

INTERMEDIATE

GROUP - II

PAPER 8

**COST
AND
MANAGEMENT
ACCOUNTING**



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STUDY NOTE 1

Financial Accounting, Cost Accounting and Management Accounting

Learning Objectives

After studying this topic, you should be able to,

1. Understand the concept of Financial Accounting, Cost Accounting and Management Accounting.
 2. Understand role of Financial Accounting, Cost Accounting and Management Accounting.
 3. Understand the various concepts in the three types of Accounting Systems.
 4. Understand the difference between the three systems of Accounting.
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1.1 Introduction

Accounting is a very old science which aims at keeping records of various transactions. The accounting is considered to be essential for keeping records of all receipts and payments as well as that of the income and expenditures. Accounting can be broadly divided into three categories.

Financial Accounting, aims at finding out profit or losses of an accounting year as well as the assets and liabilities position, by recording various transactions in a systematic manner.

Cost Accounting helps the business to ascertain the cost of production/services offered by the organization and also provides valuable information for taking various decisions and also for cost control and cost reduction.

Management Accounting helps the management to conduct the business in a more efficient manner.

The scope of management accounting is broader than that of cost accounting. In other words, it can be said that the management accounting can be considered as an extension of cost accounting. Management Accounting utilises the principles and practices of financial accounting and cost accounting in addition to other modern management techniques for efficient operation of a company. The main thrust in management accounting is towards determining policy and formulating plans to achieve desired objectives of management. Management Accounting makes corporate planning and strategies effective and meaningful.

In the present chapter all these concepts are discussed in detail in order to make the concepts more clear.

1.2 Financial Accounting

Financial Accounting aims at finding the results of an accounting year in terms of profits or losses and assets and liabilities. In order to do this, it is essential to record various transactions in a systematic manner. Financial Accounting is defined as, 'Art and science of classifying, analyzing and recording business transactions in a systematic manner in order to prepare a summary at the end of the year to find out the results of the concerned accounting year.' The definition given above is self explanatory, however for understanding clearly, the following terms are explained below.

- A **Business transactions** :- A transaction means an activity, a business transaction means any activity which creates some kind of legal relationship. For example, purchase and sale of goods, appointing an employee and paying his salary, payment of various expenses, purchase of assets etc.
- B **Classification of transactions** :- Before recording any transaction, it is essential that it is to be classified. A transaction can be classified as cash transaction and credit transaction. Similarly transactions of receiving income and payment of expenditure can be segregated. Even in case of expenditure, transactions involving revenue expenditure and capital expenditure can be segregated.
- C **Recording of transactions** :- The essence of financial accounting is recording of transaction. In accounting language, recording of the transaction is known as entry. There are well defined rules for recording various transactions in books of accounts. As per the rules of financial accounting, each and every transaction is recorded at two places and hence it is called as 'Double Entry' system of accounting.



D Summary of transactions :- After recording all transactions, it is essential to prepare a summary of them so as to draw meaningful conclusions. The summary will help in finding out the Profit/Loss of a particular year and also ascertaining Assets and Liabilities on a particular date. In fact, the very purpose of financial accounting is to know the results of a particular year. From this angle, the process of preparing the summary is extremely important.

1.2.1 Concepts and conventions of Financial Accounting :- There are some well defined concepts and conventions of financial accounting system. Concepts can also be termed as ‘principles’ while conventions are those which have been followed over a period of time and are accepted as norms to be followed in financial accounting systems. The concepts and conventions of financial accounting are explained in the following paragraphs.

1.2.2 Concepts of Financial Accounting:- The following are the concepts of financial accounting.

A. Separate Entity :- This concept implies that the businessman is different from business. Thus if X starts his business known as X and Sons, X as a person shall be different from his firm, i.e. X and Sons. Actually in Law, separate entity concept is recognized only in the case of joint stock companies registered under Companies Act, 1956. In case of partnerships and sole proprietorship business, separate entity concept is not recognized under Law. However in accounting, separate entity concept is recognized and the accounting entries are passed in the books of the business and not in the books of the proprietor as such. Thus when X starts his business and invests his own money as capital, it is shown as liability in the Balance Sheet of the business. On the other hand, if the proprietor incurs any private expenditure from the resources of the business, it is shown as recoverable in the books of accounts of the business. Thus the principle of separate entity is applied in practice.

B. Double Entry :- This principle can be called as ‘Heart’ of the entire accounting mechanism. Double entry means a transaction is recorded at two places in the books of accounts, the reason being that any transaction has two fold effects and hence it is to be recorded at two places. The following example will clarify the point.

1. If goods are purchased for cash, the cash goes out and goods come in. Thus one effect is the cash going out and the second effect is that goods come in.
2. When goods are sold for cash, the first effect is that the cash comes in and the second one is that the goods are going out.
3. In case of credit transactions like purchase of goods, one effect is that goods come in and the person from whom the goods are purchased becomes the creditor of the business.

Thus in double entry system, each and every transaction has the two fold effects. There is another system of recording the transactions, which is known as single entry system. In single entry system, every transaction is recorded only once and hence no double effect is given. There are very few organizations where single entry system is still implemented. However the double entry system is now being accepted everywhere.

C. Money Measurement Concept :- Another important concept of financial accounting is the money measurement concept. This concept means that only the transactions which are capable of being expressed in monetary terms will be recorded in the books of accounts. In other words, transactions which cannot be expressed in monetary terms cannot be recorded



in the books of accounts. For example, in books of accounts monetary value of assets or goods will be recorded and not the quantity of the same. Furniture will not be recorded as 1 table or 12 chairs or 100 cupboards, but the values of the same in monetary terms will be recorded. This principle means that items like Human Resources will not be recorded in the books of accounts as they cannot be converted into monetary terms. This principle is important as it brings uniformity in recording transactions in the books of accounts.

- D. *Going Concern Concept* :-** As per Glossary of terms, International Accounting Standards, 1999, the definition of 'Going Concern' is as follows

'That enterprise is normally viewed as a going concern, that is as continuing in operation for the foreseeable future. It is assumed that the enterprise has neither the intention nor the necessity of liquidation or curtailing materially the scale of its operations.'

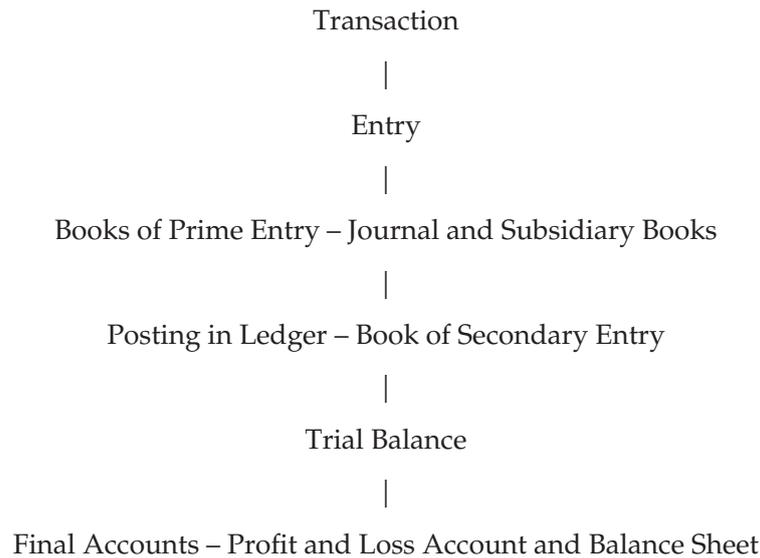
The implications of this concept is that the financial statements, fixed assets are shown at the cost of acquisition less depreciation accumulated up to the date of closure. The reason is that it is assumed that the enterprise is going to continue for a long period of time and there is no intention to close it down in the near future. Therefore the market values of the same are not relevant at all, the cost prices are relevant and hence the assets should be shown at the cost value.

- E. *Matching Concept* :-** Matching of costs and revenues concept is explained below in the International Accounting Standards

'Expenses are recognized in the income statement on the basis of a direct association between the costs incurred and the earnings of specific items of income. This process involves the simultaneous or combined recognition of revenues and expenses that result directly and jointly from the same association or other events. However, the application of the matching concept does not allow the recognition of items in the Balance Sheet which do not meet the definition of assets or liabilities.'

In other words, matching concept means that it is necessary to periodically match the costs and revenues in order to find out the results of a particular period. This period is called as accounting year. For any business it is essential to find out the profit or loss after periodic intervals. Actually, real profit or loss can be found out only after the business is closed down. But in the earlier concept we have seen that any business organization is a going concern and not likely to shut down in the near future. Therefore it is necessary to match the revenue and expenditure on periodic basis. This period is normally for one year and is called as accounting year. In case of limited companies established under the Companies Act, 1956, first accounting year in case of a company can be of 18 months but subsequent accounting years must be of 12 months duration. A business organization is free to choose the accounting year, i.e. a calendar year can be adopted as accounting year or financial year starting from 1st April to 31st March can be an accounting year. The assessment year for income tax purpose is always from 1st April to 31st March and hence many organizations adopt this period as accounting year.

1.2.3 *Accounting Cycle* : It is essential to describe the accounting cycle in brief. The cycle commences with the happening of a transaction and ends with the preparation of final accounts, i.e. Profit and Loss Account and Balance Sheet. The following chart will show the accounting cycle.



As mentioned above, the accounting cycle starts with a transaction. As soon as a transaction takes place, it is recorded in the books of Prime Entry, i.e. either Journal or subsidiary books. After recording the same in these books, the transaction is posted in the ledger which is called as book of secondary entry. All ledger accounts are closed and a list of the same is prepared which is called as 'Trial Balance'. From the trial balance, final accounts, Profit and Loss Account and Balance Sheet are prepared.

1.2.4 Utility of Financial Accounting : The utility of financial accounting can be explained in the following manner.

- A. Financial Accounting provides well defined rules and principles of recording business transactions. This provides uniformity in recording the transactions and thus results of various organizations become comparable.
- B. For any organization, whether it is profit making or non-profit making, it is essential to find out the results of a particular accounting period, i.e. accounting year. Financial accounting mechanism enables them to prepare Profit and Loss Account and Balance Sheet at the end of the financial year.
- C. Financial Accounting helps the taxation authorities for determining the tax liability in a fair manner. Income Tax is levied on the profits and financial accounting helps to disclose true and fair view of the business as regards to profits. Thus the assessment of tax liability becomes rational and free from any controversies.
- D. Financial Accounting is also helpful for the investors who are interested in finding out the profitability of the business in which they want to invest the money. Financial accounting information helps in ascertaining profitability so that decision-making is easier.
- E. In the course of the business, a firm has to borrow money for various objectives such as expansion, diversification, modernization and so on. The lenders have to ensure that the money lent by them will be repaid back. For this, they study financial statements viz. Profit and Loss Account and Balance Sheet to ascertain the financial condition of the business. Thus the financial accounting helps them in decision-making regarding granting of loan.



- F. Financial accounting also provides useful information for the purpose of valuation of business during merger and acquisition process.

1.3 Cost Accounting

As compared to the financial accounting, the focus of cost accounting is different. In the modern days of cut throat competition, any business organization has to pay attention towards their cost of production. Computation of cost on scientific basis and thereafter cost control and cost reduction has become of paramount importance. Hence it has become essential to study the basic principles and concepts of cost accounting. These are discussed in the subsequent paragraphs.

1.3.1 Cost :- Cost can be defined as the expenditure (actual or notional) incurred on or attributable to a given thing. It can also be described as the resources that have been sacrificed or must be sacrificed to attain a particular objective. In other words, cost is the amount of resources used for something which must be measured in terms of money. For example – Cost of preparing one cup of tea is the amount incurred on the elements like material, labor and other expenses, similarly cost of offering any services like banking is the amount of expenditure for offering that service. Thus cost of production or cost of service can be calculated by ascertaining the resources used for the production or services.

1.3.2 Costing :- Costing may be defined as ‘the technique and process of ascertaining costs’. According to Wheldon, ‘Costing is classifying, recording, allocation and appropriation of expenses for the determination of cost of products or services and for the presentation of suitably arranged data for the purpose of control and guidance of management. It includes the ascertainment of every order, job, contract, process, service units as may be appropriate. It deals with the cost of production, selling and distribution.

If we analyze the above definitions, it will be understood that costing is basically the procedure of ascertaining the costs. As mentioned above, for any business organization, ascertaining of costs is must and for this purpose a scientific procedure should be followed. ‘Costing’ is precisely this procedure which helps them to find out the costs of products or services.

1.3.3 Cost Accounting :- Cost Accounting primarily deals with collection, analysis of relevant of cost data for interpretation and presentation for various problems of management. Cost accounting accounts for the cost of products, service or an operation. It is defined as, ‘the establishment of budgets, standard costs and actual costs of operations, processes, activities or products and the analysis of variances, profitability or the social use of funds’.

1.3.4 Cost Accountancy :- Cost Accountancy is a broader term and is defined as, ‘the application of costing and cost accounting principles, methods and techniques to the science and art and practice of cost control and the ascertainment of profitability as well as presentation of information for the purpose of managerial decision making.’

If we analyze the above definition, the following points will emerge,

- A. Cost accounting is basically application of the costing and cost accounting principles.
- B. This application is with specific purpose and that is for the purpose of cost control, ascertainment of profitability and also for presentation of information to facilitate decision making.



- C. Cost accounting is a combination of art and science, it is a science as it has well defined rules and regulations, it is an art as application of any science requires art and it is a practice as it has to be applied on continuous basis and is not a one time exercise.

1.3.5 Objectives of Cost Accounting :- Objectives of Cost Accounting can be summarized as under

1. To ascertain the cost of production on per unit basis, for example, cost per kg, cost per meter, cost per liter, cost per ton etc.
2. Cost accounting helps in the determination of selling price. Cost accounting enables to determine the cost of production on a scientific basis and it helps to fix the selling price.
3. Cost accounting helps in cost control and cost reduction.
4. Ascertainment of division wise, activity wise and unit wise profitability becomes possible through cost accounting.
5. Cost accounting also helps in locating wastages, inefficiencies and other loopholes in the production processes/services offered.
6. Cost accounting helps in presentation of relevant data to the management which helps in decision making. Decision making is one of the important functions of Management and it requires presentation of relevant data. Cost accounting enables presentation of relevant data in a systematic manner so that decision making becomes possible.
7. Cost accounting also helps in estimation of costs for the future.

1.3.6 Essentials of a good Costing system :- For availing of maximum benefits, a good costing system should possess the following characteristics.

- A. Costing system adopted in any organization should be suitable to its nature and size of the business and its information needs.
- B. A costing system should be such that it is economical and the benefits derived from the same should be more than the cost of operating of the same.
- C. Costing system should be simple to operate and understand. Unnecessary complications should be avoided.
- D. Costing system should ensure proper system of accounting for material, labor and overheads and there should be proper classification made at the time of recording of the transaction itself.
- E. Before designing a costing system, need and objectives of the system should be identified.
- F. The costing system should ensure that the final aim of ascertaining of cost as accurately possible should be achieved.

1.3.7 Certain Important Terms :- It is necessary to understand certain important terms used in cost accounting.

- A. **Cost Center :-** Cost Center is defined as, 'a production or service, function, activity or item of equipment whose costs may be attributed to cost units. A cost center is the smallest



organizational sub unit for which separate cost allocation is attempted'. To put in simple words, a cost center is nothing but a location, person or item of equipment for which cost may be ascertained and used for the purpose of cost control. For example, a production department, stores department, sales department can be cost centers. Similarly, an item of equipment like a lathe, fork-lift, truck or delivery vehicle can be cost center, a person like sales manager can be a cost center. The main object of identifying a cost center is to facilitate collection of costs so that further accounting will be easy. A cost center can be either personal or impersonal, similarly it can be a production cost center or service cost center. A cost center in which a specific process or a continuous sequence of operations is carried out is known as Process Cost Center.

B. Profit Center :- Profit Center is defined as, 'a segment of the business entity by which both revenues are received and expenses are incurred or controlled'. (CEMA) A profit center is any sub unit of an organization to which both revenues and costs are assigned. As explained above, cost center is an activity to which only costs are assigned but a profit center is one where costs and revenues are assigned so that profit can be ascertained. Such revenues and expenditure are being used to evaluate segmental performance as well as managerial performance. A division of an organization may be called as profit center. The performance of profit center is evaluated in terms of the fact whether the center has achieved its budgeted profits. Thus the profit center concept is used for evaluation of performance.

1.3.8 Costing Systems :- There are different costing systems used in practice. These are described below.

- A. Historical Costing :-** In this system, costs are ascertained only after they are incurred and that is why it is called as historical costing system. For example, costs incurred in the month of April, 2007 may be ascertained and collected in the month of May. Such type of costing system is extremely useful for conducting post-mortem examination of costs, i.e. analysis of the costs incurred in the past. Historical costing system may not be useful from cost control point of view but it certainly indicates a trend in the behavior of costs and is useful for estimation of costs in future.
- B. Absorption Costing :-** In this type of costing system, costs are absorbed in the product units irrespective of their nature. In other words, all fixed and variable costs are absorbed in the products. It is based on the principle that costs should be charged or absorbed to whatever is being costed, whether it is a cost unit, cost center.
- C. Marginal Costing :-** In Marginal Costing, only variable costs are charged to the products and fixed costs are written off to the Costing Profit and Loss A/c. The principle followed in this case is that since fixed costs are largely period costs, they should not enter into the production units. Naturally, the fixed costs will not enter into the inventories and they will be valued at marginal costs only.
- D. Uniform Costing :-** This is not a distinct method of costing but is the adoption of identical costing principles and procedures by several units of the same industry or by several undertakings by mutual agreement. Uniform costing facilitates valid comparisons between organizations and helps in eliminating inefficiencies.



1.3.9 Classification of Costs :- An important step in computation and analysis of cost is the classification of costs into different types. Classification helps in better control of the costs and also helps considerably in decision making. Classification of costs can be made according to the following basis.

A. Classification according to elements :- Costs can be classified according to the elements. There are three elements of costing, viz. material, labor and expenses. Total cost of production/ services can be divided into the three elements to find out the contribution of each element in the total costs.

B. Classification according to nature :- As per this classification, costs can be classified into Direct and Indirect. Direct costs are the costs which are identifiable with the product unit or cost center while indirect costs are not identifiable with the product unit or cost center and hence they are to be allocated, apportioned and then absorb in the production units. All elements of costs like material, labor and expenses can be classified into direct and indirect. They are mentioned below.

i. Direct and Indirect Material :- Direct material is the material which is identifiable with the product. For example, in a cup of tea, quantity of milk consumed can be identified, quantity of glass in a glass bottle can be identified and so these will be direct materials for these products. Indirect material cannot be identified with the product, for example lubricants, fuel, oil, cotton wastes etc cannot be identified with a given unit of product and hence these are the examples of indirect materials.

ii. Direct and Indirect Labor :- Direct labor can be identified with a given unit of product, for example, when wages are paid according to the piece rate, wages per unit can be identified. Similarly wages paid to workers who are directly engaged in the production can also be identified and hence they are direct wages. On the other hand, wages paid to workers like sweepers, gardeners, maintenance workers etc are indirect wages as they cannot be identified with the given unit of production.

iii. Direct and Indirect Expenses :- Direct expenses refers to expenses that are specifically incurred and charged for specific or particular job, process, service, cost center or cost unit. These expenses are also called as chargeable expenses. Examples of these expenses are cost of drawing, design and layout, royalties payable on use of patents, copyrights etc, consultation fees paid to architects, surveyors etc. Indirect expenses on the other hand cannot be traced to specific product, job, process, service or cost center or cost unit. Several examples of indirect expenses can be given like insurance, electricity, rent, salaries, advertising etc.

It should be noted that the total of direct expenses is known as 'Prime Cost' while the total of all indirect expenses is known as 'Overheads'.

C. Classification according to behavior :- Costs can also be classified according to their behavior. This classification is explained below.

i. Fixed Costs :- Out of the total costs, some costs remain fixed irrespective of changes in the production volume. These costs are called as fixed costs. The feature of these costs is that the total costs remain same while per unit fixed cost is always variable. Examples of these costs are salaries, insurance, rent, etc.



- ii. Variable Costs :-* These costs are variable in nature, i.e. they change according to the volume of production. Their variability is in the same proportion to the production. For example, if the production units are 2,000 and the variable cost is Rs. 5 per unit, the total variable cost will be Rs. 10,000, if the production units are increased to 5,000 units, the total variable costs will be Rs. 25,000, i.e. the increase is exactly in the same proportion of the production. Another feature of the variable cost is that per unit variable cost remains same while the total variable costs will vary. In the example given above, the per unit variable cost remains Rs. 2 per unit while total variable costs change. Examples of variable costs are direct materials, direct labor etc.
 - iii. Semi-variable Costs :-* Certain costs are partly fixed and partly variable. In other words, they contain the features of both types of costs. These costs are neither totally fixed nor totally variable. Maintenance costs, supervisory costs etc are examples of semi-variable costs. These costs are also called as 'stepped costs'.
- D. Classification according to functions :-** Costs can also be classified according to the functions/ activities. This classification can be done as mentioned below.
- i. Production Costs :-* All costs incurred for production of goods are known as production costs.
 - ii. Administrative Costs :-* Costs incurred for administration are known as administrative costs. Examples of these costs are office salaries, printing and stationery, office telephone, office rent, office insurance etc.
 - iii. Selling and Distribution Costs :-* All costs incurred for procuring an order are called as selling costs while all costs incurred for execution of order are distribution costs. Market research expenses, advertising, sales staff salary, sales promotion expenses are some of the examples of selling costs. Transportation expenses incurred on sales, warehouse rent etc are examples of distribution costs.
 - iv. Research and Development Costs :-* In the modern days, research and development has become one of the important functions of a business organization. Expenditure incurred for this function can be classified as Research and Development Costs.
- E. Classification according to time :-** Costs can also be classified according to time. This classification is explained below.
- I. Historical Costs :-** These are the costs which are incurred in the past, i.e. in the past year, past month or even in the last week or yesterday. The historical costs are ascertained after the period is over. In other words it becomes a post-mortem analysis of what has happened in the past. Though historical costs have limited importance, still they can be used for estimating the trends of the future, i.e. they can be effectively used for predicting the future costs.
 - II. Predetermined Cost :-** These costs relating to the product are computed in advance of production, on the basis of a specification of all the factors affecting cost and cost data. Pre determined costs may be either standard or estimated. Standard Cost is a predetermined calculation of how much cost should be under specific working conditions. It is based on technical studies regarding material, labor and expenses. The main purpose of standard



cost is to have some kind of benchmark for comparing the actual performance with the standards. On the other hand, estimated costs are predetermined costs based on past performance and adjusted to the anticipated changes. It can be used in any business situation or decision making which does not require accurate cost.

