials	` 1,480
Direct labour	` 6,500
Direct expenses	` 1,605

The wastage of process C is sold at `1.00 per unit. The overhead charges were 168% of direct labour. The final product was sold at `10.00 per unit fetching a profit of 20% on sales.

Find the percentage of wastage in process C and prepare Process C Account.

(Unit - II, Pg.165, Problem -1)

(OR)

5. In a certain period 500 units of main product are produced and 400 units are sold at ` 50 per unit. The by-product emerging from the main product is sold at ` 1,000. The total cost of production of 500 units is ` 15,000. Calculate the amount of gross profit after crediting by-product value (a) to cost of production, and (b) to cost of sales.

(Unit - II, Pg.194, Problem -1)

6. Define marginal costins? Explain Advantages of marginal costins **(Unit - III, Topic -3.1)**

(OR)

7. A certain product passes through two processes desired before it is transferred to finished stock. The following information is obtained for the month of December:

Items	Process-I `	Process-II `	Finished stock `
Opening stock	7,500	9,000	22,500
Direct material	15,000	15,750	
Direct wages	11,200	11,250	
Production overheads	10,500	4,500	
Closing stock	3,700	4,500	11,250
Profit % on transfer price to the next process	25%	20%	
Inter-process profits for opening stock	-	1,500	8,250

Stocks in processes are valued at prime cost and finished stock has been valued at the price at which it was received from Process II. Sales during the period were ? 1,40,000.

Prepare and compute,

(a) Process cost accounts showing profit element at each stage;

(b) Actual realised profit; and

(c) Stock valuation for balance sheet purposes.

(Unit - III, Pg.241, Problem -4)

8. Present the following information to show to the management:

(i) The marginal product cost and the contribution per unit.

(ii) The total contribution and profits resulting from each of the following sales mixtures.

(iii) The proposed sales mixes to earn a profit of ` 250 and ` 300 with total sales and A and B being 300 units.

	Product A `	Product B `
Direct materials (per unit)	10	9
Direct wages (per unit)	3	2
Sales price (per unit)	20	15

Fixed expenses ` 800

(Variable expenses are allocated to products as 100% of direct wages)

Sales mixtures :

(a) 100 units of Product A and 200 of B

(b) 150 units of Product A and 150 of B

(c) 200 units of Product A and 100 of B

Recommend which of the sales mixture should be adopted.

(Unit - IV, Pg.255, Problem -1)

Or

9. Explain advantages of Break even analysis **(Unit - IV, Topic -3.1)**

10. Explain advantages of bundetary control **(Unit - V, Topic -5.2.2)**

Or

11. The expenses budgeted for production of 10,000 units in a factory are furnished below :

	Per unit `
Materials 70	
Labour 25	
Variable Factory Overheads	20
Fixed Factory Overheads (` 1,00,000)	10
Variable Expenses (Direct)	5
Selling Expenses (10% fixed)	13
Distribution Expenses (20% fixed)	7
Administrative Expenses (Fixed – ` 50,000)	5
Total cost of sales per unit	155

You are required to prepare a budget for the production of 6000 units and 8,000 units.

(Unit - V, Pg.301, Problem -1)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

M.B.A III - Semester Examination R19

Model Paper - II

STRATEGIC MANAGEMENT ACCOUNTING

Time : 3 Hours] [Max. Marks : 75

PART - A (5 × 5 = 25 Marks)
[Short Answer type]

ANSWERS

1. (a) Cost center **(Unit - I, S.A.- 1)**

   (b) Equivalent production **(Unit - II, S.A.- 10)**

   (c) Key factors **(Unit - III, S.A.- 6)**

   (d) Interfirm comparison **(Unit - IV, S.A.- 5)**

   (e) Flexible budget **(Unit - V, S.A.- 4)**

PART - B (10 × 5 = 50 Marks)
[Essay Answer type]

2. Difference cost accounting? Explain advantages of cost accountings **(Unit - I, Topic -1.3, 1.3.2)**

(OR)

3. The "Modern Company" is divided into four departments : P_1, P_2, P_3 are producing departments and S1 is a service department. The actual costs for a period are as follows :

	`		`
Rent	1,000	Supervision	1,500
Repairs to plant	600	Fire insurance in respect of stock	500
Depreciation of plant	450	Power	900
Employer's liability for insurance	150	Light	120

Following information is available in respect of the four departments :

	Dept. P_1	Dept. P_2	Dept. P_3	Dept. S_1
Area (sq. metres)	1,500	1,100	900	500
Number of Employees	20	15	10	5
Total Wages (`)	6,000	4,000	3,000	2,000
Value of plant (`)	24,000	18,000	12,000	6,000
Value of Stock (`)	15,000	9,000	6,000	
H.P. of Plant	24	18	12	6

Apportion the costs to the various departments on the most equitable basis.

(Unit - I, Pg.27, Problem -1)

4. The following information is extracted from the manufacturing account of a factory for the year ending 31st Dec 2006. Material consumed Rs. 600,000; Direct wages Rs. 400,000 factor expenses Rs. 240,000 ; office and administrative expenses Rs. 155,000.