F. Classification of costs for Management decision making :- One of the important function of cost accounting is to present information to the Management for the purpose of decision making. For decision making certain types of costs are relevant. Classification of costs based on the criteria of decision making can be done in the following manner

- I. Marginal Cost :-** Marginal cost is the change in the aggregate costs due to change in the volume of output by one unit. For example, suppose a manufacturing company produces 10,000 units and the aggregate costs are Rs. 25,000, if 10,001 units are produced the aggregate costs may be Rs. 25,020 which means that the marginal cost is Rs. 20. Marginal cost is also termed as variable cost and hence per unit marginal cost is always same, i.e. per unit marginal cost is always fixed. Marginal cost can be effectively used for decision making in various areas.
- II. Differential Costs :-** Differential costs are also known as incremental cost. This cost is the difference in total cost that will arise from the selection of one alternative to the other. In other words, it is an added cost of a change in the level of activity. This type of analysis is useful for taking various decisions like change in the level of activity, adding or dropping a product, change in product mix, make or buy decisions, accepting an export offer and so on.
- III. Opportunity Costs :-** It is the value of benefit sacrificed in favor of an alternative course of action. It is the maximum amount that could be obtained at any given point of time if a resource was sold or put to the most valuable alternative use that would be practicable. Opportunity cost of goods or services is measured in terms of revenue which could have been earned by employing that goods or services in some other alternative uses.
- IV. Relevant Cost :-** The relevant cost is a cost which is relevant in various decisions of management. Decision making involves consideration of several alternative courses of action. In this process, whatever costs are relevant are to be taken into consideration. In other words, costs which are going to be affected matter the most and these costs are called as relevant costs. Relevant cost is a future cost which is different for different alternatives. It can also be defined as any cost which is affected by the decision on hand. Thus in decision making relevant costs play a vital role.
- V. Replacement Cost :-** This cost is the cost at which existing items of material or fixed assets can be replaced. Thus this is the cost of replacing existing assets at present or at a future date.
- VI. Abnormal Costs :-** It is an unusual or a typical cost whose occurrence is usually not regular and is unexpected. This cost arises due to some abnormal situation of production. Abnormal cost arises due to idle time, may be due to some unexpected heavy breakdown of machinery. They are not taken into consideration while computing cost of production or for decision making.



VII. Controllable Costs :- In cost accounting, cost control and cost reduction are extremely important. In fact, in the competitive environment, cost control and reduction are the key words. Hence it is essential to identify the controllable and uncontrollable costs. Controllable costs are those which can be controlled or influenced by a conscious management action. For example, costs like telephone, printing stationery etc can be controlled while costs like salaries etc cannot be controlled at least in the short run. Generally, direct costs are controllable while uncontrollable costs are beyond the control of an individual in a given period of time.

VIII. Shutdown Cost :- These costs are the costs which are incurred if the operations are shut down and they will disappear if the operations are continued. Examples of these costs are costs of sheltering the plant and machinery and construction of sheds for storing exposed property. Computation of shutdown costs is extremely important for taking a decision of continuing or shutting down operations.

IX. Capacity Cost :- These costs are normally fixed costs. The cost incurred by a company for providing production, administration and selling and distribution capabilities in order to perform various functions. Capacity costs include the costs of plant, machinery and building for production, warehouses and vehicles for distribution and key personnel for administration. These costs are in the nature of long-term costs and are incurred as a result of planning decisions.

X. Urgent Costs :- These costs are those which must be incurred in order to continue operations of the firm. For example, cost of material and labor must be incurred if production is to take place.

1.3.10 Costing Methods and Techniques :-

Introduction :- It is necessary to understand the difference between the costing methods and techniques. Costing methods are those which help a firm to compute the cost of production or services offered by it. On the other hand, costing techniques are those which help a firm to present the data in a particular manner so as to facilitate the decision making as well as cost control and cost reduction. Costing methods and techniques are explained below.

Methods of Costing :- The following are the methods of costing.

- I. Job Costing :-** This method is also called as job costing. This costing method is used in firms which work on the basis of job work. There are some manufacturing units which undertake job work and are called as job order units. The main feature of these organizations is that they produce according to the requirements and specifications of the consumers. Each job may be different from the other one. Production is only on specific order and there is no pre demand production. Because of this situation, it is necessary to compute the cost of each job and hence job costing system is used. In this system, each job is treated separately and a job cost sheet is prepared to find out the cost of the job. The job cost sheet helps to compute the cost of the job in a phased manner and finally arrives the total cost of production.
- II. Batch Costing :-** This method of costing is used in those firms where production is made on continuous basis. Each unit coming out is uniform in all respects and production is made prior to the demand, i.e. in anticipation of demand. One batch of production consists of the units produced from the time



machinery is set to the time when it will be shut down for maintenance. For example, if production commences on 1st January 2007 and the machine is shut down for maintenance on 1st April 2007, the number of units produced in this period will be the size of one batch. The total cost incurred during this period will be divided by the number of units produced and unit cost will be worked out. Firms producing consumer goods like television, air-conditioners, washing machines etc use batch costing.

- III. Process Costing :-** Some of the products like sugar, chemicals etc involve continuous production process and hence process costing method is used to work out the cost of production. The meaning of continuous process is that the input introduced in the process I travels through continuous process before finished product is produced. The output of process I becomes input of process II and the output of process II becomes input of the process III. If there is no additional process, the output of process III will be the finished product. In process costing, cost per process is worked out and per unit cost is worked out by dividing the total cost by the number of units. Industries like sugar, edible oil, chemicals are examples of continuous production process and use process costing.
- IV. Operating Costing :-** This type of costing method is used in service sector to work out the cost of services offered to the consumers. For example, operating costing method is used in hospitals, power generating units, transportation sector etc. A cost sheet is prepared to compute the total cost and it is divided by cost units for working out the per unit cost.
- V. Contract Costing :-** This method of costing is used in construction industry to work out the cost of contract undertaken. For example, cost of constructing a bridge, commercial complex, residential complex, highways etc is worked out by use of this method of costing. Contract costing is actually similar to job costing, the only difference being that in contract costing, one construction job may take several months or even years before they are complete while in job costing, each job may be of a short duration. In contract costing, as each contract may take a long period for completion, the question of computing of profit is to be solved with the help of a well defined and accepted method.
- 1.3.11 Technique of Costing :-** As mentioned above, costing methods are for computation of the total cost of production/services offered by a firm. On the other hand, costing technique help to present the data in a particular format so that decision making becomes easy. Costing techniques also help for controlling and reducing the costs. The following are the techniques of costing.
- I. Marginal Costing :-** This technique is based on the assumption that the total cost of production can be divided into fixed and variable. Fixed costs remain same irrespective of the changes in the volume of production while the variable costs vary with the level of production, i.e. they will increase if the production increases and decrease if the production decreases. Variable cost per unit always remains the same. In this technique, only variable costs are taken into account while calculating production cost. Fixed costs are not absorbed in the production units. They are written off to the Costing Profit and Loss Account. The reason behind this is that the fixed costs are period costs and hence should not be absorbed in the production. Secondly they are variable on per unit basis and hence there is no equitable basis for charging them to the products. This technique is effectively used for decision making in the areas like make or buy decisions, optimizing of product mix, key factor analysis, fixation of selling price, accepting or rejecting an export offer, and several other areas.
- II. Standard Costing :-** Standard costs are predetermined costs relating to material, labor and overheads. Though they are predetermined, they are worked out on scientific basis by



conducting technical analysis. They are computed for all elements of costs such as material, labor and overheads. The main objective of fixation of standard cost is to have benchmark against which the actual performance can be compared. This means that the actual costs are compared with the standards. The difference is called as 'variance'. If actual costs are more than the standard, the variance is 'adverse' while if actual costs are less than the standard, the variance is 'favorable'. The adverse variances are analyzed and reasons for the same are found out. Favorable variances may also be analyzed to find out the reasons behind the same. Standard costing, thus is an important technique for cost control and reduction.

III. Budgets and Budgetary Control :- Budget is defined as, 'a quantitative and/or a monetary statement prepared to prior to a defined period of time for the policies during that period for the purpose of achieving a given objective.' If we analyze this definition, it will be clear that a budget is a statement, which may be either in monetary form or quantitative form or both. For example, a production budget can be prepared in quantitative form showing the target production, it can also be prepared in monetary terms showing the expected cost of production. Some budgets can be prepared only in monetary terms, e.g. cash budget showing the estimated receipts and payments in a particular period can be prepared in monetary terms only. Another feature of budget is that it is always prepared prior to a defined period of time which means that budget is always prepared for future and that too a defined future. For example, a budget may be prepared for next 12 months or 6 months or even for 1 month, but the time period must be certain and not vague. One of the important aspect of budgeting is that it lays down the objective to be achieved during the defined period of time and for achieving the objectives, whatever policies are to be pursued are reflected in the budget.

Budgetary control involves preparation of budgets and continuous comparison of actual with budgets so that necessary corrective action can be taken. For example, when a production budget is prepared, the production targets are laid down in the same for a particular period. After the period is over, the actual production is compared with the budget and the deviation is found out so that necessary corrective action can be taken.

Budget and Budgetary Control is one of the important techniques of costing used for cost control and also for performance evaluation. The success of the technique depends upon several factors such as support from top management, involvement of employees and co-ordination within the organization.

1.3.12 Cost Sheet

Cost Sheet is a statement of cost showing the total cost of production and profit or loss from a particular product or service. A Cost Sheet shows the cost in a systematic manner and element wise. A typical format of the Cost Sheet is given below.



Cost Sheet for the period.....

Production units

Particulars	Amount (Rs.)	Amount (Rs.)
A. Direct Materials Opening Stock		
+ Purchases		
+ Carriage inwards		
- Closing Stock		
B. Direct Wages		
C. Direct Expenses		
I. Prime Cost (A + B + C)		
D. Factory Overheads- Indirect materials		
Loose Tools		
Indirect wages		
Rent and Rates (Factory)		
Lighting and heating (F)		
Power and fuel		
Repairs and Maintenance		
Drawing office expenses		
Research and experiment		
Depreciation – Plant (F)		
Insurance – (F)		
Work Manager’s salary		
II. Factory Cost/Works Cost (I + D)		
E. Office and Administrative Overheads		
Rent and Rates – office		
Salaries – office		
Insurance of office building and equipments		
Telephone and postage		
Printing and Stationery		
Depreciation of furniture and office equipments		
Legal expenses		
Audit fees		
Bank Charges		
III. Cost of Production (II + E)		
F. Selling and Distribution Overheads		
Showroom rent and rates		
Salesmen’s salaries and commission		
Traveling expenses		
Printing and Stationery – Sales Department		
Advertising		
Bad debts		
Postage		
Debt collection expenses		
Carriage outwards		



Particulars	Amount (Rs.)	Amount (Rs.)
Depreciation of delivery van		
Debt collection expenses		
Samples and free gifts		
IV. Cost of Sales (III + F)		
V. Profit/Loss		
VI. Sales (IV + V)		

A glance at the above cost sheet will reveal that it works out the total cost of production/service in a phased manner. In other words, total costs are segregated into elements like Prime Cost, Factory or Works Cost, Cost of Production, Cost of Sales and finally the profit/loss is worked out by comparing the total cost with the selling price. Appropriate adjustments are made for opening and closing stock of Work in Progress and also opening and closing stock of finished goods. The format of cost sheet may be suitably changed according to the requirements of each firm but the basic form remains the same.

1.3.13 Cost Control and Reduction :- One of the important functions of cost accounting is cost control and cost reduction. Cost control implies various actions taken in order to ensure that the cost do not rise beyond a particular level while cost reduction means reducing the existing cost of production. Both these concepts are discussed below.

Cost Control :- As mentioned above, cost control means keeping the expenses within limits or control. Cost control has the following features.

- A. Cost control is a continuous process. It involves setting standards and budgets for deciding targets of different expenses and constant comparison of actual the budgeted and standards.
- B. Cost control involves creation of responsibilities center with clearly defined authorities and responsibilities.
- C. It also involves, timely cost control reports showing the variances between standard and actual performance.
- D. Motivating and encouraging employees to accomplish budgetary goals is also one of the essential aspects of cost control.
- E. Actually cost control not only means monetary limits on cost but it also involves optimum utilization of resources or performing the same job at same cost.

Cost Reduction :- Cost control means attempts to reduce the costs. For example, if the present costs are Rs. 1,000 per unit, attempts can be made to reduce it to bring it down below Rs. 1,000. For doing this, all out efforts will have to be made for achieving this target. The goal of cost reduction can be achieved in two ways, first is reducing the cost per unit and the second one is increasing productivity. Reducing wastages, improving efficiency, searching for alternative materials, and a constant drive to reduce costs, can effect cost reduction. The following tools and techniques are normally used for cost reduction.

- A. Value analysis or value engineering.
- B. Setting standards for all elements of costs and constant comparison of actual with standard and analysis of variances.



- C. Work study
- D. Job evaluation and merit rating
- E. Quality control
- F. Use of techniques like Economic Order Quantity
- G. Classification and codification
- H. Standardization and simplification
- I. Inventory management
- J. Benchmarking
- K. Standardization
- L. Business Process Re-engineering.

1.3.14 Cost Management :- The term 'Cost Management' has not been defined as such. However it can be said that cost management identifies, collects, measures, classifies and reports information that is useful to managers and other internal users in cost ascertainment, planning, controlling and decision making. Cost management aims to produce and provide information to internal users and personnel working in the organization.

Need for Cost Management :- Effective management of cost makes an organization more strong, more stable and helps in improving the potentials of a business. The organization calls for a system that would monitor the full economic impact of the business, on resource acquisition and consumption. This provides supplying of information to the top management for exploring various alternatives by which cost effectiveness can be improved. Cost management also helps in optimizing resources which will improve overall efficiency of the organization and help the firm to achieve its objectives.

1.3.15 Difference between Cost Accounting and Financial Accounting

The distinguishing features of financial accounting and cost accounting are given below.

Financial Accounting	Cost Accounting
1. It aims at finding out results of accounting year in the form of Profit and Loss Account and Balance Sheet.	1. It aims at computing cost of production/ service in a scientific manner and then cost control and cost reduction.
2. It is more attached with reporting the results and position of business to persons and authorities other than management like government, creditors, investors, owners etc.	2. It is an internal reporting system for an organization's own management for decision making.
3. Financial Accounting data is historical in nature	3. It not only deals with historical data but is also futuristic in approach.
4. In financial accounting, the major emphasis is in cost classification based on type of transactions, e.g. salaries, repairs, insurance, stores etc.	4. In cost accounting, classification is basically on the basis of functions, activities, products, process and on internal planning and control and information needs of the organization.



Financial Accounting	Cost Accounting
5. In financial accounting, only those transactions are recorded which can be expressed in monetary terms.	5. Cost accounting uses both monetary as well as quantitative information.
6. It aims at presenting 'true and fair' view of the profit and loss position as well as financial position.	6. It aims at computing 'true and fair' view of the cost of production/services offered by the firm.
7. Financial Accounts are subject to statutory audit to verify whether they disclose a true and fair view of the profit and loss as well as financial position	7. Cost accounts are subject to cost audit which verifies whether the cost accounts disclose true and fair view of the cost of production of the company.

1.3.16 Installation of a Costing System :- As explained above, cost accounting system is a system that accumulates costs, assigns them to cost objects and reports cost information. In addition to this, a proper cost accounting system assists management in the planning and control of the business operations as well as in analyzing product profitability. There are several other advantages of a well defined costing system in an organization like generating information for decision making, supplying information to the management for internal control, detailed analysis of costs like fixed costs, variable costs, controllable costs, labor costs, material costs, overheads etc. However it is necessary that the cost accounting system is properly installed in an organization. Costing system installed in an organization should be simple to understand, easy to operate, highly reliable and suitable to the organization. The following factors should be taken into consideration while designing a costing system.

- I. Size of the firm :-** Size of the firm is an extremely important factor in designing a cost accounting system. As the size of the firm and its business grows, the volume and complexity of the cost data also grows. In such situation, the cost accounting system should be capable of supplying such information.
- II. Manufacturing Process :-** Process of manufacturer changes from industry to industry. In some industries, there may be a continuous process of production while in some batch or job type of production may be in operation. A cost accounting system should be such that the manufacturing process is taken into consideration and cost data is collected accordingly.
- III. Nature and Number of Products :-** If a single product is produced, all costs like material, labor and indirect expenses can be directly allocated to that product. But if more than one product is manufactured, the question of allocation and apportionment as well as absorption of indirect expenses (Overheads) arises and hence the cost accounting system should be designed accordingly as more complex data will be required.
- IV. Management Control Needs :-** The designing of a cost accounting system in a business organization is guided by the management control requirements. The costing system should supply data to persons at different levels in the organization to take suitable action in their respective areas.
- V. Raw Materials :-** The designing of a cost accounting system in a business is also guided by the raw materials required for the production. The nature of raw materials and the degree of waste therein influence the designing of costing system. There are some materials which have a high degree of spoilage. The costing system should be such that identification of spoilage, keeping records of materials, pricing of the issues etc are taken into consideration.



VI. Organization Structure :- The structure of the organization also plays a vital role in designing a costing system. The system should correspond to the hierarchy of the organization.

VII. External Factors :- External factors are also important in designing of a costing system. For example, Cost Accounting Record Rules have been mandatory for certain types of industries. For the sake of compliance of the same, costing system should be designed.

1.3.17 Practical Difficulties in Installation of Costing system :- The practical difficulties expected at the time of installation of costing system are given below.

- I. Top Management of an organization may not give necessary support and recognition to the costing system installed in an organization. Due to lack of support, this system may not give desired results.
- II. There may be resistance from existing accounting staff due to fear of losing job recognition and importance after the implementation of the system.
- III. Employees of other departments may not co-operate for installation of costing system due to fear of increase in workload or revealing of inefficiency.
- IV. The foremen, supervisors, workers and other operating level staff may resent the introduction of costing system due to the fear on increasing of workload.
- V. Shortage of qualified and efficient staff may be another difficulty in installing and operating a costing system.
- VI. Sometimes firms resist a costing system due to the heavy cost of installation and operating of the same. The cost may be more than the benefits of the same.

1.4 Management Accounting

Introduction :- The scope of Management Accounting is broader than the scope of cost accounting. In cost accounting, as we have seen, the primary emphasis is on cost and it deals with collection, analysis, relevance, interpretation and presentation for various problems of management. Management Accounting is an accounting system which will help the Management to improve its efficiency. The main thrust of Management Accounting is towards determining policy and formulating plans to achieve desired objectives of management. It helps the Management in planning, controlling and analyzing the performance of the organization in order to follow the path of continuous improvement. Management Accounting utilizes the principle and practices of financial accounting and cost accounting in addition to other modern management techniques for effective operation of a company. In fact there is an overlapping in various areas of cost accounting and management accounting. However, the distinguishing features of Management Accounting are given below.

1.5 Features of Management Accounting

The features of Management Accounting are given below.

1. The Management Accounting data are derived from both, the financial accounting and cost accounting.
2. The main thrust in management accounting is towards determining policy and formulating plans to achieve desired objectives of management.
3. Management Accounting makes corporate planning and strategy effective and meaningful.
4. It is concerned with short and long range planning and uses highly sophisticated techniques like



sensitivity analysis, probability techniques, decision tree, ratio analysis etc for planning, control and evaluation.

5. It is futuristic in approach and predictive in nature.
6. Management Accounting system cannot be installed without proper cost accounting system.
7. Management Accounting systems generate various reports which are extremely useful from the Management point of view.

1.6 Management Accounting Information and their use

In the above paragraphs, we have seen the utility of Management Accounting. One of the distinguishing factors between the financial accounting and management accounting is that the management accounting does not have a unified structure. The format in which it is prepared varies widely according to the circumstances in each case and the purpose for which the information is being summarized. The management accounting generates information, which is used for three different purposes. I] Measurement II] Control and III] Decision making [Alternative choice problems] For each of these purposes, management accounting generates vital information. The uses of information for each of the three purposes of management accounting is explained below.

- I. Measurement:** For measurement of full costs, the management accounting system focuses on the measurement of full costs. Full costs are the total costs required for producing goods or offering services. These costs are divided into A] Direct costs and B] Indirect costs. Direct costs are identifiable or traceable to the products or services offered while indirect costs are not traceable to the products or services. Full cost accounting measures not only the total costs [direct plus indirect costs] required for producing products or services but also the full costs required to run other activity like conducting a research project or running a welfare scheme and so on. Thus full cost accounting is not restricted to solely to measure the cost of manufacturing.
- II. Control:** An important aspect of the management accounting information is to provide information, which can be used for 'Control'. The management accounting system is structured in such a manner that information is generated for each 'Responsibility Center'. A responsibility center is an organization unit headed by a manager who is responsible for its operations and performance. Management accounting helps to prepare budget for each responsibility center and also facilitates comparison between the budgeted and actual results. A report is prepared for each responsibility center, which shows the budgeted and actual performance and also the difference between the two. This enables the performance analysis of each responsibility center so that proper corrective action can be taken in this respect.
- III. Decision Making:** Management accounting generates useful information for decision making. Management has to take several decisions in the course of business. Some of the major decisions are, Make or Buy, Accepting or rejecting of an Export Order, Working of second shift, Fixation of selling price, Capital expenditure decisions, Increasing production capacity, Optimizing of Product Mix and so on. For all these decisions, providing of information is necessary and the management accounting generates this information, which enables the management to take such decisions.



1.7 Role of Management Accountancy

The role of management accounting and financial accounting is quite different from each other as they have different goals altogether. Management Accounting measures, analyzes and reports financial and non financial information that helps managers to take decisions to fulfill the goals of an organization. Managers use management accounting information to choose, communicate and implement strategy. They also use management accounting information to coordinate product design, production and marketing decisions. Management accounting focuses on internal reporting. The following points highlight the role played by Management Accounting in the business organization.

- I. *Implementing Strategy:*** Managers implement strategies by translating them into actions. Creating value for customers is an important part of planning and implementation of strategies. Strategic planning and implementation will include decisions regarding the design of products, services or processes, research and development, production, marketing, distribution and customer services. Each of this area is important for satisfying customers and keeping them satisfied. Management accounting will help to track the costs of each of the activity mentioned above. The ultimate target is to reduce costs in each category and to improve efficiency. Cost information also helps managers make cost benefit analysis. For example, managers can find out that is it cheaper to buy products from outside vendors or to do manufacturing in-house? Is it worthwhile to invest more resources in design and manufacturing if it reduces costs in marketing and customer service?
- II. *Supply Chain Analysis:*** Companies can also implement strategy, cut costs and create value by enhancing their supply chain. The term 'Supply Chain' describes the flow of goods, services and information from the initial sources of materials and services to the delivery of products to customers regardless of whether those activities occur in the same organization or in other organization. Customers expect improved performance from companies through the supply chain. They expect that the companies should perform all these activities in an efficient manner so as to reduce costs and also maintain quality of the products and the products be available easily for them. This is no doubt a daunting task and the management accounting plays a vital role in ensuring value for money for the customers. Tools like standard costing and target costing can be used effectively for cost control and cost reduction and thus ensure reasonable prices for customers. A system of budgets and budgetary control will ensure continuous planning and monitoring various functions and thus provide for introspection. Continuous improvement in these activities will help in creating value for customers.
- III. *Decision Making:*** One of the important functions of management is decision making. Management Accounting helps in this crucial area by providing relevant information to the management. Techniques like marginal costing helps to generate information, which will be useful for taking decisions. Decisions include make or buy decisions, adding or dropping a product line, working of additional shift, shut down or continue operations, capital expenditure decisions and so on. Decisions based on information are expected to be more rational and objective rather than subjective.
- IV. *Performance Measurement:*** Management accounting helps immensely for the measurement of performance of the organization. The main aspect of performance measurement is comparison between the targets and actual. There are several tools and techniques like budgets and budgetary control, standard costing and marginal costing, which are used in measuring the actual performance against the target performance. This will facilitate introspection and corrective action can be taken for further improving the performance.