During the year 2007, the factory received a request from customer for quotation for the manufacturer and supply of a machine for which the estimated cost of material was Rs. 40,000 and Rs. 30,000 in wages. What should be the quotation if the factory desires to make a profit of 25% on the selling price.

(Unit - II, Pg.120, Problem -1)

(OR)

5. A product passes through three distinct processes to completion. These processes are numbered respectively I, II and III. During the week ended 15th January 2010, 500 units are produced. Following information is obtained :

	Process I `	Process II `	Process III `
Direct Materials	3,500	1,600	1,500
Direct Labour	2,500	2,000	2,500

The overhead expenses for the period were ` 1,400 apportioned to the processes on the basis of wages.

No work-in-progress or process stocks existed at the beginning or at the end of the week. Prepare Process Accounts. **(Unit - II, Pg.155, Problem -6)**

6. Cost Data:

Selling Price	` 5 per unit
Variable Cost	` 3 per unit
Fixed Cost	` 1 per unit
Normal Production	15,000 units
Total Fixed Cost for the year	` 15,000

Following statement shows the position of production, sales, opening and closing stock :

	Period I units	**Period II units**
Opening Stock	—	3,000
Production	17,000	14,000
Sales	14,000	16,000
Closing Stock	3,000	1,000

Prepare statements showing the figure of profit by both the methods, i.e., marginal costing method and absorption costing method. Also explain the difference in profits.

(Unit - III, Pg.232, Problem -5)

(OR)

7. Discuss briefly about CVP analysis **(Unit - III, Topic -3.2)**

8. The revenue account of Goodwill Co. Ltd. has been summarised as shown below:

	`	`
Sales		60,00,000
Direct Materials	18,00,000	
Direct Wages	12,00,000	
Variable Overheads	4,80,000	
Fixed Overheads	17,20,000	52,00,000
Profit		8,00,000

The licensed capacity of the company is ` 80,00,000 but the key factor is sales demand. It is proposed by the management that in order to utilise the existing capacity, the selling price of the product should be reduced by 5%.

You are required to prepare a forecast statement showing the effect of the proposed reduction in selling price after taking into account the following changes in costs :

(i) Sales forecast ` 76,00,000 (at reduced prices).

(ii) Direct wages rates and variable overheads are expected to increase by 5%.

(iii) Direct material prices are expected to increase by 2%.

(iv) Fixed overheads will increase by ` 80,000. **(Unit - IV, Pg.277, Problem -2)**

(OR)

9. Discuss briefly about Interfirm comparison **(Unit - IV, Topic -4.7)**

10. Prepare a Cash Budget for the three months ending 30th June, 2011 from the information given below :

(a)

Month	Sales `	Materials `	Wages `	Overheads `
February	14,000	9,600	3,000	1,700
March	15,000	9,000	3,000	1,900
April	16,000	9,200	3,200	2,000
May	17,000	10,000	3,600	2,200
June	18,000	10,400	4,000	2,300

(b) Credit terms are :

Sales/Debtors–10% sales are on cash, 50% of the credit sales are collected next month and the balance in the following month :

Creditors: Materials 2 months

Wages $\frac{1}{4}$ month

Overheads $\frac{1}{2}$ month

(c) Cash and Bank balance on 1st April, 2011 is expected to be ` 6,000.

(d) Other relevant informations are :

(i) Plant and Machinery will be installed in February, 2011 at a cost of ` 96,000. The monthly instalment of ` 2,000 is payable from April onward.

(ii) Dividend @ 5% on Preference Share Capital of ` 2,00,000 will be paid on 1st June.

(iii) Advance to be received for sale of vehicles ` 9,000 in June.

(iv) Dividends from investments amounting to ` 1,000 are expected to be received in June.

(v) Income-tax (advance) to be paid in June is ` 2,000

(Unit - V, Pg.317, Problem -1)

(OR)

11. Explain the essentials for an effective systems of standard costing.

(Unit - V, Topic -5.15)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD

M.B.A III - Semester Examination R19

Model Paper - III

STRATEGIC MANAGEMENT ACCOUNTING

Time : 3 Hours] [Max. Marks : 75

PART - A (5 × 5 = 25 Marks)
[Short Answer type]

ANSWERS

1. (a) ABC **(Unit - I, S.A.- 9)**
   (b) Job costins vs process consting **(Unit - II, S.A.- 5)**
   (c) Marginal costing **(Unit - III, S.A.- 1)**
   (d) Diversification of products **(Unit - IV, S.A.- 3)**
   (e) Variance analysis **(Unit - V, S.A.- 14)**

PART - B (10 × 5 = 50 Marks)
[Essay Answer type]

2 Differences between ABC vs Traditional based costins

(Unit - I, Topic -1.14.9)

(OR)

3. Explain classification of cost **(Unit - I, Topic -1.7.1)**

4. Calculate Prime Cost, Factory Cost, Cost of Production, Cost of Sales and Profit from the following particulars:

	`		`
Direct materials	1,00,000	Depreciation :	
Direct wages	30,000	Factory Plant	500
Wages of foreman	2,500	Office Premises	1,250
Electric power	500	Consumable stores	2,500
Lighting : Factory	1,500	Manager's salary	5,000
Office	500	Directors' fees	1,250