STUDY NOTE 2

Material Control

Learning Objectives

After studying this topic, you should be able,

1. To understand the basic principles of Material Control
 2. To study the procedures of Purchase, Storing and Issues
 3. To acquaint with the latest techniques in inventory control
 4. To understand the material losses
-





2.1 Introduction

Material is one of the important element of cost and it has been observed that in the total cost structure of a product, material content is about 60 to 65%. The substantial proportion of material cost in the total cost demands more and more attention of the management towards this element. The term 'material' generally used in manufacturing concerns, refers to raw materials used for production, sub-assemblies and fabricated parts. The terms 'materials' and 'stores' are sometimes used interchangeably. However, both the terms differ. 'Stores' is wider in meaning and comprises many other items besides raw materials, such as tools, equipments, maintenance and repair items, factory supplies, components, jigs, fixtures. Sometimes, finished goods and partly finished goods are also included within the scope of this item. This chapter aims at discussing various aspects of material control such as purchasing, storekeeping, issuing and other aspects like material losses etc.

2.2 Concept and objectives of Materials Control

Material cost constitutes a prime part of the total cost of production of manufacturing firm. Proper accounting, therefore is required for controlling the material through purchase control, stores control, issue control and control over various losses. Material control basically aims at efficient purchasing of materials, their efficient storing and efficient use or consumption. The following are the objectives of material control.

- a. Material of desired quality should be available when needed for efficient and uninterrupted production.
- b. Material should be purchased only when it is needed and in most economic quantities.
- c. Investment in material is maintained at minimum level consistent with the operating requirement.
- d. Purchasing of material will be made at the most favorable prices under the best possible terms.
- e. Material is stored in such a way that the objective of protection is met fully and at the same time material is made available easily.
- f. Issues of materials are authorized properly and are accounted for properly.
- g. Materials are, at all the time, charged as the responsibility of some individual.

2.3. Steps in Material Control

The material control is ensured by laying down proper procedures for Purchasing, Storing, Issuing and minimizing material losses by identifying slow moving, obsolete, dormant material and also by minimizing scrap, wastages, defectives and spoilages. These steps are discussed below.

A. *Purchasing and Receiving* : Purchase procedure differs from business to business, but all of them follow a general pattern or procedure. There should be proper Purchase Procedure to ensure that right type of material is purchased at right time, in right quantity, at right prices and at right place. All these things require a well-defined procedure of purchasing. The steps in Purchase Procedure are explained below.

- ❖ ***Purchase Requisition***: A form known as 'Purchase Requisition' is commonly used as a format requesting the purchase department to purchase the required material. Normally the purchase



requisition is issued by the Stores Department when the quantity of the concerned material reaches the minimum level. Only in the cases of materials, which is not kept in the stores on regular basis, the requisition is issued by the concerned department. Purchase requisition has information like the quantity required, the expected date of receipt, the department in which the material is required, description of material etc. Copies of the purchase requisition are sent to the Accounts department and the concerned department who is in need of the material. [Format of this document is given at the end of the point A]

- ❖ **Purchase Order:** After the receipt of purchase requisition, the purchase department places an order with a supplier, offering to buy certain material at stated price and terms. However before issuing the purchase order, quotations may be invited from various suppliers for arriving at the best deal. The purchase department usually keeps a list of suppliers from whom the quotations are invited. The quotations received are examined on various parameters like price, delivery period, terms and conditions, quality of material etc. After this, purchase order is issued to the selected supplier. It should be remembered that a purchase order is a legal document and it results into a contract between the company and the supplier. Hence the terms and conditions in the purchase order should be drafted clearly without any ambiguity.
- ❖ **Receiving the Materials:** The receiving department performs the function of unloading and unpacking materials which are received by an organization. This will need an inspection report which is sometimes incorporated in the receiving report, indicating the items accepted and rejected with reasons. Copies of the receiving report along with the inspection report are sent to various departments like purchase, stores, concerned department, accounts department and costing department.
- ❖ **Approval of invoice:** Approval of invoice indicates that goods according to the purchase order have been received and payments can be made for the same. However if the goods are not according to the quality ordered or are in excess of the quantity specified or are damaged or are of inferior quality, payment is withheld.
- ❖ **Making the Payment:** After the invoice is approved the payment is made to the supplier. The purchase procedure is completed with the payment released.



FORMAT OF PURCHASE REQUISITION

ABC LTD.

PURCHASES REQUISITION

Department:

Requisition No:

Delivery Required:

Date:

Item No.	Quantity	Particulars of Materials	Grade or Quality	Remarks

Requested By:

Checked By:

Approved By:



FORMAT OF PURCHASE ORDER

ABC CO. LTD.

PURCHASE ORDER

Date:

Supplier

Purchase Order No.

Requisition No.

Department No.

Date:

Please supply the following items on the terms and conditions mentioned herewith,

Item No.	Quantity	Particulars of Materials	Rate per unit	Total Amount	Remarks

Purchase Manager

Terms and Conditions:

1. _____
2. _____
3. _____
4. _____

Important Issues in Material Procurement:

- **Economic Order Quantity:** One important question that is to be answered by the Purchase Manager is how much to purchase at any one time? In other words, how much quantity is to be ordered at any one point of time? Whether there are any costs associated with the ordering quantity apart from the purchase price? It will be noticed that there are costs attached to the ordering quantity. These costs are of two types, the first is the ordering cost and the other one is the carrying cost. We will discuss about these costs. Ordering cost is the cost of placing an order. In other words, it can be said that when an order is placed, the company has to incur certain costs at the time of order. These costs include costs like handling and transportation costs, stationery costs, costs incurred for inviting quotations and tenders etc. The more is the frequency of order, the more are these costs.



On the other hand, there are certain costs that are called as carrying costs. The cost of carrying the inventory is the real out of pocket cost associated with having inventory on hand, such as warehouse charges, insurance, lighting, losses due to handling, spoilage, breakage etc, and another important component of carrying cost is the amount of interest lost due to the investment in the inventory. Carrying costs will go on increasing if the quantity of material in inventory goes on increasing.

Both, the carrying costs and the ordering costs are variable costs, however their behavior is exactly opposite of each other. If orders are more frequent, ordering costs will go on increasing but as the material ordered will be in less quantity, the carrying costs will decrease. On the other hand, if number of orders are reduced, the quantity per order will increase and the carrying cost will increase. The ordering cost will come down due to reduction of number of orders.

In this situation, the most desirable quantity to be ordered is that quantity at which both, the ordering costs and carrying costs will be minimum. This quantity is called as 'Economic Order Quantity'. This quantity can be calculated with the help of the following formula.

$$\text{Economic Order Quantity} = \sqrt{\frac{2 \times U \times O}{IC}}$$

U = Annual demand / annual consumption in units

O = Cost of placing and receiving an order

IC = Carrying cost per unit per annum

The Economic Order Quantity is an important concept as it guides the Purchase Manager regarding the quantity to be purchased of a particular material. However, this concept is based on some assumptions. These assumptions are as follows.

- The concerned material will be available all the time without any difficulty.
- The price of the material will remain constant.
- Ordering cost and carrying costs are variable.
- Impact of quantity discounts on the prices is negligible.

➤ **Fixation of Level** : Another important aspect of material procurement is not to purchase too much or too little. Similarly the timing of the purchase is also important. Fixation of levels of materials is done precisely with these objectives in mind. The following levels of materials are fixed for achieving objectives like avoiding overstocking, ensuring that the material is ordered at right time and also avoiding shortage of materials.

❑ **Maximum Level** : This is the highest level of material beyond which the inventory of material is not allowed to rise. Obviously this level is fixed with the objective of avoiding overstocking. This level is fixed after taking into consideration the consumption of material and the re-order period. Mathematically the level is fixed as under.

$$\text{Maximum Level} = \text{Re-order Level} + \text{Re-order Quantity} - [\text{Minimum Consumption} \times \text{Minimum Re-order period}]$$

❑ **Minimum Level** : This level is fixed with the objective of avoiding shortage of material. If production is held up due to shortage of material, there will be huge loss to the company. In order to avoid this, the minimum level is fixed. Care is taken that the stock do not fall below this level. The minimum level is fixed in the following manner.



Minimum Level = Ordering Level – [Average rate of consumption × Re-order period]

- ❑ **Re-order Level :** This level is fixed for deciding the time of placing an order. If the stock of materials reaches this level, fresh order is placed so that by the time the material is procured, the level of material may fall up to minimum level but not below that. This level is fixed in the following manner.

Re-order Level = Maximum Usage per Period × Maximum Re-order Period

- ❑ **Average Level :** This level is the average of the maximum and minimum level and computed in the following manner.

Average Level = Maximum Level + Minimum Level / 2

- ❑ **Danger Level :** Generally the danger level of stock is indicated below the safety or minimum stock level. Sometimes, depending on the practices of the firm and circumstances prevailing, the danger level is determined between the re-order level and minimum level.

B. Storing of Materials : Material purchased by the purchase department is sent to stores before it is issued for production. Thus storing of material can be called as an intermediate step in the material control. If an organization practices Just in Time inventory system, there is no need for storing the materials, but otherwise there is a need that there is a well-planned stores department in the company that will take care of the storing material. A storekeeper is a person who is in charge of the stores department. He has to perform important functions. Though these functions may vary from organization to organization, the following functions are usually performed by a storekeeper.

- i. Acting as a buffer or protection against the consequences of non-availability of material.
- ii. Protecting the material
- iii. Avoiding overstocking and under stocking
- iv. Establishing a proper system for ensuring control over usage, through streamlining issues and receipts.
- v. Keeping proper records of usage, wastages etc.
- vi. Minimizing material losses occurring due to mis-handling, evaporation, breakage etc.
- vii. Preparing proper documentation regarding the receipts and issues.

I] Aspects of Stores Control: The following are the aspects of stores control.

- ❑ **Stores Layout:** Storage layout, i.e. careful designing and arrangement of storerooms is desirable for savings in cost. The layout should take care of proper ventilation, lighting, temperature control and easy handling. There can be a centralized stores system or decentralized stores system. Both the systems have their own merits and demerits. It can be said that the stores system should be such as it is most convenient for the company.
- ❑ **Classification and Codification of Materials:** For proper identification of materials, there should be proper classification and codification of materials. Materials can be classified according to their types. Codification can be done for simplification of identification. Codification can be on the basis of alphabets or numbers or a combination of both. Whatever system of codification is used, it should be ensured that the system is simple to understand and easy to operate.
- ❑ **Stores Records:** For streamlining the stores function, it is essential to keep records properly. The most important record in the stores is the Bin Card. It is the quantitative record of all receipt of



Material Control

materials, issue of materials and the balance of materials on a particular day. This record is kept for each and every material and entries are made daily after every receipt and issue. Bin Card do not record the amount of receipt or issue, it records only the quantity. Care is to be taken to physically verify the material quantity and reconcile the same with the quantity shown in the Bin Card. This periodic verification will serve as a moral check on the staff and the chances of errors and frauds will be minimized.

- **Inventory Control:** One of the important aspects of the overall material management is the inventory control. It is necessary to avoid the overstocking as well as under stocking. For ensuring this, maximum level, minimum level, re-order level are fixed. Besides this it is essential to take care of the material lying in the stock. There is huge investment made in the materials and if proper care is not taken, there will be severe loss. Even though records are maintained in the stores regarding the receipts and issues, they should be periodically verified with the physical stock so that chances of errors and frauds are minimized. For inventory control, the following methods are used.
 - A. **Perpetual Inventory System:** Perpetual Inventory system means continuous stock taking. CIMA defines perpetual inventory system as 'the recording as they occur of receipts, issues and the resulting balances of individual items of stock in either quantity or quantity and value'. Under this system, a continuous record of receipt and issue of materials is maintained by the stores department and the information about the stock of materials is always available. Entries in the Bin Card and the Stores Ledger are made after every receipt and issue and the balance is reconciled on regular basis with the physical stock. The main advantage of this system is that it avoids disruptions in the production caused by periodic stock taking. Similarly it helps in having a detailed and more reliable check on the stocks. The stock records are more reliable and stock discrepancies are investigated and appropriate action is taken immediately.
 - B. **ABC System:** In this technique, the items of inventory are classified according to the value of usage. Materials are classified as A, B and C according to their value.

Items in class 'A' constitute the most important class of inventories so far as the proportion in the total value of inventory is concerned. The 'A' items constitute roughly about 5-10% of the total items while its value may be about 80% of the total value of the inventory.

Items in class 'B' constitute intermediate position. These items may be about 20-25% of the total items while the usage value may be about 15% of the total value.

Items in class 'C' are the most negligible in value, about 65-75% of the total quantity but the value may be about 5% of the total usage value of the inventory.

The numbers given above are just indicative, actual numbers may vary from situation to situation. The principle to be followed is that the high value items should be controlled more carefully while items having small value though large in numbers can be controlled periodically.
 - C. **Just in Time Inventory:** This is the latest trend in inventory management. This principle envisages that there should not be any intermediate stage like storekeeping. Material purchased from supplier should directly go the assembly line, i.e. to the production department. There should not be any need of storing the material. The storing cost can be saved to a great extent by using this technique. However the practicality of this technique in Indian conditions should be verified before practicing the same. The benefits of Just in time system are as follows,



- o Right quantities are purchased or produced at right time.
 - o Cost effective production or operation of correct services is possible.
 - o Inventory carrying costs are eliminated totally.
 - o The stores function is eliminated and hence there is a considerable saving in the stores cost.
 - o Losses due to breakage, wastage, pilferage etc are avoided.
- D. VED Analysis:** This analysis divides items into three categories in the descending order of their criticality as follows.
- 'V' stands for vital items and their stock analysis requires more attention. The reason is that if these items are not available, the resulting stock outs will cause heavy losses due to stoppage of production. Thus these items are required to be stored adequately to ensure smooth operation of the plant.
 - 'E' means essential items. Such items are considered essential for efficient running but without these items, the system will not fail. Care must be taken to see that they are always in stock.
 - 'D' stands for desirable items, which do not affect production immediately but availability of these items will lead to more efficiency and less fatigue.
 - Thus VED analysis can be very useful to capital intensive process industries. As it analyses items based on their importance and it can be used for those special raw materials which are difficult to procure.
- E. FSND Analysis:** Age of the inventory indicates the duration of inventory in the organization. It shows the moving position of inventory during the year. This analysis divides the items of inventory into four categories in the descending order of their usage rate as follows.
- I] 'F' stands for fast moving items and stocks of such items are consumed in a short span of time. Stock of fast moving items must be observed constantly and replenishment orders be placed in time to avoid stock out position.
 - II] 'N' means normal moving items and such items are exhausted over a period of time, i.e. say one year. The order levels and quantities for such items should be on the basis of a new estimate of future demand to minimize the risks of a surplus stock.
 - III] 'S' indicates slow moving items, existing stock of which would last for two years or so. These items must be reviewed carefully before eliminating them.
 - IV] 'D' stands for dead stock which means that there will not be any further demand for the same. It is necessary to identify these items and if there cannot be any alternative use for the same, should be eliminated.
- C. Issue Control :** Another important aspect of material control is the issue control. Material is issued to production and utmost care is to be taken while issuing the material. The first thing is that without authorization material should not be issued to any department. A Material Requisition Note is prepared by the department that is in need of the material and sent to the stores department. It is a written request made to the stores department for sending the material. In the Material Requisition Note, the details of the material required such as the quantity, quality, date by which it is required etc.



It is signed by the authorized signatory of the concerned department. On the receipt of this requisition, the stores department takes action of supplying the required material to the department. While issuing material care should be taken that exact quantity as per the requirement should be supplied. If there is surplus material remaining after satisfying the needs of the concerned department, it should be returned to the stores department. In such case, Material Return Note should be prepared and sent along with the material. Similarly if material is transferred from one site to other site without being returned to the store, it is necessary to prepare Material Transfer Note for recording the same. Proper documentation is extremely necessary for minimizing the chances of errors and frauds.

Pricing of Issues

One of the important aspects of issue control is of pricing of the issues. Material is issued to production and it is necessary to find out the consumption value of the material. However the question is that at what price the issue is to be charged. Obviously the answer is that the issues should be priced at the same price at which they are purchased. But it is not practical as it is virtually impossible to identify the material issued. Hence it is necessary to price the issues by using certain methods. The various methods of pricing of issues are given below.

1. **First In First Out:-** As per this method, material received first is issued first. Thus the material in stock at the beginning of a period is issued firstly and then the issues are made according to the dates of purchases made. This method is quite logical as the sequence of issue is as per the dates of purchases. However the consumption value will be as per the purchases made earlier and hence the latest price may not be charged to the consumption. In case of rising prices it will result in charging lower prices while in case of falling price it will result in charging higher prices to the material consumption. The closing stock will be shown at the latest prices as the material purchased towards the end of the period will remain the stock.
2. **Last In First Out [LIFO]:-** The assumption under this method is that the material which is purchased last is issued first to the production. Therefore the issue should be charged at the latest prices. The main advantage of this method is that the issues are priced at the latest prices and hence consumption value is also the latest. This will make the product cost more realistic. However, the inventory valuation will be at the older price as material in balance will be from the earlier batches of purchases. Valuation of inventory according to this method is not accepted for inventory valuation in the preparation of financial statements.
3. **Highest In First Out [HIFO]:-** Under this method, the materials with highest prices are issued first, irrespective of the date upon which they are purchased. The basic assumption is that in fluctuating and inflationary market, the cost of material are quickly absorbed into product cost to hedge against risk of inflation. As the issues are shown at highest prices, the product costs tend to be on the higher side and hence this method is not suitable in competitive environment.
4. **Simple Average Cost Method:-** Under this method, the issues are charged at the average price of the material purchased without taking into consideration the quantities involved in the same. For example, if materials are purchased in three batches at prices of Rs.18, Rs.19 and Rs.23, the issue will be charged at the average price of the three prices, i.e. $\text{Rs.18} + \text{Rs.19} + \text{Rs.23} = \text{Rs.60}/3 = \text{Rs.20}$. This method is not very popular because it takes into consideration the prices of different batches but not



the quantities purchased in different batches. In the periods of price fluctuations this method is useful but if fluctuations are too wide, the method may not be useful.

5. **Weighted Average Method:-** This method takes into consideration the prices as well as the quantities of materials purchased. Thus weighted average is computed after each receipt by dividing the total amount by the total quantity. The issue is charged at prices arrived at according to this calculation. For example, if three consignments of materials are purchased at prices of Rs.10, Rs.12 and Rs.11 and the quantities involved are respectively 1,000, 1,200 and 1,400. The weighted average price will be calculated as shown below.

$Rs.10 \times 1,000 + Rs.12 \times 1,200 + Rs.11 \times 1,400 = Rs.10,000 + Rs.14,400 + Rs.15,400 = Rs.39,800 / 3,600 = Rs.11.05$. The subsequent issue will be charged at this price. The main advantage of this method is that it evens out the price fluctuations and reduces the number of calculations to be made.

6. **Periodic Average Cost Method:-** Under this method, instead of recalculating the simple or weighted average cost every time there is a receipt, periodic average is computed. The average may be calculated for the entire period. The price may be calculated as given below.

Cost of Opening Stock + Total Cost of all receipts / Units in Opening Stock + Total Units received during the period.

7. **Standard Cost Method:-** Under this method, material issues are priced at a predetermined standard issue price. Any difference between the actual purchase price and the standard price is written off to the Costing Profit and Loss Account. Standard Cost is a predetermined cost and if it is set accurately, it can be very effective. However revision of standard cost at regular intervals is required.
8. **Replacement Cost [Market Price]:-** The replacement cost is the cost at which material identical to that is to be replaced could be purchased at the date of pricing of the issues as distinct from the actual cost price at the date of purchase. The replacement price is the price of replacing the material at the time of the issue of materials or on the date of valuation of closing stock. This method is not acceptable for standard accounting practices as it reflects the price, which has not been paid actually.
9. **Next In First Method:-** Under this method, the price quoted on the latest purchase order or contract is used for all issues until a new order is placed. Thus this method is a variation of the Replacement Cost Method.
10. **Base Stock Method:-** Under this method, a certain quantity of materials is always held in stock and any material over and above this quantity is priced according to any other pricing method like First In First Out or Last In First Out or any other method. For example, it may be decided that 500 units will be held in stock and for materials over and above this FIFO method may be followed. However, this method is not popular and also not accepted under standard accounting practices as it would result in stock valuation totally unrealistic.

Thus it will be observed that there are several methods of pricing of issues. Any one of these can be selected. However care should be taken that once a particular method is selected, it should be followed consistently year after year because if frequent changes are made, the results will be not comparable. The following points should be taken into consideration before selecting a particular method.

- Method of production or process
- Nature of material used



- Frequency of purchases and issues
- Economic Batch Quantity
- Tendency of inflation or deflation
- Rate of stock turnover
- Accounting practices acceptable in valuation of inventory
- Normal losses due to evaporation
- System of costing prevailing in the organization
- Objective of charging material cost to production on consistent and realistic basis.

D. Material Losses: One of the main reason of rising material costs is the loss of material in the production process. It is of paramount importance that there should be rigid control over the material losses failing which it will be very difficult to keep the material costs in check. The material losses can be categorized as given below.

- **Waste:-** Waste is a loss of material either in stores or in production due to reasons like evaporation, chemical reaction, shrinkage, unrecoverable residue etc. Wastages may be visible or invisible. It is necessary to take steps to control the material wastage. In cost accounting, the wastage is divided into the following categories.
 - **Normal Wastage:-** This wastage is such that it cannot be avoided. It is inherent in any production process. The normal wastage is normally estimated in advance and included in the material cost. In other words, the good units should bear the cost of normal wastage.
 - **Abnormal Wastage:-** Any wastage over and above the normal wastage is the abnormal wastage. In other words it is more than the standard wastage. The cost of the abnormal wastage is not charged to the production, but it is written off to the Costing Profit and Loss Account.
 - Wastage can be controlled by adopting strict quality control measures. Normal allowance of waste can be fixed with technical assessment and past experience as well as by identifying the special features of materials. The causes for abnormal wastages should be studied in detail and responsibility should be fixed for wastage. Better material handling system will also help in controlling the wastage.
- **Scrap:-** Scrap is a residual material resulting from a manufacturing process. It has a recovery value and is measurable. The treatment of scrap in cost accounts is normally as per the following details.
 - If the value of scrap is negligible, the good units should bear the cost of scrap and any income collected will be treated as other income.
 - If the value of scrap is considerable and identifiable with the process or job, the cost of job will be transferred to scrap account and any realization from sale of such scrap will be credited to the job or process account and any unrecovered balance in the scrap account will be transferred to the Costing Profit and Loss Account.
 - If scrap value is quite substantial and it is not identifiable with a particular job or process, the amount will be transferred to factory overhead account after deducting the selling cost. This will reduce the cost of production to the extent of the scrap value.



- **Control of Scrap:-** For the control purpose, scrap may be divided into the following categories.
 - **Legitimate Scrap:-** This is predetermined or anticipated in advance due to experience in manufacturing operations.
 - **Administrative Scrap:-** This results from administrative decisions, e.g. change in design of a product or discontinuation of existing product lines.
 - **Defective Scrap:-** This results from poor quality of raw material, negligent handling of material etc.
 - Scrap can be controlled through selection of right type of material, selection of right type of manpower, determination of acceptable limits of scrap, and reporting the source of waste.
- **Spoilage:-** Spoilage is the production that fails to meet quality or dimensional requirements and so much damaged in manufacturing operations that they are not capable of rectification and hence has to withdraw and sold off without further processing. Rectification can be done at a cost which may not be economic. If the spoilage is within limits, it is called as 'normal' spoilage and anything exceeding this limit is called as 'abnormal' spoilage. The accounting treatment of spoilage is as follows.
- The cost of normal spoilage is spread over to the good production by charging either to the specific production order or to the product overheads.
 - The cost of abnormal spoilage is charged to the Costing Profit and Loss Account.
- **Defectives :-** The defectives are part of production units which do not confirm to the standards of quality but can be rectified with additional application of materials, labor and/or processing and made it into saleable condition either as firsts or seconds depending upon the characteristics of the product. The accounting treatment of defectives is the same like that of spoilage. The cost of normal defectives is spread over the good units and the cost of additional processing is charged to a particular department/process if it is identifiable with the same. If it cannot be identified, it is charged to factory overheads. Cost of abnormal defectives is charged to the Costing Profit and Loss Account.
- E. Inventory Turnover Ratio:** There are several items in the store which are slow moving which means that they are issued to the production after a long time gap. Some items are such that they are never issued to the production as they have become obsolete or outdated and need to be disposed off. For identifying these items, it is necessary to compute the inventory turnover ratio. Inventory turnover ratio enables the management to avoid the capital being locked in such items. This ratio indicates the efficiency or inefficiency with which inventories are maintained. Inventory turnover ratio is calculated in the following manner.

Inventory Turnover Ratio: $\text{Cost of material consumed} / \text{Cost of average stock held during the year}$

The cost of average stock here is taken as the average of opening stock and closing stock. The inventory turnover ratio can also be calculated in days as below.

$\text{Days during the period} / \text{Inventory turnover ratio}$



Detection of Slow Moving and Non-Moving or Obsolete Materials: It is essential for any business unit to detect slow moving and non-moving or obsolete materials. Obsolete materials become useless or obsolete due to change in the product, process, design or method of production. Obsolete materials are different from slow moving materials and non-moving materials. Slow moving materials move at a slow rate. In the case of slow moving materials as well as non moving materials, capital remains blocked unnecessarily and also cost of storing continue to be incurred of these materials are kept in the store in excess of the requirements. Management should make proper investigations into slow moving and obsolete materials and try to minimize the capital investments in the same. It is necessary to have an efficient Management Information System which will enable to generate regular reports to examine the situations relating to these stocks so that the non-moving and obsolete stocks can be disposed off in time.

Problems and Solutions – Material Control

1. From the following figures relating to two components X and Y, compute Reorder Level, Minimum Level, Maximum Level and Average Stock Level.

Particulars	Component X	Component Y
Maximum consumption per week	75 units	75 units
Average consumption per week	50 units	50 units
Minimum consumption per week	25 units	25 units
Reorder period	4 to 6 weeks	2 to 4 weeks
Reorder quantity	400 units	600 units

Solution: The computation of various levels is shown below.

A] Reorder Level = Maximum Consumption \times Maximum Reorder Period

$$\text{Component X} = 75 \text{ units} \times 6 \text{ weeks} = 450 \text{ units}$$

$$\text{Component Y} = 75 \text{ units} \times 4 \text{ weeks} = 300 \text{ units.}$$

B] Minimum Level = Reorder Level – Average Consumption \times Average Reorder Period

$$\text{Component X} = 450 \text{ units} - [50 \text{ units} \times 5 \text{ weeks}] = 200 \text{ units}$$

$$\text{Component Y} = 300 \text{ units} - [50 \text{ units} \times 3 \text{ weeks}] = 150 \text{ units}$$

C] Maximum Level = Reorder Level + Reorder Quantity – [Minimum Consumption \times Minimum Reorder Period]

$$\text{Component X} = 450 \text{ units} + 400 \text{ units} - [25 \text{ units} \times 4 \text{ weeks}] = 750 \text{ units}$$

$$\text{Component Y} = 300 \text{ units} + 600 \text{ units} - [25 \text{ units} \times 2 \text{ weeks}] = 850 \text{ units}$$

D] Average Level = $\frac{1}{2}$ [Maximum Level + Minimum Level]

$$\text{Component X} = \frac{1}{2} [750 \text{ units} + 200 \text{ units}] = 475 \text{ units}$$



Component Y = $\frac{1}{2}$ [150 units + 850 units] = 500 units

2. From the following particulars, compute Economic Order Quantity

Annual consumption = 8, 10, 000 units

Order placing and receiving costs: Rs.10 per order

Annual stock holding stock: 20% of consumption

$$\begin{aligned} \text{Solution: Economic Order Quantity} &= \sqrt{\frac{2 \times U \times O}{IC}} \\ &= \sqrt{\frac{2 \times 8,10,000 \times 10}{0.2}} \\ &= \text{Rs.9, 000} \end{aligned}$$

3. A manufacturer purchases 800 units of a certain component p.a. @ Rs.30 per unit from outside supplier. The annual usage is 800 units, order placing and receiving cost is Rs.100 per order and cost of holding one unit of the component for one year is Rs.4. Calculate the Economic Order Quantity by tabular method. Also calculate the number of orders to be placed per year.

Solution: The following table is prepared to compute the Economic Order Quantity.

Annual Consumption	Number of orders p.a.	Units per order	Average Inventory Units	Carrying cost @ Rs.4 per unit on average inventory	Order placing and receiving cost @ Rs.100 per order	Total annual costs
800	1	800	400	Rs.1600	Rs.100	Rs.1700
	2	400	200	800	200	1000
	3	267	133	532	300	832
	4	200	100	400	400	800*
	5	160	80	320	500	820
	6	133	67	268	600	868

* The total annual cost of Rs.800 is the lowest when number of orders placed are 4 in a year. This means that the quantity per order of 200 [4 orders per year] is the Economic Order Quantity.

4. After inviting tenders, two quotations are received as follows.

Supplier A: Rs.2.20 per unit

Supplier B: Rs.2.10 per unit plus Rs.2000 fixed charges irrespective of the units ordered.

Calculate the order quantity for which the purchase price per unit will be the same. Considering all factors regarding production requirements and availability of finance, the purchase officer wants to place an order for 15, 000 units. Which supplier should he select?

Solution:

The difference between the prices quoted by the supplier is Rs.0.10 per unit as regards to the variable costs while the difference between the fixed costs is Rs.2000. The quantity of purchase where the purchase price per unit will be the same can be calculated with the help of the following formula.

Desired purchase quantity = Difference in the fixed cost / Difference in the variable cost

$$= \text{Rs.2000} / \text{Rs.0.10} = 20, 000 \text{ units.}$$



Thus the purchase cost will be the same if the number of units ordered is 20,000. If more than 20,000 units are ordered, supplier B should be selected while for orders of less than 20,000 units, supplier A should be selected.

For order of 15,000 units, supplier A should be selected. This can be proved as shown below.

Supplier A: Total Cost = 15,000 units × Rs.2.20 per unit = Rs.33,000

Supplier B: Total Cost = 15,000 units × Rs.2.10 per unit = Rs.31,500 + Rs.2000 fixed cost = Rs.33,500 units.

5. From the following particulars in respect of a material, compute the Economic Ordering Quantity by preparing a table.

Ordering Quantities	Price Per Kg. [Rs.]
Less than 250	6.00
250 and less than 800	5.90
800 and less than 2000	5.80
2000 and less than 4000	5.70
4000 and above	5.60

The annual demand for the material is 4000 kg. Stock holding costs are 20% of the material cost per annum. The ordering and receiving costs are Rs.10 per order.

Solution:

The following table is prepared to work out the Economic Order Quantity.

Statement showing comparative annual total cost at different ordering quantities

Particulars	Order Size 200 units	Order Size 250 units	Order Size 800 units	Order Size 2000 units	Order Size 4000 units
Number of orders *	20	16	5	2	1
Value per order **	Rs.1200	Rs.1475	Rs.4640	Rs.11,400	Rs.22,400
Average inventory ***	Rs.600	Rs.738	Rs.2320	Rs.5700	Rs.11,200
Ordering cost ****	Rs.200	Rs.160	Rs.50	Rs.20	Rs.10
Holding cost #	Rs.120	Rs.148	Rs.464	Rs.1140	Rs.2240
Annual cost of material ##	Rs.24,000	Rs.23,600	Rs.23,200	Rs.22,800	Rs.22,400
Total cost ####	Rs.24,320	Rs.23,908	Rs.23,714	Rs.23,960	Rs.24,650

* Number of orders = Total annual consumption/quantity per order

** Value per order = Price × Order quantity

*** Ordering cost = Rs.10 × number of orders

Holding cost = 20% of average inventory [Average inventory = order quantity/2]

Annual cost of materials = Annual demand × price per unit

Total Cost = Annual cost of materials + Holding cost + Ordering cost.

EOQ = 800 units, where the total cost is minimum



6. From the following information, prepare Store Ledger using First In First Out [FIFO], Last In First Out [LIFO] and Weighted Average Method of pricing the issues

December 1st: Balance in hand 1000 units @ Rs.1 each.

December 15th: Received 3000 units costing Rs.3, 300

January 12th: Received 2000 units costing Rs.2400

January 30th: Issued 2000 units

February 17th: Issued 3400 units.

Solution:

First In First Out Method (FIFO):

Store Ledger

Date	Particulars	Ref. No.	Receipts	Issue	Balance
Dec.1st	Opening Balance				1000 units @ Re.1 = Rs.1000
Dec.15th	Receipts	—	3000 units Rs.3300		4000 units Rs.4300
Jan.12th	Receipts	—	2000 units Rs.2400		6000 units Rs.6700
Jan.30th	Issue	—		2000 units 1000 units @ Re.1 per unit = Rs.1000 1000 units @ Rs.1.10 = Rs.1100	4000 units Rs.4600
Feb.17	Issue	—		3400 units 2000 units @ Rs.1.10 = Rs.2200 1400 units @ Rs.1.20 = Rs.1680	600 units Rs.720



LAST IN FIRST OUT: [LIFO]

Store Ledger

Date	Particulars	Ref. No.	Receipts	Issue	Balance
Dec.1st	Opening Balance				1000 units @ Re.1 = Rs.1000
Dec.15th	Receipts	—	3000 units Rs.3300		4000 units Rs.4300
Jan.12th	Receipts	—	2000 units Rs.2400		6000 units Rs.6700
Jan.30th	Issue	—		2000 units @ Rs.1.10 = Rs.2200	4000 units Rs.4500
Feb.17	Issue	—		3400 units 2000 units @ Rs.1.20 = Rs.2400 1000 units @ Rs.1.10 = Rs.1100 400 units @ Re.1 = Rs.400	600 units Rs.600

WEIGHTED AVERAGE METHOD

Store Ledger

Date	Particulars	Ref. No.	Receipts	Issue	Balance
Dec.1st	Opening Balance				1000 units @ Re.1 = Rs.1000
Dec.15th	Receipts	—	3000 units Rs.3300		4000 units Rs.4300 Rate per unit = Rs.4300/4000 = Re.1.075
Jan.12th	Receipts	—	2000 units Rs.2400		6000 units Rs.6700 Rate per unit = Rs.6700/6000 = Re.1.11
Jan.30th	Issue	—		2000 units @ Rs.1.11 = Rs.2220	4000 units Rs.4480 Rate per unit = Rs.4480/4000 = Re.1.11
Feb.17	Issue	—		3400 units @ Rs.1.11 = Rs.3774	600 units Rs.706



7. The following is the summary of the receipts and issues of material in a factory during December 2007. Prepare Store Ledger according to First In First Out Method.

December 2007

1. Opening balance 500 units @ Rs.25 per unit
3. Issue 70 units
4. Issue 100 units
8. Issue 80 units
13. Received from supplier 200 units @ Rs.24.50 per unit
14. Returned to store 15 units @ Rs.24 per unit
16. Issue 180 units.
20. Received from supplier 240 units @ Rs.24.75 per unit
24. Issue 304 units.
25. Received from supplier 320 units @ Rs.24.50 per unit
26. Issue 112 units
27. Returned to store 12 units @ Rs.24.50 per unit
28. Received from supplier 100 units @ Rs.25 per unit

It was revealed that on 15th there was a shortage of five units and another on 27th of 8 units.

Solution:

First In First Out Method

Date	Particulars	Ref. No.	Receipts			Issue			Balance		
			Qty.	Rate	Amount	Qty.	Rate	Amount	Qty.	Rate	Amount
1	Balance b/d								500	25	12,500
3	Issue					70	25	1750	430		10,750
4	Issue					100	25	2500	330		8250
8	Issue					80	25	2000	250		6250
13	Purchases		200	24.50	4900				450		11,150
14	Returned		15	24.00	360				465		11,510
15	Shortage					5	25	125	460		11,385
16	Issue					180	25	4500	280		6885
20	Purchases		240	24.75	5940				520		12,825
24	Issue					304 *		7479	216		5346
25	Purchases		320	24.50	7840				536		13,186
26	Issue					112	24.75	2772	424		10,414
27	Shortage					8	24.75	198	416		10,216
27	Returns		12	24.50	294				428		10,510
28	Receipts		100	25.00	2500				528		13,010

* Issue of 304 units on 24th January is priced as per the following details.



Material Control

- ❖ Out of 500 units from the opening balance, 435 units have been issued so far on different dates from 3rd January to 16th January and hence balance 65 units are available.
 - ❖ 65 units will be priced at Rs.25 each, so the value will be Rs.1625
 - ❖ Next 200 units will be priced at Rs.24.50 each, value will be Rs.4900
 - ❖ Next 15 units will be priced at Rs.24 each, value will be Rs.360
 - ❖ Balance 24 units will be priced at Rs.24.75 each, value will be Rs.594
 - ❖ Total value will be Rs.1625 + Rs.4900 + Rs.360 + Rs.594 = Rs.7479, this value is shown in the issue column against the quantity.
8. The Store Ledger Account for Material X in a manufacturing concern reveals the following data for the quarter ended on 30th September

Date	Particulars	Receipts		Issue	
		Quantity	Price Rs.	Quantity	Price Rs.
July 1	Balance b/d	1,600	2.00		
July 9	Receipts	3,000	2.20		
July 13	Issue			1,200	2.556
Aug. 5	Issue			900	1.917
Aug. 17	Receipts	3,600	2.40		
Aug. 24	Issue			1,800	4.122
Sept. 11	Receipts	2,500	2.50		
Sept. 27	Issue			2,100	4.971
Sept. 29	Issue			700	1.656

Physical verification on September 30th revealed an actual stock of 3,800 units. You are required to,

- [a] Indicate the method of pricing employed above.
- [b] Complete the above account by making entries you would consider necessary including adjustments, if any, and giving explanations for such adjustments.

Solution:

- [a] The verification of the value of issues applied in the problem shows that Weighted Average Method has been followed. This is clear from the following example.
- ❖ On July 1st, the balance b/d is 1,600 @ Rs.2.00, the value is Rs.3200
 - ❖ On July 9th, receipts are 3000 units @ Rs.2.20, the value is Rs.6600
 - ❖ The total of these two will be 4600 units and the value is Rs.9800
 - ❖ The rate per unit will be Rs.9800/4600 units = Rs.2.13
 - ❖ The same rate has been charged to the issues on July 13th of 1200 units.
 - ❖ The same methodology has been used for the subsequent issues.



[b] The complete store ledger is shown below.

Date	Particulars	Receipts			Issues			Balance		
		Qty	Rate	Amount	Qty	Rate	Amount	Qty	Rate	Amount
July 1	Balance b/d	1600	2.00	3200				1600	2.00	3200
July 9	Receipts	3000	2.20	6600				4600	2.13	9800
July 13	Issues				1200	2.13	2556	3400	2.13	7244
Aug. 5	Issues				900	2.13	1917	2500	2.13	5327
Aug. 17	Receipts	3600	2.40	8640				6100	2.29	13,967
Aug. 24	Issue				1800	2.29	4122	4300	2.29	9845
Sept. 11	Receipts	2500	2.50	6250				6800	2.37	16,095
Sept. 27	Issue				2100	2.37	4971	4700	2.37	11,124
Sept. 29	Issue				700	2.37	1656	4000	2.37	9468
Sept. 30	Issue#				200	2.37	473	3800	2.37	8995

The closing stock given in the example is 3800 units. However after the issue on September 30th, the closing stock comes to 4000 units. This means that there is a shortage of 200 units, which is charged at the issue price of Rs.2.37.

9. The following transactions in respect of Material Y occurred during the six months ended 30th June 2007.

Month	Purchased [Units]	Price Per Unit Rs.	Issued [Units]
January	200	25	Nil
February	300	24	250
March	425	26	300
April	475	23	550
May	500	25	800
June	600	20	400

Required: The Chief Accountant argues that the value of closing stock remains the same, no matter which method of pricing of material issues is used. Do you agree? Why or why not? Detailed Stores Ledgers are not required.

Solution:

- ❖ On observation of the transactions, it is clear that from January to May, the number of units purchased and number of units issued is the same and hence there is no closing stock as such. In June, there is a purchase of 600 units and issue of 400 units. Valuation of closing stock will be at Rs.20, which is the purchase price, irrespective of the method of pricing of issues is concerned.
- ❖ However, if it is decided to value the closing stock at the end of each month, the values will be different according to different methods.



10. ABC Ltd. provides you the following information. Calculate the cost of goods sold and ending inventory applying the Last In First Out method of pricing raw materials under the Perpetual Inventory and Periodic Inventory Control System.

Date	Particulars	Units	Per Unit Cost Rs.
January 1	Opening Stock	200	10
January 10	Purchases	400	12
January 12	Withdrawals	500	---
January 16	Purchases	300	11
January 19	Issues	200	---
January 30	Receipts	100	15

Also explain the difference in profits if any.

Solution: The following statement is prepared to show the cost of goods sold and inventory valuation under both the methods.

Particulars	Perpetual Inventory Method Units X Rate = Amount Rs.	Periodic Inventory Method Units X Rate = Amount Rs.
I] Cost of goods sold/ withdrawn or issued – 12th January	400 × 12 = 4,800 100 × 10 = 1,000 5,800	100 × 15 = 1,500 300 × 11 = 3,300 300 × 12 = 3,600
On 19th January	200 × 11 = 2,200 Total Rs.8,000	700 units = 8,400
II] Ending Inventory	100 × 10 = 1,000 100 × 10 = 1,000 100 × 15 = 1,500 300 units = 3,500	100 × 12 = 1,200 200 × 10 = 2,000 300 units = 3,200

Reasons for the difference: The cost of good sold/ issued/ withdrawn is more under Periodic Inventory System as compared to Perpetual Inventory System. Hence the profit under the former will be less as compared to the latter. It can also be said that the lesser is the amount of ending inventory lesser will be the profits.

11. From the following details, prepare Store Ledger under Simple Average Method of pricing the issues.

January 2007

- 1st: Received 500 units @ Rs.20 per unit
- 10th: Received 300 units @ Rs.24 per unit
- 15th: Issued 700 units
- 20th: Received 400 units @ Rs.28 per unit



25th: Issue 300 units
 27th: Received 500 units @ Rs.22 per unit
 31st: Issued 200 units.

Solution:

Store Ledger

Date	Particulars	Receipts			Issue			Balance	
		Qty.	Rate	Amount	Qty.	Rate	Amount	Qty.	Amount
January 1st	Receipts	500	20	10,000				500	10,000
10th	Receipts	300	24	7,200				800	17,200
15th	Issue				700	22 *	15,400	100	1,800
20th	Receipts	400	28	11,200				500	13,000
25th	Issue				300	26 #	7,800	200	5,200
27th	Receipts	500	22	11,000				700	16,200
31st	Issue				200	25 ^	5,000	500	11,200

* The rate of issue is computed by taking the simple average of the rates of Rs.20 and Rs.24, i.e. Rs.22

The rate is computed by taking the simple average of the rates of Rs.24 and Rs.28, i.e. Rs.26. The earlier rate of Rs.20 is not taken into consideration as the material quantity has been issued and is not there in the stock on 15th January.

^ The rate is computed by taking the simple average of the rates of Rs.28 and Rs.22, i.e. Rs.25.

Question Bank

Material Control

A] Essay Type

1. What do you understand by 'Material Control'? What are the essentials of an efficient material control system?
2. Explain the role played by 'Material Control' in cost control and cost reduction.
3. Describe briefly the functions of each of the following departments with regard to material control.
 A] Stores Purchase B] Stores receiving and inspection department C] Store keeping department D] Production department and E] Stock control department
4. Indicate the reasons why the purchase department should function as a separate department and state the advantages of a centralized purchase function.
5. What is a purchase requisition? Give a specimen form of purchase requisition and state the information contained therein.



6. What is purchase order? Give a specimen form. What main points, clauses and instructions must appear on the face of a purchase order?
7. Between the initiation of purchase to issue of stores to different shops, enumerate the important documents you will like to introduce for an effective control of material cost.
8. Explain the advantages and disadvantages of purely centralized and independent decentralized stores. Discuss how the imprest system of stores can function effectively.
9. Distinguish between 'Store Ledger' and 'Bin Card'. Give a specimen of each.
10. Explain the procedure followed for issue, returns and transfer of materials.
11. What is the objective behind fixing maximum, minimum, re-order levels? How will you fix the same?
12. Write a detailed note on ABC System of stores control.
13. Discuss in detail 'Perpetual Inventory System.'
14. What are the objectives of inventory control? How this control is exercised?
15. Explain: Slow moving, Dormant, and Obsolete stock. How will you identify these items?
16. What do you mean by 'input-output ratio' of materials? Explain how it can be used to measure the performance of an industry.
17. What is the information that could be supplied by the costing department regarding material cost to various levels of management?
18. On taking up the appointment as a cost accountant in a factory, you find that no report is submitted to the management on the subject of stock. List the reports with brief details, which you consider necessary for managerial control.
19. What do you understand by 'pricing of issues'? Explain any two methods of pricing of the issues.
20. Explain – Scrap, Wastage, Spoilage and Defectives. How will you control these losses?
21. Distinguish between scrap, spoilage and defectives in an engineering industry with specific reference to the accounting treatment for each.
22. What factors should be taken into consideration while fixing a method of pricing of the issues?