Storekeeper's wages		1,000	Office stationery		500
Oil and water		500	Telephone charges		125
Rent :	Factory	5,000	Postage and Telegrams		250
	Office	2,500	Salesmen's salaries		1,250
Repairs and Renewals :			Travelling expenses		500
	Factory Plant	3,500	Advertising		1,250
	Office Premises	500	Warehouse charges		500
Transfer to Reserves		1,000	Sales		1,89,500
Discount on shares written off		500	Carriage outward		375
Dividend		2,000	Income-tax		10,000

(Unit - II, Pg.108, Problem -5)

(OR)

5. Raghu and Co. products A product, that passes through three process before it is transfer to finished stock.

Following information is available for the month of December 1993.

Particulars	**process - I**	**Process - II**	**Process - III**	**Finished stock**
Opening stock	Rs. 40,000	Rs. 48,000	Rs. 32,000	Rs. 1,20,000
Direct material	Rs. 80,000	Rs. 84,000	Rs.120,000	–
Direct wages	Rs. 60,000	Rs.60,000	Rs. 64,000	–
Production over heads	Rs. 56,000	Rs. 24,000	Rs. 1,60,000	–
Closing stock	Rs. 20,000	Rs. 24,000	Rs. 16,000	60,000
Profit on cost	33.33%	25%	25%	–
Inter process profit for opening stock	–	8,000	8,000	44,000

Stock in process are valued at prime cost, finished stock has been valued at which it is received from the process sales during the month is Rs. 14,00,000.

(i) Prepare process Accounts

(ii) Prepare the statement showing profit actually released

(iii) Stock valuation for balance sheet purpose. **(Unit - II, Pg.108, Problem -5)**

6. A firm can purchase a separate part from an outside source @ ` 11 per unit. There is a proposal that the spare part be produced in the factory itself. For this purpose a machine costing `1,00,000 with annual capacity of 20,000 units and a life of 10 years will be required. A foreman with a monthly salary of ` 500 will

have to be engaged. Materials required will be ` 4.00 per unit and wages ` 2.00 per unit. Variable overheads are 150% of direct labour. The firm can easily raise funds @ 10% p.a. Advice the firm whether the proposal should be accepted.

(Unit - III, Pg.246, Problem -2)

(OR)

7. Explain applications of marginal costing **(Unit - III, Topic -3.3)**

8. The following particulars are extracted from the records of Ellora sales LTD.

	Product A	Product B
Sales per unit	Rs. 100	Rs. 120
Consumption of material	2 Kg.	3 Kg.
Material cost	Rs. 10	Rs. 15
Direct wage cost	Rs. 15	Rs. 10
Direct expenses	Rs. 5	Rs. 6
Machine hours used	3	2
Over head expenses		
Fixed	Rs. 5	Rs. 10
Variable	Rs. 15	Rs. 20

Direct wage per hour is Rs. 5

a) Comment on the profitability of each product (both use the same material) when
   i) Total sales potential in units is limited :
   ii) Total sales potential in value is limited :
   iii) Raw material is in short supply; and
   iv) Production capacity (in terms of machine hours) is the limiting actor.

b) Assuming raw material as the key factor, availability of which is 10,000 kg. And maximum sales potential of each product being 3,500 units, find out the product mix which will yield the maximum profit. **(Unit - IV, Pg.285, Problem -3)**

(OR)

9. Following data relate to XYZ company :

   Output and sales 40,000 units. Sale price per unit `15. Material and Labour cost per unit `8.

   Production overheads :

   Variable ` 2 per unit

   Fixed ` 50,000

   Other fixed overheads `1,00,000

Prepare income statement under : (a) absorption costing and (b) marginal costing.

(Unit - III, Pg.227, Problem -2)

10. From the following information, calculate the materials mix variance.

Materials	Standard	Actual
A	200 units @ ` 12	160 Units @ ` 13
B	100 units @ ` 10	140 Units @ ` 10

Due to shortage of material A, it was decided to reduce consumption of A by 15% and increase that of material B by 30%.

(Unit - V, Pg.364, Problem -1)

(OR)

11. The following information has been made available from the records of Srujan Tools limited for the six months of 1989. (And only the sales of Jan 90) in respect of Product "X".

(i) The units to be sold in different months :

1989 July : 1,100 units
Aug : 1,100 units
Sep : 1,700 units
Oct : 1,900 units
Nov : 2,500 units
Dec : 2,300 units

1990 : January = 2000 units.

(ii) There will be no work - in - progress at the end of any month.

(iii) Finished units equal to half the sales of the next month will be in stock at the end of every month [including June - 1989].

(iv) Budgeted production and production cost for the year ending 31st Dec 1989 as are under.

Production in units = 22,000
Direct material cost per unit = 10/-
Direct wages per unit Rs. 4/-

Total factory over heads Rs. 88000 it is required to prepare.

(a) Production Budget for each of 6 months of 1989.

(b) A summarised production cost budget for the same period.

(Unit - V, Pg.327, Problem -3)