B] Objective Type

Select the correct answer for the following multiple-choice questions.

1. Which one of the following items is not included in the annual carrying cost of inventory?
 - I] Cost of capital
 - II] Insurance on inventory
 - III] Annual warehouse depreciation
 - IV] Inventory breakage on stored inventory



2. Economic order quantity is used by business organizations for,
 - I] Minimizing the cost of inventory
 - II] Minimize the annual purchase cost
 - III] Minimizing the carrying cost and ordering cost of materials
 3. Material control system will be most useful for,
 - I] Wholesalers
 - II] Retailers
 - III] Manufacturers
 - IV] Non-profit organizations.
 4. The valuation of inventory according to Last In First Out method of pricing is done at,
 - I] The latest prices
 - II] The earliest prices
 - III] At average prices
 - IV] None of these
 5. Which of the following items would most likely to be included in the calculation of economic order quantity?
 - I] Price
 - II] Cost
 - III] Demand
 - IV] Supply
- C] State which of the following statements are True or False.**
- 1) The storekeeper maintains store ledger.
 - 2) Purchase requisition is issued by storekeeper.
 - 3) Bin Card is quantitative and monetary record of materials in stores.
 - 4) Ordering cost and carrying cost are variable in nature.
 - 5) At the economic order quantity, order cost and carrying cost are minimum.
 - 6) In FIFO, current prices are reflected in the cost of production.
 - 7) ABC analysis is based on quantity of materials.
 - 8) Wastage and scrap are one and the same.
 - 9) Abnormal material losses are always charged to the Costing Profit and Loss Account.
 - 10) Slow moving items have a high turnover ratio.

STUDY NOTE 3

Labor Cost- Computation and Control

Learning Objectives

After studying this Chapter, you should be able to,

1. Distinguish between the direct and indirect labor cost
 2. Understand the various facets of labor cost control
 3. Understand the concepts like labor turnover, time-keeping, time booking and idle and overtime
 4. Know the various methods of remuneration including incentive plans
 5. Understand the pay roll accounting and disbursement of wages.
-





3.1 Introduction

In the previous chapter, we have seen the material control and various aspects involved in the same like purchasing, store keeping and issuing. Like material, labor is another important element of cost and for overall cost control and cost reduction, of labor cost is of paramount importance. However, for control and reduction of labor cost, it is essential to compute the labor cost in a scientific manner and hence there should be proper systems of systems and processes and documentation, which will help computation of labor cost in a scientific manner. It should be remembered that labor is not like material as there is a human aspect involved in it. Therefore, there should be a comprehensive study of all related aspects of labor cost and then only computation and control over the same will be possible. Attention should also be paid to the productivity aspect. Low productivity results in higher labor cost per unit while higher productivity will reduce the labor cost per unit. All these aspects of labor cost are discussed in detail in this chapter.

3.2 Various aspects of labor cost control

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

- A. **Classification of labor cost:** The first step in the direction of controlling and reducing the labor cost is proper classification of the same. The labor cost is classified into direct cost and indirect cost. Direct labor cost is the cost that can be identified with a product unit. It can also be described as cost of all labor incurred for altering the construction, composition or condition of the product. Indirect labor cost is the cost, which cannot be identified with a product unit. It represents the amount of wages which is paid to the workers who are not directly engaged on the production but it includes wages paid to the workers and assistants working in departments like purchasing, store keeping, time office, maintenance, and other service and production departments. In other words, indirect wages are the wages paid to the workers who facilitate the production rather than actually engaged in production. The direct labor cost can be charged directly to the job or product units and is included in the prime cost. Indirect labor cost is included in the overhead cost. Direct labor cost is variable in nature and can be controlled by strictly adhering to the norms and standards set by the management. Indirect labor cost can be controlled by establishing labor budgets and comparing the actual indirect labor cost with the budgeted labor cost. Any difference between the two is analysed carefully and suitable corrective action is taken.
- B. **Production Planning:** Effective control over the labor cost can be achieved through proper production planning. Production planning includes activities like planning, scheduling, routing, machine loading, product and process engineering, work study etc. With the help of work study, time and motion study can be conducted which will help in fixation of standard time for a particular job. A comparison between the standard time and actual time is constantly made to find out the difference between the two. Suitable corrective action can be taken if it is noted that the actual time taken is constantly more than the standard time allowed for the job.
- C. **Labor Budget:** Budget and budgetary control are effective tools for cost control and cost reduction. A labor budget can be prepared which will set the target for the labor cost which will again facilitate comparison between the budgeted labor cost and the actual labor cost.



- D. **Labor Standards:** Standards can be set for labor cost against which the actual labor cost can be compared. Standard labor cost is the cost, which should have been incurred for producing a particular quantity of production. While fixing the standard labor cost, use of time and motion study is made to fix up the standard time that should be taken for the actual production.
- E. **Labor Performance Report:** There should be a system of periodic labor efficiency and utilisation reports. These reports will give an idea about the efficiency and productivity of the labor.
- F. **Incentive Schemes:** Improving the labor productivity is one of the important ways to reduce the labor cost per unit. Productivity can be improved by motivating the workers. Offering monetary and non-monetary incentives can help to improve the productivity substantially. However, there should be a periodic review of the incentive schemes and therefore incentive schemes report should be prepared at periodic intervals.
- G. **Labor Cost Accounting:** There should be a proper cost accounting system, which will identify the direct and indirect labor cost. Similarly the cost accounting department should be able to generate and maintain records for time keeping, time booking, idle and overtime, impact of incentive schemes, per unit of labor, cost due to labor turnover and other relevant records.

Thus from the above mentioned points, it will be clear that there is a need to control the labor cost and it can be done by the combined efforts of various departments. The following departments play a crucial role in doing this job and hence the activities of those departments are discussed in detail in the subsequent paragraphs.

3.3 Departments involved in labor cost control and reduction

The following departments play an important role in labor cost control and reduction. There is a need that a proper co-ordination exists between these departments and all activities are directed towards the goal of labor cost control and reduction. The activities of these departments are discussed in detail in the subsequent paragraphs.

- I. Personnel Department
- II. Time Keeping
- III. Work Study
- IV. Payroll and
- V. Cost Accounting

Activities performed in these departments are discussed in the following paragraphs.

- I. **Personnel Department:** The personnel department is responsible for various activities like recruitment, training, transfer, termination, implementation of incentive schemes and maintaining records regarding the labor force. Actually the labor cost control starts from the recruitment of labor force. Care should be taken that recruitment is done at right time and there is a right man for the right job. Square pegs in round hole should be avoided; otherwise there will be dissatisfaction amongst the workers. Recruitment should be made only when a Labor Requisition [format given below] is received from the concerned department. Firstly, records should be checked to verify whether a person is available in other departments or not and only when it is ensured that the required type of



Labor Cost Computation and Control

persons is not available, recruitment should be made from outside sources like educational institutes, technical institutions, newspaper advertisements, employment exchanges etc. After the recruitment of worker, his detailed personal record is prepared which includes details regarding his date of joining, previous experience if any, family history, educational qualifications and so on. His other details like department, scale of pay, clock number, various deductions to be made etc. are informed to the pay roll department for arranging his payment. The personnel department prepares a Personal Record Card for each employee. In this card the entire information about the employee is given.

Personnel department also performs other important functions like maintenance of statutory records required under various labor laws, recording of absenteeism, labor turnover, disciplinary action etc.

The format of Labor Requisition and Personal Card is given on the next page.

Labor Requisition

Department:

Date:

Please arrange for workers for the following categories for my department with effect from ----. This is in accordance with the original/revised budget.

Number of employees requisitioned	Category	Job specification	Description	Remarks

Special remarks if any:

Approved by

Requisitioned by:

Action Taken:

Personnel Record Card:

ABC CO. LTD.

Personnel Record Card

Name:

Clock No.

Address:

Emergency Phone No.

➤ Permanent

L.I. Policy No.

➤ Present

Grade No.

➤ Emergency

1. Engagement Particulars	2. Employment Record
A. Present Employment	3. Wage Rate Record
B. Previous Employment	5. Education
4. Time Keeping and Leave Record	6. Training and Progress
7. Separation	8. Annual Report



I.I Labor Turnover: Labor turnover, which is also called as 'attrition' is a major problem in the modern times. Labor turnover can be defined as, a change in the labor force as compared to the total labor force. Labor turnover is prevalent in every industry, however, the proportion of the same changes from industry to industry. For example, turnover in information technology sector is the highest today due to ample job opportunities due to the rapid growth of this sector. Labor turnover should not be very high as it will result into double loss to the organisation, the first one is that an experienced employee will be lost and secondly new person who is replacing the old one, may not have same qualifications and experience and till he is accustomed to the new job, his productivity is bound to be low. Similarly suitable training will have to be given to him in order to acquaint him with the environment, which will also result in additional expenditure. Due to these reasons, every organisation tries to minimise the labor turnover. However, some proportion of labor turnover is actually necessary, as it will bring in fresh ideas in the organisation. If labor turnover is reduced to zero, it will indicate that the employees do not have any opportunity outside and hence they are surviving. Therefore some degree of labor turnover is always desirable.

I.II Measurement of Labor Turnover: It is essential for any organisation to measure the labor turnover. This is necessary for having an idea about the turnover in the organisation and also to compare the labor turnover of the previous period with the current one. The following methods are available for measurement of the labor turnover.

- ❖ **Additions Method:** Under this method, number of employees added during a particular period is taken into consideration for computing the labor turnover. The method of computing is as follows.

$$\text{Labor Turnover} = \text{Number of additions} / \text{Average number of workers during the period} \times 100$$

- ❖ **Separations Method:** In this method, instead of taking the number of employees added, number of employees left during the period is taken into consideration. The method of computation is as follows.

$$\text{Labor Turnover} = \text{Number of separations} / \text{Average number of workers during the period} \times 100$$

- ❖ **Replacement Method:** In this method neither the additions nor the separations are taken into consideration. The number of employees replaced is taken into consideration for computing the labor turnover.

$$\text{Labor Turnover} = \text{Number of replacements} / \text{Average number of workers during the period} \times 100$$

- ❖ **Flux Method:** Under this method labor turnover is computed by taking into consideration the additions as well as separations. The turnover can also be computed by taking replacements and separations also. Computation is done as per the following methods.

$$\text{Labor Turnover} = \frac{1}{2} [\text{Number of additions} + \text{Number of separations}] / \text{Average number of workers during the period} \times 100$$

$$\text{Labor Turnover} = \frac{1}{2} [\text{Number of replacements} + \text{Number of separations}] / \text{Average number of workers during the period} \times 100$$

I.III Causes of Labor Turnover: Computation of labor turnover and a report of the same help the management in taking action for minimising the labor turnover. It will also be useful if the management finds out the reasons for the labor turnover. Broadly, causes of labor turnover can be divided into two categories, avoidable and unavoidable.



- ❖ **Avoidable Causes:** These causes include the following.
 - Dissatisfaction with the job
 - Dissatisfaction with the working hours
 - Dissatisfaction with the working environment
 - Relationship with colleagues
 - Relationship with the superiors like supervisors
 - Dissatisfaction with monetary and non monetary incentives
 - Other reasons such as lack of facilities like insurance, absence of promotion chances, lack of proper training etc.
- ❖ **Unavoidable Causes:** These causes include the following.
 - Personal betterment
 - Retirement
 - Death
 - Illness or accident
 - Change in locality
 - Termination
 - Marriage
 - National service
 - Other reasons like lack of residential facilities, family commitments, attitude etc.

I.IV Cost of Labor Turnover: For an organisation, labor turnover results into a cost. If labor turnover is very high, it will result in high cost and hence efforts should be made to prevent the same. The costs of the labor turnover can be grouped into the following categories, preventive and replacement. These are explained below.

- ❖ **Preventive Costs:** It is said that preventions is always better than cure. Same thing is applicable in case of labor turnover. It is always better to prevent the labor turnover rather than taking action after it has taken place. The costs incurred for preventing the labor turnover are known as preventive costs. These costs are as follows.
 - ❖ Cost of personnel administration which includes expenditure incurred in maintaining good relationships between the management and the workers.
 - ❖ Cost of medical services incurred for improvement in medical facilities and also for motivating the employees.
 - ❖ Expenditure incurred on welfare measures like sports facilities, transport, housing, cultural activities, canteens etc.
 - ❖ Certain schemes like pension, gratuity schemes and other post retirement benefits.
- ❖ **Replacement Costs:** These costs are incurred for removing the effect of the labor turnover and include the following costs.



- ❖ Cost of recruitment and training of new workers
- ❖ Loss of output due to delay in recruiting new workers
- ❖ Loss due to inefficiency of new workers.
- ❖ Cost of increased spoilage
- ❖ Cost of tool and machine breakage.

The preventive costs should be collected under different standing order numbers and are apportioned to different departments in proportion to the number of persons engaged in each department.

Replacement costs arising on account of fault of a particular department, such replacement costs may be charged directly to that department. If however, the labor turnover is due to shortsighted policy of the management the cost is collected as an overhead item and is apportioned to departments on the basis of number of persons engaged in each department.

❖ **Illustrations on Labor Turnover:**

1. During October 2007, the following information is obtained from the Personnel Department of a manufacturing company.

Labor force at the beginning of the month 1900 and at the end of the month 2100

During the month, 25 people left while 40 persons were discharged. 280 workers were engaged out of which only 30 were appointed in the vacancy created by the number of workers separated and the rest on account of expansion scheme. Calculate the labor turnover by different methods.

Solution:

Computation of Labor Turnover

- I. **Additions Method:** $\text{Number of additions} / \text{Number of average workers during the period} \times 100$
 $= 280 / 2000 \times 100 = 14\%$
- II. **Separations Method:** $\text{Number of separations} / \text{Number of average workers during the period} \times 100$
 $= 65 / 2000 \times 100 = 3.25\%$
- III. **Replacement Method:** $\text{Number of replacements} / \text{Number of average workers during the period} \times 100$
 $= 30 / 2000 \times 100 = 1.5\%$
- IV. **Flux Method:** $\frac{1}{2} [\text{Number of additions} + \text{Number of separations}] / \text{Number of average workers during the period} \times 100$
 $= \frac{1}{2} [280 + 65] / 2000 \times 100 = 173 / 2000 \times 100 = 8.65\%$

Note: Average number of workers in all the above methods is computed by taking opening number of workers + closing number of workers / 2 = $1900 + 2100 / 2 = 2000$



2. From the following particulars compute the cost of labor turnover per employee

Particulars	Amount Rs.
A. Preventive Cost	
a) Personnel administration	10,000
b) Medical services	6,000
c) Welfare	30,000
d) Pension scheme	40,000
Total	86,000
B. Replacement Cost	
a) Cost of selection and replacement	6,050
b) Inefficiency of new labor - extra wages	4,000
c) Inefficiency of new labor - overheads	2,000
d) Training costs	3,950
e) Loss of output	2,500
f) Cost of scrap, tool and machine breakdown etc	15,500
Total	34,000
Grand total	1,20,000
Average employees during the period	1,000

Solution:

Cost of labor turnover can be computed by dividing the preventive cost and replacement cost by the average number of employees. The computation is shown below.

- ❖ Preventive cost: $\text{Rs.}86,000 / 1000 = \text{Rs.}86$
- ❖ Replacement cost: $\text{Rs.}34,000 / 1000 = \text{Rs.}34$
- ❖ Total labor turnover cost = $\text{Rs.}86 + \text{Rs.}34 = \text{Rs.}120$

3. The management of XYZ Ltd. is worried about the increasing labor turnover in the factory and before analyzing the causes and taking remedial steps, they want to have an idea of the profit foregone as a result of labor turnover during the last year.

Last years sales amounted to Rs.83,03,300 and the profit/volume ratio was 20%. The total number of actual hours worked by the direct labor force was 4.45 lakhs. As a result of the delays by the Personnel department in filling vacancies due to labor turnover, 1,00,000 potentially productive hours were lost. The actual direct labor hours included 30,000 hours attributable to training new recruits, out of which, half of the hours were unproductive.

The cost incurred consequent on labor turnover revealed, on analysis the following.

Settlement cost due to leaving: Rs.43,820

Recruitment costs: Rs.26,740



Selection costs: Rs.12, 750

Training costs: Rs.30, 490

Assuming that the potential production lost as a consequence of labor turnover could have been sold at prevailing prices, find the profit foregone last year on account of labor turnover.

Solution:

We will have to calculate the profit foregone by calculating the amount of contribution lost and the additional cost that was incurred as a result of the labor turnover. This is done in the following manner.

- I. Actual productive hours: Actual hours worked – unproductive training hours
 = 4, 45, 000 – 15, 000 [30% of 30, 000]
 = 4, 30, 000 actual productive hours.

- II. Total hours lost: 1, 00,000 hrs
 Sales lost [Rs.83, 03, 300 × 1, 00, 000]/4, 30, 000 = Rs.19, 31, 000
 Loss of contribution – 20% of Rs.19, 31, 000 = Rs.3, 86, 200

Statement Showing Profit Foregone

Contribution lost: Rs.3, 86, 200 [As per II above]	
Settlement cost due to leaving:	Rs. 43, 820
Recruitment cost:	Rs. 26, 740
Selection cost:	Rs. 12, 750
Training cost:	Rs. 30, 490
Profit foregone:	Rs.5, 00,000

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

- 1) It shows the total number of hours worked by each workman and so the calculation of his wages becomes possible. This is applicable where the workers are paid wages as per the time rate.
- 2) Time keeping promotes punctuality and discipline amongst the workers. In the absence of the time keeping system, there will be not only indiscipline amongst them but the workers who are otherwise punctual and disciplined will be frustrated.
- 3) Certain benefits like pension, gratuity, leave with pay, provident fund, promotion, and salary scale are linked with the continuity of service. Attendance records in this regard, can be helpful in computation of these benefits.



- 4) Computation of labor hours becomes possible through time keeping records. This will be useful in overhead apportionment and absorption, which may be made on the basis of labor hours.
- 5) Time keeping is a statutory requirement under labor laws.
- 6) The time keeping records can be used for further analysis like for fixation of standard time and finding out idle time as well as the efficiency of labor. It can be used by researchers as well as by Government Authorities for various purposes.

II.I Methods of time keeping : The above-mentioned points highlight the importance of the time keeping. The question that we have to answer now is that what are the methods of time keeping? The answer to this is given in the following paragraphs. The methods of time keeping are explained below.

1. **Time Recording Clocks or Clock Cards:** This is mechanized method of time recording. Each worker punches the card given to him when he comes in and goes out. The time and date is automatically recorded in the card. Each week a new card is prepared and given to the worker so that weekly calculation of wages will be possible. If wages are paid on monthly basis, a new card may be given in each month. Due to advancement of technology, giving a new card each month is also not required as the same card continued till the worker either leaves the service or retires from the service. The only limitation of this method, [in fact it is the limitation of all the methods of time keeping] is that though the time in and time out are recorded, the records do not show the productive time of the worker, i.e. how he has spent the time in the factory. Thus if a worker comes in at 8 am and leaves at 5 pm, he has spent 9 hours in the company, which can be ascertained from the time keeping records. However, how he has spent this time, will not be shown by these records. For showing the productive time, separate records showing time booking are to be prepared. The time booking records can also be combined with time keeping records so that there is no need to keep dual records.
2. **Disc Method:** This is one of the older methods of recording time. A disc, which bears the identification number of each worker, is given to each one. When the worker comes in, he picks up his disc from the tray kept near the gate of the factory and drops in the box or hooks it on a board against his number. Same procedure is followed at the time of leaving the factory. The box is removed at starting time, and the time keeper becomes aware of late arrivals by requiring the workers concerned to report him before starting. The time keeper will record in an Attendance Register any late arrivals and workers leaving early. He will also enter about the absentees in the register on daily basis. The main limitation of this method is that there is a possibility of marking the attendance of a worker by his friend i.e. by a proxy. Secondly if the number of workers is large, there will be a delay in recording time due to manual operation of this system.
3. **Attendance Records:** This is the simplest and the oldest method of marking attendance of workers. In this method, every worker signs in an attendance register against his name. Leaves taken by workers as well as late reporting is marked on the attendance register itself. The main limitation of this system is that in case there is large number of workers, there may be large queues for signing the muster. Similarly there is little control over marking the attendance time and hence there may be irregularities in time recording.



II.II Time Booking: In time keeping we have seen that the basic objective of time keeping is to mark the attendance time, i.e. time in and time out. Time keeping aims at keeping a check on the number of hours spent by a worker in the factory. However, it do not record the productive time of the workers. It means the time keeping methods do not provide information about how the time is spent by the workers in the factory. For example, the time keeping record will show that the worker has reported for duty at 8 am and left at 6 pm, thus, he has spent 10 hours in the company. But the analysis of these 10 hours is not provided by the time keeping. In view of this there is a need to have a system, which will tell about the productive time spent by the workers in the factory. The method, which supplies this information, is known as 'Time Booking Methods' and the recording the time spent by a worker in each job, process or operation is known as 'Time Booking'. The objects of time booking are as follows.

- i. To determine the productive time spent by the worker on the job or operation. This helps in finding out the idle time and control the same.
- ii. To determine the quantity and value of work done.
- iii. To determine earnings like wages and bonus, which depend on the time taken by a worker in performing job or jobs in a factory.
- iv. To determine the efficiency of workers.

II.III Time Booking Methods : The following methods are used for time booking.

- 1) **Daily Time Sheet:** In this method, each worker records the time spent by him on the work during the day, for which a sheet is provided to each worker. The time is recorded daily and hence accuracy is maintained. However, the main limitation of this method is lot of paper work is involved as daily sheets are maintained on daily basis by each worker.
- 2) **Weekly Time Sheets:** The only difference between the daily time sheet and weekly time sheet is that these time sheets are maintained on weekly basis. This means that each worker prepares these sheets weekly rather than daily. This helps in reducing the paper work to a great extent. The only care to be taken is that since the information is filled up on daily basis, there may be inaccuracies and hence filling the information should be done on daily basis only.
- 3) **Job Ticket:** Job tickets are given to all workers where time for commencing the job is recorded as well as the time when the job is completed. The job tickets are given for each job and the recording of the time as mentioned above helps to ascertain the time taken for each job. After completing one job, the worker is given another job.
- 4) **Labor Cost Card:** This card is meant for a job, which involves several operations or stages of completion. Instead of giving one card to each worker, only one card is passed on to all workers and time taken on the job is recorded by each one of them. This card shows the aggregate labor cost of the job or the product.
- 5) **Time and Job Card:** This card is a combined record, which shows both, the time taken for completion of the job as well as the attendance time. Therefore there is no need to keep separate record of both, time taken and attendance time.

III. Work Study : In order to motivate workers, it is necessary to design a proper incentive system of payment of wages. Money is the strongest motivating factor and hence monetary incentive



system become essential. In any incentive system, the bonus is paid by comparing the standard performance/production with the actual performance, i.e. actual production. Bonus is paid if the actual performance is higher than the standard one. However, for deciding the standard performance, standard time, i.e. time that is allowed to do a particular job should be fixed against which the actual time taken should be compared. The Work Study which includes, the job study, and the method study ensures the fixation of standard time to do a particular job and thus has become extremely important in the designing of the incentive system. Work Study components are discussed below.

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

- A. Method Study is generally conducted for the jobs, which involve complex operations as well as costly operations. Hence the first step is to select jobs, which are having complexity of operations.
- B. There should be a detailed of related aspect of the selected job. Information about the job like, purpose, location, sequence, relationship with other work, methods of working, operators, requirement of skilled workers, facilities required etc. should be collected.
- C. The crucial step is that after studying the relevant aspects of the job, there should be development of the improved method of doing the job. An improved method of job might change the location and sequence of the work, methods of production and the layout for the job. The improved method will result in more efficiency, more simplicity and effectiveness and job will be done in a better manner.
- D. The developed method should be applied in doing the job.
- E. For any new method, a follow up is always required. For Method Study also a constant follow up is necessary to ensure that the method selected is implemented properly. Thus Method Study ensures efficient use of resources by reducing unnecessary work and helps to achieve highest production.

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

- A. Incentive wage schemes which require data about the time allowed and time taken for a particular job.
- B. Improving utilization of men, machines and materials.
- C. Assisting in production control
- D. Assist in setting labor standards
- E. Cost control and reduction.

The following stages are involved in work measurement.

- A. Selection of work



B. Measuring the actual time taken in the work done

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

III.III Job Evaluation: It is necessary for the management of any organization to establish proper wage and salary structure for various jobs. For doing this in a scientific manner, it is necessary to determine the relative value of jobs and hence a job evaluation is done. Job evaluation is a technique of analysis and assessment of jobs to determine their relative value within the firm. It aims at providing a rational and equitable basis for differential salaries and wages for different classes of workers. Job evaluation has the following objectives.

- ❖ It helps in developing a systematic and rational wage structure as well as job structure.
- ❖ Job evaluation aims at removing the controversies and disputes relating to salary between the employers and employees. Thus the employees and also the employer remain satisfied.
- ❖ Another important objective of job evaluation is to bring fairness and stability in the wage and salary structure so as to ensure full cooperation of workers in implementing various policies of the employers.
- ❖ Job evaluation discloses characteristics and conditions relating to different jobs. This is very useful at the time of recruiting of workers as only suitable workers can be recruited. This avoids square pegs in round holes.

III.IV Methods of Job Evaluation: Methods of job evaluation are as follows.

- ❖ **Point Ranking Method:** In this method each job is analyzed in terms of various job factors or characteristics. The characteristics are skills required, efforts involved, working conditions, hazards, responsibility and so on. In other words the job factors are the requirements needed for performing the job effectively. Each job factor is given weightage or points depending upon its value for the job. For example, for certain jobs, maximum value is assigned to experience while for some jobs, education may be the most crucial factor. Finally each job is ranked in the order of points or weights secured by them. The wage structure can be suitably designed according to the points assigned to each job. The method is quite sound in principle but difficulties may be faced in assigning the weights to each job.
- ❖ **Ranking Method:** In this method, jobs are ranked in order of importance on the basis of skills required, experience requirements, working conditions etc. Jobs are rearranged in an order, which can be either from the lowest to the highest or in the reverse. Wage scales are determined in terms of ranks. Though this method is quite simple to operate and less costly as well as easy for understanding, it is suitable when the size of the organization is small and jobs are few and well defined. In a large organization, where jobs are quite complex, this method is not beneficial.
- ❖ **Grading Method:** This method is an improvement over the ranking method. Under this method, each job is analyzed in terms of a predetermined grade and then assigned a grade or class. Grades are established after making an investigation of job factors, such as complexity in the job, supervision, responsibility, education etc.



III.V Merit Rating: Job evaluation is the rating of the job in order to bring rationality in the wage and salary structure in the organization. On the other hand merit rating is the comparative evaluation and analysis of individual merits of the employees. The merit rating aims at evaluation and ranking the individual employees in order to plan and implement rational promotional policies in the organization. Merit rating has the following objectives.

- ❖ To evaluate the merit of an employee for the purpose of promotion, increment, reward and other benefits.
- ❖ To establish and develop a wage system and incentive scheme.
- ❖ To determine the suitability of an employee for a particular job.
- ❖ To analyze the merits or limitations of a worker and help him to develop his capability and competence for a job.
- ❖ To examine characteristics like cooperation, quality of work done, attendance and regularity, education, skill, experience, character and integrity and initiative.
- ❖ Thus it can be understood that merit rating is extremely useful for organizations for evaluating the employees. However the main limitations are that the rating can be subjective which will give rise to the disputes and there is a possibility that past performance of an employee may be given too much importance.

III.VI Difference Between Merit Rating and Job Evaluation: The difference between the merit rating and job evaluation is as follows.

- ❖ Job evaluation is the assessment of the relative worth of jobs within a business enterprise and merit rating is the assessment of the employers with respect to a job.
- ❖ Job evaluation helps in establishing a rational wage and salary structure. On the other hand, merit rating helps in fixing fair wages for each worker in terms of his competence and performance.
- ❖ Job evaluation brings uniformity in wages and salaries while merit rating aims at providing a fair rate of pay for different workers on the basis of their performance.

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



- Eliminating unnecessary motions, thereby reducing inefficiency
- Improving methods, procedures, techniques, and processes relating to a job.
- Effective utilization of men, material, machines and time.
- Improving working environment, layout and design of plant and equipment.

The following are the benefits of Time and Motion study.

- Effective utilization of resources like men, material, machine and time.
- Helps in assessment of labor
- Helps in designing incentive system as many of the incentive systems are based on standard time.
- Preparation of labor budget
- Proper planning of production for preparation of production budget
- Helps in improving labor productivity by designing best method for performing a job or process.
- Improvement of work methods.

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

- To compute the wages of the employees
- To prepare a detailed wages sheet showing the gross wages payable, various deductions and other payroll liabilities.
- To maintain individual employee payroll records
- To prepare department wise summaries of wages
- Compilation of labor statistics for management.
- To install and implement an effective internal check system for preventing frauds and irregularities in payment of wages.
- To detect and prevent ghost workers.

VI. **Cost Accounting Department:** The Cost Accounting department is responsible for analyzing the labor cost for the purpose of computation and control of the same. It is responsible for the accumulation and classification of all cost data of which labor cost is one of the important component. The cost accounting department classifies the labor cost into direct and indirect, compares the actual labor cost with the budgeted cost, compute unit labor cost and compiles the data for further analysis of the labor cost. The data generated can be useful for various purposes including decision making by the management.



3.4 Methods of Wages Payment: One of the important components of labor cost control is the wages system. A system of wage payment, which takes care of both, i.e. providing guarantee of minimum wages as well as offering incentive to efficient workers helps to motivate the workers to a great extent. It should also be remembered that high wages do not necessarily mean high labor cost because it may be observed that due to high wages the productivity of workers is also high and hence the per unit cost of production is actually decreased. On the other hand, if low wages are paid, it may result in lower productivity and hence higher wages do not necessarily mean high cost. The following are the various methods of payment of wages.

I] Time Rate System

- A] At ordinary levels.
- B] At high wage levels and
- C] Graduated time rate

II] Piece Rate

- A] Straight piece rate
- B] Piece rate with guaranteed day rates and
- C] Differential piece rates

III] Bonus Systems

- A] Individual Bonus for Direct Workers
- B] Group Bonus for Direct Workers
- C] Bonus for Indirect Workers

IV] Indirect Monetary Incentives

- A] Profit Sharing
- B] Co-partnerships

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

These methods are discussed in the following paragraphs.

A] Time Rate at Ordinary Levels: Under this method, rate of payment of wages per hour is fixed and payment is made accordingly on the basis of time worked irrespective of the output produced. However, overtime is paid as per the statutory provisions. The main benefit of this method for the workers is that they get guarantee of minimum income irrespective of the output produced by them. If a worker is not able to work due to genuine reasons like illness or physical disability, he will continue to get the wages on the basis of time taken for a particular job. This method is used in the following situation.

- Where the work requires high skill and quality is more important than the quantity.
- Where the output/services is not quantifiable, i.e. where the output/services cannot be measured.
- Where the work done by one person is dependent upon other person, in other words where a individual worker has no control over the work



- Where the speed of production is governed by time in process or speed of a machine.
- Where the workers are learners or inexperienced.
- Where continuous supervision is not possible.

The main advantage of this method is that the worker is assured of minimum income irrespective of the output produced. He can focus on quality as there is no monetary incentive for producing more output. However, the main limitation of this method is that it does not offer any incentive to the efficient workers. Efficient and inefficient workers are paid at the same rate of wages and hence there is a possibility that even an efficient worker may become inefficient due to lack of incentive.

B] Time Rate at High Wage Levels: This system is a variation of time rate at ordinary levels in the sense that in this system, workers are paid at time rate but the rate is much higher than that is normally paid in the industry or area. In this method, the workers are paid according to the time taken and overtime is not normally allowed. This method offers a very strong incentive to workers and it can attract talented workers in the industry. However, care should be taken that productivity also increases, otherwise the cost will go on increasing.

C] Graduated Time Rate: Under this method payment is made at time rate, which varies according to personal qualities of the workers. The rate also changes with the official cost of living index. Thus this method is suitable for both employer and employees.

II] Piece Rate Method: This method is also called as payment by results where the workers are paid as per the production achieved by them. Thus if a worker produces higher output, he can earn higher wages. The following are the variations of this method.

A] Straight Piece Rate: In this method, rate per unit is fixed and the worker is paid according to this rate. For example, if the rate per unit is fixed at Rs.10, and the output produced is 300 units, the remuneration to the worker will be Rs.10 X 300 units = Rs.3,000. This method thus offers a very strong incentive to the workers and is particularly suitable where the work is repetitive. The benefits of this method are as follows.

- The method is simple and provides a very strong incentive to the workers by linking the monetary reward directly to the results.
- Productivity can be increased substantially if the rate of pay includes a really adequate incentive.
- Higher productivity will result in lowering the cost per unit.

However, the main limitation of this method is that if a worker is not able to work efficiently due to reasons beyond his control, he will be penalized in the form of lower wages.

B] Differential Piece Rates: Under these methods, the rate per standard per hour of production is increased as the output level rises. The increase in rates may be proportionate to the increase in output or proportionately more or less than that as may be decided. In other words, a worker is paid higher wages for higher productivity as an incentive. The rate per unit will be higher in this case as compared to the rate paid to a worker with lower productivity. For deciding the efficiency, comparison is made between the standard production and actual production of the worker. If the actual production is more, the worker qualifies for higher rate of wages. The differential piece



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rates methods will be useful when the production is of repetitive type, methods of production are standardized and the output can be identified with individual workers. The following are the major systems of differential piece rate system

I] Taylor

II] Merrick

III] Gantt Task and Bonus

These methods are explained in the following paragraphs.

- I] Taylor's Differential Piece Rate System:** Taylor is regarded as father of scientific management and he has recommended a system of differential piece rate. According to him, there are only two classes of workers, efficient and inefficient. He suggests that while efficient workers should be encouraged to the maximum possible extent, the inefficient workers should be penalized. In order to do this, he has suggested two rates for the two classes of workers. Thus according to Taylor, if the workers are efficient, they should be paid @ 120% of the normal piece rate and if they are inefficient, they should be paid @ 80% of the normal piece rate. For measuring efficiency, each worker will be given a standard production quantity to be produced in the time allowed for the same and the actual production produced should be compared with the same. If a worker exceeds the standard, he will be regarded as efficient while if he fails to do so, he will be regarded as inefficient.

The positive and negative points of this system are as follows.

Merits:

- There is a very strong incentive to the workers, which helps to achieve higher productivity.
- Due to the incentive, best workers are attracted to the company.
- This method is quite simple and hence easy to understand.

Limitations:

- Slow workers and beginners are penalized severely. Similarly workers get penalized for reasons beyond their control, e.g. medical reasons, accidents etc. Therefore it is said that there is no human element in this system.
- In an anxiety to produce more, quality may be neglected in order to achieve higher quantity of production.

Illustration: From the following particulars, calculate the earnings of workers X and Y and also comment on the labor cost.

Standard time allowed: 20 units per hour

Normal time rate: Rs.30 per hour

Differential to be applied:

80% of piece rate when below standard

120% of piece rate at or above standard

In a particular day of 8 hours, X produces 140 units while Y produces 165 units



Solution:

Standard production per day is 20 units × 8 hours = 160 units

Worker X produces 140 units which means he is below standard and will get wages @ 80% of the normal piece rate.

X's earnings:

Normal piece rate = Rs.30 per hour/20 units = Rs.1.5 per unit

80% of the normal piece rate = Rs.1.20 per unit

Earnings = Rs.1.20 × 140 units = Rs.168

Labor cost per unit = Rs.168/140 units = Rs.1.20

Y's Earnings: Y has produced more than the standard production of 160 units and hence he will get wages @ 120% of normal piece rate. His earnings will be as shown below.

Normal piece rate = Rs.30 per hour/20 units = Rs.1.50 per unit

120% of normal piece rate = Rs.1.80 per unit

Earnings = Rs.1.80 × 165 units = Rs.297

Labor cost per unit = Rs.1.80

Comment: Labor cost increases from Rs.1.20 per unit to Rs.1.80 per unit. Taylor's system is resisted on this ground as well as on the ground that it is very harsh on the workers.

II] Merrick Differential Piece Rate System: Merrick's system is modification of Taylor's system and is comparatively less harsh on the workers. The scale of remunerations is as follows.

Production	Rates of Payment
Up to 83%	Normal piece rate
83% to 100%	110% of ordinary piece rate
Above 100%	120% of ordinary piece rate

As mentioned earlier, this method is less harsh on the workers as compared to Taylor's system. It is particularly useful to beginners and also offers an incentive who have potential of higher productivity.

III] Gantt Task Bonus Plan: In this method, there is a combination of time rate, bonus and piece rate plan. The remuneration is computed as shown below.

Production	Payment
Production below standard	Guaranteed time rate
Production at standard	Bonus of 20% [normally] of time rate
Production above standard	High piece rate for the entire output

This method assures minimum wages even to less efficient workers and hence is a preferred method of payment of wages. It also offers reasonably good incentive to efficient workers. However, the main limitation is that the method is complicated to understand by the workers and hence may create confusion amongst them.



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Illustration: X, Y and Z are three workers working in a manufacturing company and their output during a particular 40 hours week was, 96, 111 and 126 units respectively. The guaranteed rate per hour is Rs.10 per hour, low piece rate is Rs.4 per unit, high piece rate is Rs.6 per unit. High task is 100 units per week.

Compute the total earnings and labor cost per unit under Taylor, Merrick and Gantt Task Bonus Plan.

Solution:

- ❖ Taylor Plan: High task is 100 units
- ❖ Worker X: $96 \text{ units} \times \text{Rs.4} = \text{Rs.384}$ [X will get the wages at low piece rate as his output is below the high task]
- ❖ Worker Y: $111 \text{ units} \times \text{Rs.6} = \text{Rs.666}$ [Y will get the wages at high piece rate as his output is above the high task i.e. standard]
- ❖ Worker Z: $126 \text{ units} \times \text{Rs.6} = \text{Rs.756}$ [Z will also get the wages at high piece rate as his output is above the high task, i.e. standard]
- ❖ Merrick Plan:
- ❖ Worker X = High task is 100 units, actual output is 96, this means that the efficiency level is 96%. As per Merrick Plan, wages of X will be 110% of normal piece rate which is Rs.6.60 per unit = $\text{Rs.6.60} \times 96 = \text{Rs.633.6}$
- ❖ Worker Y = High task is 100 units, actual output is 111 units, efficiency level is 111%. Y will be entitled for wages @ 120% of normal piece rate i.e. @ Rs.7.20 per unit. His wages will be, $\text{Rs.7.20} \times 111 = \text{Rs.799.2}$
- ❖ Worker Z = High task is 100 units, actual output is 126 units, efficiency level is 126%. Z will get at higher piece rate @ Rs.7.20 per unit. His wages will be $\text{Rs.7.20} \times 126 \text{ units} = \text{Rs.907.2}$
- ❖ Gantt Task and Bonus Plan:
- ❖ Worker X = $\text{Rs.10} \times 40 \text{ hours} = \text{Rs.400}$ [X will get guaranteed time rate as his output is below the high task]
- ❖ Worker Y = $\text{Rs.6} \times 111 \text{ units} = \text{Rs.666}$ [High piece rate as output is above standard]
- ❖ Worker Z = $\text{Rs.6} \times 126 = \text{Rs.756}$ [High piece rate as output is above standard]

C] Individual Bonus Plans: We have seen earlier that in the time rate system, the workers are paid according to the time taken while in case of piece rate system, the output produced by the worker decides his wages as rate per unit is fixed rather than rate per hour. In the premium bonus plan, the gain arising out of increased productivity is shared by both, the employer and employee.

The bonus to be paid to the workers is computed on the basis of savings in the hours, i.e. the difference between the time allowed and time taken. The time allowed is the standard time, which is fixed by conducting a time and motion study by the work-study engineers. While fixing the standard time, due allowance is given for physical and mental fatigue as well as for normal idle time. The actual time taken is compared with this standard time and bonus is payable to the worker if the time taken is less than the standard time.



The individual bonus schemes commonly used are as follows.

- I] *Halsey Premium Plan*
- II] *Halsey-Weir Premium Plan*
- III] *Rowan Plan*
- IV] *Barth Variable Sharing Plan*

These methods are discussed below.

- I] **Halsey Premium Plan:** This plan was introduced by F.A. Halsey, an American engineer. In this plan, bonus is paid on the basis of time saved. Standard time is fixed for a job and if the actual time taken is less than the same, the worker becomes eligible for bonus. However bonus is paid equal to wages of 50% of the time saved. A worker is assured of time wages if he takes longer time than the allowed time. The formula for computing the total wages is as follows.

$$\text{Total Earnings} = H \times R + 50\% [S - H] R$$

Where, H = Hours worked, R = Rate per hour, S = Standard time

- Illustration: Time allowed for a job is 48 hours; a worker takes 40 hours to complete the job. Time rate per hour is Rs.15. Compute the total earnings of the worker.
- Solution: Total Earnings = $H \times R + 50\% [S - H] R$
- Total Earnings = $40 \times \text{Rs.15} + 50\% [48 - 40] \text{Rs.15}$
- Total Earnings = $\text{Rs.600} + \text{Rs.60} = \text{Rs.660}$

- II] **Halsey – Weir Plan:** Under this method, there is only one difference as compared to the Halsey Plan and that is instead of 50% bonus for the time saved, it is 33 1/3rd % of the time saved. Accordingly the formula for this method is modified as follows.

$$\text{Total Earnings} = H \times R + 33\frac{1}{3}\% [S - H] R$$

H = Hours worked. R = Rate per hour. S = Standard time

- III] **Rowan Plan:** This premium bonus plan was introduced by Mr. James Rowan. It is similar to that of Halsey plan in respect of time saved, but bonus hours are calculated as the proportion of the time taken which the time saved bears to the time allowed and they are paid for at time rate. The formula for computation of total earnings is as follows.

$$\text{Total Earnings} = H \times R + [S - H]/S \times H \times R$$

Where H = Hours worked, R = Rate per hour, S = Standard time,

- IV] **Barth Variable Sharing Plan:** In this system, the total earnings are calculated as follows:

$$\text{Total Earnings} = \text{Rate per hour} \times \frac{\text{Standard hours}}{\text{Actual hours worked}}$$

- D] **Group Bonus Plan:** The plans described above are all individual bonus plans. Many times output of individuals cannot be measured. Similarly, the output of individual is dependent on the performance of the group. In such cases, rather than implementing individual bonus systems, group bonus system is implemented. The total amount of bonus, which is determined according to productivity, can then be shared equally or in agreed proportion between the group members. The main objects of group bonus system are as follows.



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- Creation of team spirit.
- Elimination of excessive waste of materials and time.
- Recognition of group efforts.
- Improving productivity.

The various group bonus plans are discussed below.

- **Budgeted Expenses Bonus:** Under this system, bonus is based on the savings in actual total expenditure compared with the budgeted expenditure.
- **Cost Efficiency Bonus:** In this method, standards are set for expenses like material, labor and overheads. The actual expenditure against these standards is measured and if there is a savings in actual expenditure as compared to the standards, a portion of such savings is distributed as bonus amongst the workers.
- **Pristman System:** In this method, production standards are set in units or points and actual production is compared with the standards. If the actual production exceeds the standard, the workers are paid additional wages equal to the percentage in output over standard. Obviously no bonus is payable if actual production does not exceed the standard production. This method is mainly used in foundries.
- **Towne Profit Sharing Plan:** In this method standards are set for costs [mainly labor cost] and the actual cost is compared with the standards. If there is a saving in the costs, the saving is shared by workers and supervisory staff in agreed proportion. The principle behind this method is that if there is a saving in the cost, not only the workers but the supervisory staff should also get the reward because the cost reduction is the joint efforts of both the types of staff. Hence both, workers and supervisors share it.
- **Waste Reduction Bonus:** This system of bonus is based on savings in the material cost. If there is a saving in the material cost, the workers share the same in the agreed proportion. This system is generally used in industries where cost of material is very high.
- **Rucker Plan:** The amount of bonus is linked with 'value added' in this system. The 'value added' is obtained by deducting the cost of material and services from sales value. In other words, value added is the total of labor, overheads and profits. Under this plan, employees receive a constant proportion of value added. For example, if the target ratio of labor cost to value added is 70%, and the actual ratio comes to 68%, 2% of the actual value added is distributed as group bonus, so that the ratio of direct labor cost to value added is maintained at 70%. Normally instead of distributing the entire bonus, some proportion is distributed and the remaining is transferred to reserve fund.
- **Scanlon Plan:** This method is similar to the Rucker plan as discussed above except that the ratio of labor cost to the sales is taken instead of direct labor cost to added value. Normally bonus is paid based on average of last three years ratios. A part of the bonus may be transferred to bonus equalization fund for future use when the workers do not get bonus under this scheme.
- ❖ **Bonus System for Indirect Workers:** Indirect workers do not take part in the production process directly but they play important role in the production process. It is difficult to chalk



out a bonus system for indirect workers, as there is a difficulty in measuring their output. However it is advisable to plan a bonus system for indirect workers in order to motivate them for better productivity. Bonus to indirect workers is paid on the basis of output of the department, saving in time or expenditure against the budgeted, product quality, reduction of waste and scrap and reduction of labor turnover.

- ❖ **Indirect Monetary Incentives:** These methods aim at giving additional remuneration based on the prosperity of the concern. The following schemes fall in this category.
 - **Profit Sharing:** In this system, the profits of the organization are shared by workers in agreed proportion. The Payment of Bonus Act in India makes it mandatory to pay minimum bonus of 8.33% of salary and maximum bonus of 20% of salary to the workers.
 - **Co-partnership:** In this system, the workers get an opportunity to participate in the ownership of the organization and to receive the part of share of profits. The employees are given assistance to purchase shares of the company. Thus the employees get dividend and bonus also. These schemes help to boost the morale of workers to a great extent.
- ❖ **Non-Monetary Incentives:** These incentives are given in addition to monetary incentives for further boosting the moral of the employees. Though these benefits do not result in additional remuneration, they help to improve productivity by boosting the morale of the employees. Some of the non-monetary incentives are as follows.
 - Free education and training.
 - Medical benefits
 - Subsidized canteens
 - Superannuation benefits like pensions, gratuity, life assurance schemes
 - Sports and recreation facilities, housing facilities, long service awards.
 - Job security, promotion schemes
 - Benevolent funds and welfare funds.



Problems and Solutions

1. From the following particulars, find the amount of cash required for payment of wages in a factory for a particular month.
 - i. Wages for normal hours worked Rs.20, 500
 - ii. Wages for overtime Rs.2200
 - iii. Leave wages Rs.1700
 - iv. Deduction of employees' share of State Insurance Corporation Rs.500
 - v. Employees' contribution to Provident Fund Rs.1600
 - vi. House rent is to be recovered from 30 employees at the rate of Rs.10 per month.

Solution: The amount of cash required will be computed as shown below.

Particulars	Amount – Rs.
Wages for normal hours worked	20, 500
Wages for overtime	2, 200
Leave wages	1, 700
Total Requirement	24, 400
Less: Deduction of employees' share of ESI: Rs.500	
Employees' contribution to P.F. Rs.1600	
House rent to be recovered from 30 employees @ Rs.10 per month Rs.300	
Total	2, 400
Net requirement of cash	22, 000

2. Calculate the normal and overtime wages payable to a workman from the following data.

Days	Hours Worked
Monday	08
Tuesday	10
Wednesday	9
Thursday	11
Friday	9
Saturday	4
Total	51

Normal working hours – 8 hours per day

Normal rate per hour – Rs.20.



Overtime rate: up to 9 hours in a day at single rate and over 9 hours at double rate or up to 48 hours in a week at single rate and over 48 hours at double rate whichever is more beneficial to the workman.

Solution:

- A] Up to 48 hours per week at single rate: $Rs.20 \times 48 = Rs.960$
 Over 48 hours, at double rate: $Rs.40 \times 3 = Rs.120$
 Total = Rs.1080

B] Up to 9 hours in a day at single rate and over 9 hours at double rate

Days	Number of Hours	Normal Wages Rs.	Overtime Wages Rs.	Total Wages Rs.
Monday	8	$8 \times Rs.20 = 160$	–	160
Tuesday	10	$9 \times Rs.20 = 180$	$1 \times Rs.40 = 40$	220
Wednesday	9	$9 \times Rs.20 = 180$	–	180
Thursday	11	$9 \times Rs.20 = 180$	$2 \times Rs.40 = 80$	260
Friday	9	$9 \times Rs.20 = 180$	–	180
Saturday	4	$4 \times Rs.20 = 80$	–	80
Total	–	–	–	–

3. A worker takes 6 hours to complete a job under a scheme of payment by results. The standard time allowed for the job is 9 hours. His wage rate is Rs.15 per hour. Material cost of the job is Rs.120 and the overheads are recovered at 15% of the total direct wages. Calculate the factory cost of job under A] Rowan and B] Halsey system of incentive system.

Solution:

- A] **Rowan Plan:** $H \times R + [S - H / S] \times H \times R$
 $: 6 \text{ hrs} \times Rs.15 + [9 - 6/9] \times 6 \times Rs.15$
 $: Rs. 90 + 1/3 \times Rs.90$
 $: Rs.120$

- B] **Halsey Plan:** $H \times R + 50\% [S - H] \times R$
 $: 6 \text{ hrs} \times Rs.15 + 50\% [9 - 6] \times Rs.15$
 $: Rs.90 + Rs.22.50 = Rs.112.50$

C] Factory Cost:

Particulars	Rowan Plan	Halsey Plan
I] Material cost	Rs.120	Rs.120
II] Labor	Rs.120	Rs.112.50
III] Overheads 15% of direct wages	Rs. 18	Rs.16.80
Total I + II + III	Rs.258	Rs.249.30



4. Calculate the earnings of workers A, B and C under the Straight Piece Rate System and Merrick's Differential Piece Rate System from the following particulars.

Normal rate per hour: Rs.5.40

Standard time per unit: 1 minute

Output per day is as follows.

Worker A – 390 units

Worker B – 450 units

Worker C – 600 units.

Working hours per day are 8

Solution:

Firstly, the rate per unit will have to be calculated, as in the example, rate per hour is given. This is shown below.

Rate per hour: Rs.5.40

Standard time per unit: 1 minute

Hence the standard time per hour is 60 units

Normal piece rate per unit = Re.0.090

I] Wages under the Straight Piece Rate:

Worker A: 390 units \times Re.0.090 = Rs.35.10

Worker B: 450 units \times Re.0.090 = Rs.40.50

Worker C: 600 units \times Re.0.090 = Rs.54.00

II] Wages under Merrick's Differential Piece Rate System

Worker A:

Efficiency level: Standard production = 8 hours \times 60 units = 480 units

Actual production = 390 units

Efficiency level = 390 units/480 units \times 100 = 81.25 %

A will get wages as per the normal piece rate as his efficiency level is 81.25% which is below 83%, hence his wages will be 390 units \times Re.0.090 = Rs.35.10

Worker B:

Efficiency level: Standard production = 8 hours \times 60 units = 480 units

Actual production = 450 units

Efficiency level = 450/480 \times 100 = 93.75%

B will get wages @ 110% of normal piece rate, i.e.Re.0.099 per unit

His wages = Rs.0.09 \times 450 units = Rs.44.50



Worker C:

Efficiency level = $600 / 480 \times 100 = 125\%$

B will get wages @ 120% of normal piece rate i.e. Re.0.108 per unit

His wages = $\text{Re.}0.108 \times 600 \text{ units} = \text{Rs.}64.80$

5. A company has its factories at two locations. Rowan plan is in use at location A and Halsey plan at location B. Standard time and basic rate of wages are same for a job which is similar and is carried out on similar machinery. Time allotted is 60 hours.

Job at location A is completed in 36 hours while at B, it has taken 48 hours. Conversion costs at respective places are Rs.1224 and Rs.1500. Overheads account for Rs.20 per hour.

Required:

I] To find out the normal wage rate and,

II] To compare the respective conversion cost.

Solution: Let Rs. Y per hour be normal wage rate

So, wages at location A will be Rs.36Y and at location B, Rs. 48Y

Time allowed is 60 hours

Hence, for time saved, bonus will be payable as under,

Location A

$$\begin{aligned} \text{Bonus under Rowan Plan} &= \text{Time saved/ Time allowed} \times \text{Hours worked} \times \text{Rate} \\ &= 24/60 \times 36 \times Y = \text{Rs.}14.4 Y \end{aligned}$$

$$\text{Total wages} = \text{Rs.}36Y + \text{Rs.}14.4Y = \text{Rs.}50.4Y$$

Overheads @ Rs.20 per hour worked Rs.720

Hence, total conversion cost is $\text{Rs.}50.4Y + 720 = \text{Rs.}1224$ [given in the example]

So, $Y = \text{Rs.}10$

Location B

$$\begin{aligned} \text{Bonus under Halsey Plan} &= 50\% \text{ of time saved} \times \text{Rate per hour} \\ &= 50\% \text{ of } 12 \times Y = \text{Rs.}6Y \end{aligned}$$

$$\text{Total wages} = \text{Rs.}48Y + \text{Rs.}6Y = \text{Rs.}54Y$$

$$\text{Overheads} = \text{Rs.}20 \text{ per hour} = \text{Rs.}960$$

Total conversion cost is $\text{Rs.}54Y + 960 = \text{Rs.}1500$

$$\text{So } Y = \text{Rs.}10$$



Comparative Conversion Cost

Particulars	A [Rowan Plan]	B [Halsey Plan]
Wages @ Rs.10 per hour	Rs.360	Rs.480
Bonus	Rs.144	Rs.60
Overheads	Rs.720	Rs.960
Total	Rs.1224	Rs.1500

6. Calculate total monthly remuneration of three workers, A, B and C from the following data.
- [a] Standard production per month per worker – 1000 units, actual production during the month, A – 850 units, B – 750 units and C – 950 units.
 - [b] Piecework rate Rs.10 per unit [actual production]
 - [c] Additional production bonus is Rs.10 for each percentage or actual production exceeding 80%
 - [d] Dearness pay fixed Rs.50 per month.

Solution: Standard production = 1000 units per worker per month.

Actual production:

Worker A = 850 units, efficiency level = $850/1000 \times 100 = 85\%$

Worker B = 750 units, efficiency level = $750/1000 \times 100 = 75\%$

Worker C = 950 units, efficiency level = $950/1000 \times 100 = 95\%$

Statement showing total Remuneration of Workers

Particulars	Worker A Rs.	Worker B Rs.	Worker C Rs.
Normal piece rate wages [Rs.10 per unit]	850 units × Rs.10 per unit 8500	750 units × Rs.10 per unit 7500	950 units × Rs.10 per unit 9500
Bonus *	Rs.10 × 5 = 50	–	Rs.10 × 15 = 150
Dearness pay	50	50	50
Total	8600	7550	9700

*As per the example, bonus will be paid only if the efficiency exceeds 80%. For A and C the efficiency exceeds 80% and hence they will be entitled for a bonus of Rs.10 per percentage exceeding 80%. B will not be entitled for any bonus as his production efficiency does not exceed 80%.

7. The standard hours for job X is 100 hours. The job has been completed by Amar in 60 hours, Akbar in 70 hours and Anthony in 95 hours. The bonus system applicable to the job is as follows.

Percentage of time saved to time allowed	Bonus
Saving up to 10%	10% of time saved
From 11% to 20%	15% of time saved
From 21% to 40%	20% of time saved
From 41% to 100%	25% of time saved



The rate of pay is Rs.10 per hour. Calculate the total earnings of each worker and also the rate of earnings per hour.

Solution:

Statement showing total Earnings and Rate of Earnings per Hour

Particulars	Amar	Akbar	Anthony
Standard hours for the job	100	100	100
Time taken for the job - hours	60	70	95
Time saved [standard hours – time taken]	40	30	5
Percentage of time saved to time allowed Time saved /time allowed × 100	40	30	5
Bonus [as % of time saved, as given]	20	20	10
Bonus hours *	8	6	0.50
Total hours to be paid [time taken + bonus hours]	68	76	95.50
Total earnings [Rs.10 per hour]	Rs.680	Rs.760	Rs.955
Rate of earnings per hour #	Rs.11.33	Rs.10	Rs.10.052

* Bonus hours are computed as follows.

- ❖ **Amar:** Time saved is 40 hours, as per the slab given, he is entitled for bonus hours of 20% of time saved which mean his bonus hours is 8
- ❖ **Akbar:** Time saved is 30 hours. He is entitled for bonus hours of 20% of time saved as per the slab given. This means that his bonus hours are 6 hours.
- ❖ **Anthony:** Time saved is 5 hours. He is entitled for 10% of the time hours as per the slab given. This mean that his bonus hours are .50

Rate of earnings per hour is computed by dividing the total earnings by the total number of hours.

8. During one week the workman X manufactured 200 articles. He receives wages for a guaranteed 44 hours week at the rate of Rs.15 per hour. The estimated time to produce one article is 15 minutes and under incentive scheme the time allowed is increased by 20%. Calculate his gross wages under each of the following methods of remuneration.

- [a] Time rate
- [b] Piece rate with a guaranteed weekly wage
- [c] Rowan premium bonus
- [d] Halsey premium bonus, 50% to workman.

Solution:

- [a] Time Rate: Hours worked X Rate per hour

$$44 \times \text{Rs.15} = \text{Rs.660}$$



Labor Cost Computation and Control

[b] Piece Rate: Number of articles produced \times Rate per article

$$200 \times \text{Rs.}4.50 = \text{Rs.}900$$

Note: In the example, rate per unit is not given. Rate per hour is given which is Rs.15 and standard time for one article is 15 minutes, which is increased by 20%, i.e. 18 minutes for one article. Rate per minute is $15/60 = \text{Rs.}0.25$ and hence rate per article is $18 \times \text{Rs.}0.25 = \text{Rs.}4.50$

[c] Rowan Plan: $H \times R + S-H/S \times H \times R$, where, H = Hours worked, R = Rate per hour, S = Standard time

$$: 44 \times \text{Rs.}15 + 60 - 44/60 \times 44 \times 15 = \text{Rs.}836$$

[d] Halsey Plan: $H \times R + 50\% [S-H] \times R$

$$44 \times \text{Rs.}15 + 50\% [60 - 44] \times 15$$

$$\text{Rs.}660 + \text{Rs.}120 = \text{Rs.}780$$

9. The existing incentive system of a certain factory is,

Normal working week: 5 days of 9 hours each plus 3 late shifts of 3 hours each

Rate of payment: Day work – Rs.10 per hour, late shift – Rs.15 per hour

Additional hours payable: Rs.25 per day shift, Rs.15 per late shift

Average output per operative for 54 hours week, i.e. including 3 late shifts: 120 articles

In order to increase output and eliminate overtime it was decided to switch on to a system of payment by results. The following information is obtained.

Time rate [as usual] Rs.10 per hour

Basic time allowed for 15 articles: 5 hours

Piecework rate: Add 20% to price

Premium bonus: Add 50% to time

You are required to work out,

[I] Hours worked

[II] Weekly earnings

[III] Number of articles produced and

[IV] Labor cost per article for an operative under the following systems

- ❖ Existing time rate
- ❖ Straight piece rate
- ❖ Rowan plan
- ❖ Halsey plan

Assume that 135 articles are produced in a 45 hours week under straight piece rate, Rowan plan and Halsey plan. The additional bonus under the existing system will be discontinued in the proposed incentive scheme.



Solution:

- ❖ Existing Time Rate: 45 hours @ Rs.10 per hour: Rs.450
 9 hours @ Rs.15 per hour : Rs. 135
 Day shift bonus: Rs.125 [5 × 25]
 Late shift bonus: Rs 45 [3 × 15]
 Total: Rs.755
- ❖ Piece Rate System:
 - i. Basic Time: 5 hours for 15 articles
 - ii. Cost of 15 articles @ Rs.10 per hour = Rs.50
 - iii. Add 20% of Rs.50: Rs.10
 - iv. Total = Rs.60
 - v. Rate per article = Rs.60/15 = Rs.4
 - vi. Quantity produced in a week = 45 × 15/5 = 135
 - vii. Hence, earnings = 135 × Rs.4 = Rs.540
- ❖ Rowan Premium Plan: The following working is required before the total earnings are computed.
 - i. Basic time: 5 hours per 15 articles
 - ii. Add: 50% allowance as given in the example: 2.5 hours
 - iii. Total time allowed for 135 articles = 67.5 hours
 - iv. Actual time taken is 45 hours
 - v. Earnings = $H \times R + \frac{S-H}{S} \times H \times R$
 - vi. Earnings = $45 \times Rs.10 + \frac{67.5 - 45}{67.5} \times 45 \times Rs.10$
 - vii. Earnings = Rs.600
- ❖ Halsey Premium Plan:
 Earnings = $H \times R + 50\% [S - H] \times R$
 Earnings = $45 \times Rs.10 + 50\% [67.5 - 45] \times Rs.10 = Rs.562.50$
- ❖ Statement Showing Labor Cost Per Article

Mode of Payment	Hours Worked	Weekly Earnings Rs.	Number of Articles Produced	Labor Cost Per Article
Existing time rate	54	755	120	6.29
Straight piece rate	45	540	135	4.00
Rowan premium plan	45	600	135	4.44
Halsey premium plan	45	562.5	135	4.17



Labor Cost Computation and Control

10. In a factory bonus system, bonus hours are credited to the employees in the proportion of time taken which time saved bears to time allowed. Jobs are carried forward from one week to another. No overtime worked and payment is made in full for all units worked on, including those subsequently rejected. From the following information you are required to calculate for each employee –
- [a] The bonus hours and amount of bonus earned.
 - [b] The total wage costs and
 - [c] The wages cost of each good unit produced.

Particulars	Worker A	Worker B	Worker C
Z	Rs.10	Rs.16	Rs.12
Units produced for production	2500	2200	3600
Time allowed for 100 units	2 hrs 35 minutes	3 hours	1 hour 30 minutes
Time taken	52 hours	75 hours	48 hours
Rejects	100 units	40 units	400 units

Solution: The computation is shown in the following table.

Statement showing Bonus and Wage Cost Per Unit

Particulars	Worker A	Worker B	Worker C
Units produced	2500	2200	3600
Rejects	100 units	40 units	400 units
Good units	2600 units	2160 units	3200 units
Time allowed for 100 units	2 hrs 35 minutes	3 hours	1 hour 30 minutes
Total time allowed	65 hours	66 hours	54 hours
Time taken	52 hours	75 hours	48 hours
Time saved [Time allowed – Time taken]	13 hours	--	6 hours
Basic rate per hour	Rs.10	Rs.16	Rs.12

Statement showing Bonus and Wage Cost Per Unit [Continued from previous page]

Particulars	Worker A	Worker B	Worker C
Basic Wages	Rs.520	Rs.1200	Rs.576
Bonus *	Rs.104	--	Rs.64
Total wages cost	Rs.624	Rs.1200	Rs.640
Wages cost per unit of good units produced #	Re.0.26	Re.0.56	Re.0.20

* Bonus is computed as follows.

It is given in the example, that the bonus is to be paid in the proportion of time taken which the time saved bears to the time allowed.



For A, the time saved is 13 hours while the time allowed is 65 hours. This means that the proportion of time saved to time allowed is $13/65 = 1/5$ hours and hence the bonus is 1/5th of basic wages i.e. Rs.104

For B, there is no time saved and hence he is not entitled for any bonus.

For C, time saved is 6 hours while time allowed is 54 hours, which means that the time saved is 1/9th of the time allowed. Hence the amount of bonus will be 1/9th of the basic wages i.e. Rs.64

Wages cost per unit of good unit is computed by dividing the total wages cost by the good units.

11. XYZ Ltd. has introduced a Scanlon plan of incentive bonus for its employees from the year 2006-07. The relevant information for three previous years is as follows.

Year	Sales Revenue Rs.	Total Salaries and Wages Rs
2003-04	2, 40, 000	72, 000
2004-05	2, 50, 000	70, 000
2005-06	2, 70, 000	86, 400

For the year 2006-07, the sales revenue has been Rs.3, 25, 000 and the total salaries and wages paid Rs.90, 000. What is the amount due to employees under Scanlon Plan? If 50% is set-aside in the bonus equalization reserve fund, how much money is to be paid out for 2006-07 as Scanlon Bonus?

Solution:

- ❖ Average annual salaries and wages = $[Rs.72, 000 + Rs.70, 000 + Rs.86, 400]/3$
 - ❖ Average salaries and wages = Rs.76, 133
 - ❖ Average annual sales revenue
 - ❖ $[Rs.2, 40, 000 + Rs.2, 50, 000 + Rs.2, 70, 000]/3 = Rs.2, 53, 333$
 - ❖ Bonus percentage = $Rs.76, 133 / Rs.2, 53, 333 = 30.05\%$
 - ❖ Salaries and wages on which bonus is applicable = $Rs.97, 663 * [Rs. 3,25,000 \times 30.05\%]$
 - ❖ Actual salaries and wages for 2006-07 = Rs.90, 000
 - ❖ Bonus fund = $Rs.97, 663 - Rs.90, 000 = Rs.7, 663$
 - ❖ Transfer to Bonus equalization reserve fund = Rs.3, 831
 - ❖ Bonus available for disbursement = Rs.3, 832
12. Your organization is experiencing a high labor turnover in recent years, and management would like you to submit a report on the loss suffered by the company due to such labor turnover. Following figures are available for your consideration.

Sales: Rs.600 lakhs

Direct materials: Rs.150 lakhs

Direct labor: Rs.48 lakhs on 4, 80, 000 man hours

Other variable expenses: Rs.60 lakhs

Fixed overheads: Rs.80 lakhs



Labor Cost Computation and Control

The direct man hours include 9000 man hours spent on trainees and replacements, only 50% of which were productive. Further, during the year 12,000 man-hours of potential work could not be availed of because of delayed replacement. The cost incurred due to separation and replacements amounted to Rs.1 lakh.

On the basis of the above data, prepare a comparative statement showing actual profit vis-à-vis the profit which would have been realized had there been no labor turnover.

Solution:

I] Calculation of direct labor cost if there was no labor turnover:

Actual direct labor cost per hour = Rs.48,00,000 / 4,80,000 = Rs.10 per direct labor hour

Cost of man hours of potential work lost due to delayed replacement = 12,000 × Rs.10 = Rs.1,20,000

Direct labor cost if there was no labor turnover = Rs.48,00,000 + Rs.1,20,000
= Rs.49,20,000

II] Calculation of potential total sales if there was no labor turnover

Particulars	Hours
Hours lost for delayed replacement	12,000
Unproductive hours	4,500
50% of 9000 hours	
Total hours lost	16,500
Actual labor hours spent	4,80,000
Less: Unproductive hours	4,500
Productive labor hours worked	4,75,500

Sales related to 4,75,500 productive hours = Rs.600 lakhs

Potential sales lost due to loss of 16,500 direct labor hours,

Rs.6,00,00,000 / 4,75,500 [Direct labor hours] × 16,500 D.L.H. = Rs.20,82,019

Total sales if there was no labor turnover = Rs.6,00,00,000 + Rs.20,82,019
= Rs.6,20,82,019

III] Variable expenses if there was no labor turnover:

Rs.2,10,00,000 / 6,00,00,000 × 6,20,82,019 = Rs.2,17,28,707



Comparative Statement showing Actual Profit vis-à-vis Profit, Which would Have Been Realized If There Was No Labor Turnover

Particulars	Actual Rs.	If No Labor Turnover Rs.
Sales	6, 00, 00, 000	6, 20, 82, 019
Costs:		
Variable cost	2, 10, 00, 000	2, 17, 28, 707
Direct labor	48, 00, 000	49, 20, 000
Fixed costs	80, 00, 000	80, 00, 000
Separations replacement costs	1, 00,000	—
Total costs	3, 39, 00, 000	3, 46, 48, 707
Profit [Sales – Total Costs]	2, 61, 00, 000	2, 74, 33, 312

Thus loss of profit due to labor turnover = Rs.2, 74, 33, 312 – Rs.2, 61, 00, 000
 = Rs.13, 33, 312

13. A company uses an old method of machining a part manufactured for sale. The estimates of operating details for the year 2005-06 are given below.

Number of parts to be manufactured and sold: 30, 000

Raw materials required per part: 10 kg @ Rs.2 per kg

Average wage rate per worker: Rs.40 per day of 8 hours

Average labor efficiency: 60%

Standard time required to manufacture one part: 2 hours

Overhead rate: Rs.10 per clock hour

Material handling expenses: 2% of the value of raw material.

The company has a suggestion box scheme and an award equivalent to three months saving in labor cost is passed on to the employee whose suggestion is accepted. In response to this scheme suggestion has been received from an employee to use a special Jig in the manufacture of the aforesaid part. The cost of the Jig, which has life of one year is Rs.30, 000 and the use of the Jig will reduce the standard time by 12 minutes.

Required:

- [a] Compute the amount of award payable to the employee who has given the suggestion.
- [b] Prepare a statement showing the annual cost of production before and after the implementation of the suggestion to use the Jig and indicate the annual saving.
- [c] State the assumptions on which your calculations are based.



Solution:

[a] Computation of amount of Award payable to the employee who has given the suggestion:

Standard time: 2 hours or 120 minutes

Efficiency: 60%

Direct labor hours required: $120 \times 100/60 = 200$ minutes

For 30,000 components time required = $30,000 \times 200/60 = 1,00,000$ hours

Labor cost Rs.5 per hour = Rs.5,00,000

Standard time after suggestion = 120 minutes – 12 minutes = 108 minutes

Direct labor hour required = $108 \times 100/60 = 180$ minutes

Clock hours required for 30,000 parts = $30,000 \times 180/60 = 90,000$ hours

Time saved in a year = $1,00,000 - 90,000 = 10,000$ hours

Cost of saving in time in a year = $10,000 \text{ hours} \times \text{Rs.5} = \text{Rs.50,000}$

Award equivalent to 3 months wage cost saving = $\text{Rs.50,000} \times 3/12 = \text{Rs.12,500}$

[b] Annual Cost of Production and Savings to the Company

Particulars	Before Suggestion 1,00,000 hours	After Suggestion 90,000 hours
Raw materials: 30000 parts \times 10 kg \times Rs.2	6,00,000	6,00,000
Direct wages: @ Rs.5 per hour	5,00,000	4,50,000
Overheads @ Rs.10 per hour	10,00,000	9,00,000
Material handling @ 2% of cost of raw material	12,000	12,000
Cost of Jig		3,000
Total cost	21,12,000	19,65,000

Gross Saving in cost = Rs.1,47,000

Less: Award amount = Rs.12,500

Net savings in cost = Rs.1,34,500

[c] **Assumptions:** There will be no change in efficiency. The labor hours saved and surplus capacity formed due to improvement are used profitably for other jobs.

14. Management of a manufacturing unit is considering extensive modernization of the factory through progressive mechanization, which would result in improved productivity and reduced strength. Through negotiations with the union, it was agreed that for every 1% increase in productivity, workers would be paid 0.5% incentive wages. It was also agreed that through voluntary retirement the staff strength would be reduced to 300 from the present level of 400. The following further comparative data are available before and after the proposed mechanization.



Particulars	Before mechanization	After mechanization
Number of articles produced per month	50, 000	48, 000
Fringe benefits: 50% of wages		
Wages paid per month: Rs.4, 00, 000		
Sales per month: [value] Rs.24, 00, 000		
Profit/volume ratio: 25%		

Based on the above data, you are required to work out the annual financial implications of the proposal.

Solution:

First, we will have to find out the improvement in the productivity after mechanization as the incentive is based on productivity.

- ❖ Present productivity: 50, 000 units/400 workers = 125 units per worker
- ❖ After mechanization: 48, 000 units/300 workers = 160 units per worker
- ❖ % Improvement in the productivity = $35/125 \times 100 = 28\%$
- ❖ Incentive bonus payable @ 0.5% for every 1% improvement = 14% [28% X 0.5]
- ❖ Annual wages to 300 workers before incentive:
For 400 workers wages are Rs.4, 00, 000 per month, hence for 300 workers the wages per month will be Rs.3, 00, 000 and annually the wages will be Rs.36, 00, 000
- ❖ Selling price per unit = Rs.24, 00, 000/50, 000 units = Rs.48.00 per unit
- ❖ Statement of Profitability: On next page

Statement of Profitability

Particulars	Before Mechanization	After Mechanization
Wages payable per annum	Rs.48, 00, 000	Rs.36, 00, 000
Fringe benefits [50% of wages]	Rs.24, 00, 000	Rs.18, 00, 000
Incentive wages [14% of wages]	—	Rs.5, 04, 000
Total	Rs.72, 00, 000	Rs.59, 04, 000

- ❖ Gross savings: Rs.72, 00, 000 – Rs.59, 04, 000 = Rs.12, 96, 000
- Less: Loss in contribution due to lower sales = Rs.2, 88, 000 *
- Net increase in contribution due to mechanization = Rs.10, 08, 000
- * Reduction in sales units 50, 000 units – 48, 000 units = 2000
- 2000 × 12 months = 24, 000 units per annum × 48 × .25 [P/V ratio] = Rs.2, 88, 000



Labor Cost Computation and Control

15. With the help of the following information, you are required to ascertain the wages paid to workers X and Y under the Taylor's system

Standard time allowed: 10 units per hour

Normal wages rate: Re.1 per hour

Differential rates to be applied [a] 75% of piece rate when below standard [b] 125% of piece rate when at or above standard.

Solution: Standard time allowed: 10 units per hour

Time rate: Re.1 per hour

Unit rate: $\text{Re.1} / 10 \text{ units} = \text{Re.0.10}$ per unit

Standard output = 8 hours \times 10 units per hour = 80 pieces

$X = 60 \text{ units} \times \text{Re.0.10} \times 75/100 = \text{Rs.4.50}$

$Y = 100 \text{ units} \times \text{Re.0.10} \times 125/100 = \text{Rs.12.50}$

Question Bank

A. Essay type Questions

1. Distinguish between 'Direct' and 'Indirect' labor cost.
2. What do you understand by 'labor turnover'? What are the causes for the same? How will you prevent labor turnover in your organization?
3. Distinguish between 'time keeping' and 'time booking'. What are the objectives of 'time keeping'?
4. Discuss the methods of time booking in detail. Explain the objectives of time booking.
5. Write detailed notes on I] Job Evaluation and II] Merit Rating
6. Explain in detail 'work study'
7. What are the merits and demerits of time rate and piece rate systems of wage payment? State the situations in which each system is effective and valid.
8. What is 'idle time'? How will you control the same?
9. What is 'idle time'? Indicate the different categories into which idle time can be classified and state which of them can be controlled effectively and how?
10. Explain and distinguish between Taylor's Differential Piece Rate Plan and Merrick's Plan.
11. Explain the I] Halsey Plan II] Rowan Plan and III] Halsey – Weir Plan
12. A company is considering installing a worker's profit sharing scheme in lieu of an individual bonus scheme. You are required to specify the disadvantages of the former.
13. 'High wages do not necessarily mean high labor cost.' Elucidate.
14. How is payroll accounting function organized in a manufacturing establishment?



15. What do you understand by 'time and motion study'? Explain how standard time is set under time study. State how time and motion study is useful to management.
 16. What are the effects of labor turnover on cost of production?
 17. What do you understand by 'overtime premium'? What is the effect of the same on productivity and cost? Discuss the treatment of overtime premium in cost accounts and suggest a procedure for control of overtime.
 18. Discuss the essentials of a good incentive scheme.
 19. Explain I] Gantt Task and Bonus System II] Emerson Plan and III] Bedaux Plan
 20. How will you treat the following in cost accounts?
 - Interest on capital
 - Leave wages
 - Overtime wages
 - Idle time cost
- B] Indicate whether the following statements are True or False.
1. Incentive systems benefit only workers
 2. There is no difference between direct and indirect labor.
 3. Under Halsey plan, the benefit of time saved is given equally to workers and the management.
 4. Under the high wages plan, workers are paid normal wages plus bonus.
 5. Normally overtime wages are paid at the double rate as compared to normal rate.
 6. Taylor's differential piece rate plan assures minimum wages to workers.
 7. Time keeping and time booking are one and the same.
 8. Time booking is not necessary in case of piece workers.
 9. Cost of idle time due to labor strike should be treated as overheads.
 10. Time booking is done by the time-keeper at the factory gate.
 11. The purpose of work measurement is to determine the standard time for doing a task.
 12. Cost of normal idle time should be treated as overheads.
 13. Payroll sheets are prepared by Payroll Department.
 14. Time booking means recording of attendance time.
 15. Earnings under Halsey and Rowan Plan are the same.
- C] Fill in the Blanks
1. In _____ systems, two piece rates are set for each job.
 2. In _____ system, basis of wages payment is the quantity of work.
 3. The formula for computing wages under time rate is _____ .



Labor Cost Computation and Control

4. In Halsey Plan, a worker gets bonus equal to _____ of the time saved.
5. Under Gantt Task and Bonus Plan, no bonus is payable to a worker, if his efficiency is less than _____ .
6. Wages sheet is prepared by _____ department.
7. Cost of normal idle time is charged to _____ .
8. Idle time arises only when workers are paid on _____ basis.
9. Under _____ system of wage payment, no motivation is given to efficient workers.
10. Time booking means recording of _____ time.

STUDY NOTE 4

Overheads

Learning Objectives

After studying this topic, you should be able to,

1. Understand the concept of 'Overheads'.
 2. Understand classification, allocation, apportionment and absorption of overheads.
 3. Understand the situations of over and under absorption of overheads.
 4. Understand the Primary and Secondary Distribution of Overheads.
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4.1 Meaning and Introduction

In the previous chapter we have discussed various concepts of costs. One of the classification of costs is on the basis of 'Nature' in which costs are classified as 'Direct' and 'Indirect'. Direct costs are those which are identifiable with a cost object or a cost center while Indirect costs are not traceable to cost object or cost center. In other word, indirect costs cannot be linked with the product offered by the firm. If a firm manufactures only one product, all costs are direct but if more than one products are offered, the indirect costs incurred are not traceable with a particular product. So, while direct costs are allocable to a job, process, service, cost unit or a cost center, indirect costs cannot be so allocated. These indirect costs are called as 'Overhead' costs. According to CIMA, overhead costs are defined as, ' the total cost of indirect materials, indirect labor and indirect expenses.' Thus all indirect costs like indirect materials, indirect labor, and indirect expenses are called as 'overheads'. Examples of overhead expenses are rent, taxes, depreciation, maintenance, repairs, supervision, selling and distribution expenses, marketing expenses, factory lighting, printing stationery etc. In subsequent paragraphs, we will be discussing various aspects of overhead accounting.

4.2 Overhead Accounting

The ultimate aim of overhead accounting is to absorb them in the product units produced by the firm. Absorption of overhead means charging each unit of a product with an equitable share of overhead expenses. In other words, as overheads are all indirect costs, it becomes difficult to charge them to the product units. In view of this, it becomes necessary to charge them to the product units on some equitably basis which is called as 'Absorption' of overheads. The important steps involved in overhead accounting are as follows.

- A. Collection, Classification and Codification of Overheads
- B. Allocation, Apportionment and Reapportionment of overheads
- C. Absorption of Overheads.

As mentioned above, the ultimate of overhead accounting is 'Absorption' in the product units. This is extremely important as accurate absorption will help in arriving at accurate cost of production. Overheads are indirect costs and hence there are numerous difficulties in charging the overheads to the product units. In view of this, lot of care is to be taken in the absorption of overheads. The steps in overhead accounting are discussed below.

- A. *Collection, Classification and Codification of Overheads* :- These concepts are discussed below
 - I. *Collection of Overheads* :- Overheads collection is the process of recording each item of cost in the records maintained for the purpose of ascertainment of cost of each cost center or unit. The following are the source documents for collection of overheads.
 - i. Stores Requisition
 - ii. Wages Sheet
 - iii. Cash Book
 - iv. Purchase Orders and Invoices



- v. Journal Entries
- vi. Other Registers and Records

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

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

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

- **Indirect Materials :-** Materials which cannot be identified with the given product unit of cost center is called as indirect materials. For example, lubricants used in a machine is an indirect material, similarly thread used to stitch clothes is also indirect material. Small nuts and bolts are also examples of indirect materials.
- **Indirect Labor :-** Wages and salaries paid to indirect workers, i.e. workers who are not directly engaged on the production are examples of indirect wages.
- **Indirect Expenses :-** Expenses such as rent and taxes, printing and stationery, power, insurance, electricity, marketing and selling expenses etc are the examples of indirect expenses.

ii. Functional Classification :- Overheads can also be classified according to their functions. This classification is done as given below.

- **Manufacturing Overheads :-** Indirect expenses incurred for manufacturing are called as manufacturing overheads. For example, factory power, works manager's salary, factory insurance, depreciation of factory machinery and other fixed assets, indirect materials used in production etc. It should be noted that such expenditure is incurred for manufacturing but cannot be identified with the product units.
- **Administrative Overheads :-** Indirect expenses incurred for running the administration are known as Administrative Overheads. Examples of such overheads are, office salaries, printing and stationery, office telephone, office rent, electricity used in the office, salaries of administrative staff etc.
- **Selling and Distribution Overheads :-** Overheads incurred for getting orders from consumers are called as selling overheads. On the other hand, overheads incurred for execution of order are called as distribution overheads. Examples of selling overheads are, sales promotion expenses, marketing expenses, salesmen's salaries and commission, advertising expenses etc. Examples of distribution overheads are warehouse charges, transportation of outgoing goods, packing, commission of middlemen etc.



Overheads

- **Research and Development Overheads :-** In the modern days, firms spend heavily on research and development. Expenses incurred on research and development are known as Research and Development overheads.

iii. Classification according to Behavior :- According to this classification, overheads are classified as fixed, variable and semi-variable. These concepts are discussed below.

- **Fixed Overheads :-** Fixed overheads are commonly described as those that do not vary in total amount with increase or decrease in production volume, for a given period of time, may be a year. Salaries, depreciation of fixed assets, property taxes, are some of the examples of fixed costs. Total fixed costs remain same irrespective of changes in volume of production but per unit of fixed cost is variable. It increases if production decreases while if production increases, it decreases.
- **Variable Overheads :-** Variable overheads are those which go on increasing if production volume increases and go on decreasing if the volume decreases. Such increase or decrease may or may not be in the same proportion. Variable overheads are generally considered to be controllable as they are directly connected with the production.
- **Semi-variable Overheads :-** These types of overheads remain constant over a relatively short range of variation in output and then are abruptly changed to a new level. In other words, they remain same up to a certain level of output and after crossing that level, they start increasing. For example, supervisor's salary is treated as fixed but if a decision is taken to operate a second shift, additional supervisor may have to be appointed which results into increase in the salary of the supervisor. This indicates that it is a semi-variable overheads. Similarly, maintenance expenditure, fire insurance are also semi-variable overheads.

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

B. Allocation, Apportionment and Reapportionment of Overheads :- After the collection, classification and codification of overheads, the next step is allocation, apportionment wherever allocation is not possible and finally absorption of overheads into the product units. The following steps are required to complete this process.

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



in ascertainment of cost of each department and control of expenses. Thus departmentalization is the first step in allocation and apportionment process.

- ❖ **Allocation :-** CIMA defines cost allocation as, 'the charging of discrete, identifiable items of cost to cost centers or cost units. Where a cost can be clearly identified with a cost center or cost unit, then it can be allocated to that particular cost center or unit. In other words, allocation is the process by which cost items are charged directly to a cost unit or cost center. For example, electricity charges can be allocated to various departments if separate meters are installed, depreciation of machinery can be allocated to various departments as the machines can be identified, salary of stores clerk can be allocated to stores department, cost of coal used in boiler can be directly allocated to boiler house division. Thus allocation is a direct process of identifying overheads to the cost units or cost center.
- ❖ **Apportionment :-** Wherever possible, the overheads are to be allocated. However, if it is not possible to charge the overheads to a particular cost center or cost unit, they are to be apportioned to various departments on some suitable basis. This process is called as 'Apportionment' of overheads. For example, if separate meters are provided in each department, the electricity expenses can be allocated to various departments. However if separate meters are not provided, electricity expenses will have to be apportioned to the departments on some suitable basis like number of light points. Similarly rent will have to be apportioned to various departments on the basis of floor space, insurance of machinery on the basis of value of machinery, power on the basis of horsepower etc. A statement showing the apportionment of overheads is called as 'Primary Distribution Summary' of overheads.
- ❖ **Reapportionment of Overheads :-** As discussed above, one of the important step in overhead accounting is 'Departmentalization' of overheads. The departments are broadly divided into Production Departments and Service Departments. Production Departments are the departments where actual production takes place while Service Departments are the departments which render services to the Production Departments. Stores Department, Maintenance Department, Human Resource Department, After Sales Service Departments are some of the examples of Service Departments. In Primary Distribution Summary, the overheads are apportioned to all the Departments, i.e. Production and Service. For the purpose of absorption it is necessary that the overheads of the service departments are reapportioned to the production departments. This process is called as preparation of 'Secondary Distribution Summary' of overheads. The following example will clarify this point.

Suppose, there are five departments in a manufacturing firm, P1, P2, and P3 are the production departments and S1 and S2 are the service departments. The following results are available from the Primary Distribution Summary.

Particulars	Dept. P1	Dept. P2	Dept. P3	Dept.S1	Dept. S2
From Primary Distribution Summary	1,50,000	1,75,000	1,25,000	75,000	50,000

In the secondary distribution summary, the overheads of S1 and S2 will have to be charged to Production Departments, P1, P2, and P3. This will have to be done on some suitable basis. The matter becomes complicated if S1 and S2 are rendering services to each other in addition to the services rendered to the production departments. The methods of reapportionment are divided into two types.



Overheads

- ❖ **Non Reciprocal Methods :-** Under this method, the assumption is that while service departments render services to the production departments, they do not render services to each other. Hence their overheads are not apportioned to each other. The following methods are used under non reciprocal methods.
 - ❖ **Services Rendered :-** The principle followed in this method is quite simple. A production department which receives maximum services from service departments should be charged with the largest share of the overheads. Accordingly, the overheads of service departments are charged to the production departments.
 - ❖ **Ability to Pay :-** This method suggests that a large share of service departments overhead costs should be assigned to those producing departments whose product contribute the most to the income of the business firm. However the practical difficulty in this method is that it is difficult to decide the most paying department and hence difficult to operate.
 - ❖ **Survey or analysis Method :-** This method is used where a suitable base is difficult to find or it would be too costly to select a method which is considered suitable. For example, the postage cost could be apportioned on a survey of postage used during a year.
 - ❖ **Reciprocal Method :-** Under this method, the assumption is that the service departments do render services to the production departments, they also render services to other service departments. In other words, the service department, S1 and S2 render services to each other besides rendering services to the production departments. Hence share of overhead expenses of S1 and S2 should be charged to each other along with the production departments. The following method are used under Reciprocal Methods.
 - ❖ **Repeated Distribution Method:-** Under this method, services rendered by services departments to the production departments and other services departments are quantified in the form of percentages. The services departments costs are reapportioned to the production departments on the basis of these percentages. The process is repeated again and again till a negligible figure is reached. This method becomes complicated for calculation if the figures are too large. Illustration of this method is given at the end of the chapter.
 - ❖ **Simultaneous Equation Method :-** This is an algebraic method in which simultaneous equations are formed and amount of overhead expenses of each service department are found out, by solving the equations. The total expenses thus obtained are then directly transferred to the production departments. Illustration of this method is also given at the end of the chapter.
- C. **Absorption of Overheads :-** The most important step in the overhead accounting is 'Absorption' of overheads. CIMA defines absorption as, 'the process of absorbing all overhead costs allocated or apportioned over a particular cost center or production department by the units produced.' In simple words, absorption means charging equitable share of overhead expenses to the products. As the overhead expenses are indirect expenses, the absorption is to be made on some suitable basis. The basis is the 'absorption rate' which is calculated by dividing the overhead expenses by the base selected. A base selected may be any one of the basis given below. The formula used for deciding the rate is as follows,

Overhead Absorption Rate = Overhead Expenses / Units of the base selected.

The methods used for absorption are as follows.



- **Direct Material Cost :-** Under this method, the overheads are absorbed on the basis of percentage of direct material cost. The following formula is used for working out the overhead absorption percentage.

$$\text{Budgeted or Actual Overhead Cost} / \text{Direct Material Cost} \times 100$$

Thus if the overhead expenses are Rs. 2,00,000 and Direct Material Cost is Rs. 4,00,000 the percentage of overheads to direct material cost will be, $2,00,000 / 4,00,000 \times 100 = 50\%$. Overheads will be thus absorbed on the basis of percentage of 50% to material costs.

Illustration :- A firm produces two products, A and B. Direct material costs for A are Rs. 2,50,000 and for B, Rs. 1,50,000. The overheads will be charged to these products as shown in the following statement, assuming the rate of absorption as 50% as shown above.

Particulars	Product A	Product B
Direct Materials	2,50,000	1,50,000
Overheads 50% of Direct Materials	1,25,000	75,000
Total Materials + Overheads	3,75,000	2,25,000

This method is suitable in those organizations where material is a dominant factor in the total cost structure. Simplicity to understand and operate is also one of the positive points of this method. However it has been observed that the material prices are fluctuating and hence overhead absorption may become difficult.

- **Direct Labor Cost Method :-** This method is used in those organizations where labor is a dominant factor in the total cost. Under this method, the following formula is used for calculating the overhead absorption rate.

$$\text{Budgeted or Actual Overheads} / \text{Direct Labor Cost} \times 100$$

Thus if the overheads are Rs. 3,00,000 and Direct Labor Cost is Rs. 4,00,000 the % of absorption will be $3,00,000 / 4,00,000 \times 100 = 75\%$. Overheads will be charged to each product as 75% of labor cost.

This method is also simple to understand and easy to operate. However, it ignores the time taken by each worker for completion of the job. Similarly it ignores the work performed by machine where a labor is a mere attendant.

- **Prime Cost Method :-** This method is an improvement over the first two methods. Under this method, the Prime Cost is taken as the base for calculating the percentage of absorption of overheads by using the following formula.

$$\text{Budgeted or Actual Overheads} / \text{Prime Cost} \times 100$$

Illustration :- A manufacturing firm produces two products, A and B. The direct material cost for A is Rs. 5,00,000 and for B Rs. 3,00,000, direct labor cost is Rs. 3,00,000 and Rs. 2,00,000 respectively for A and B, direct expenses are Rs. 1,00,000 and Rs. 2,00,000 respectively for A and B. The overhead expenses are Rs. 9,60,000. The statement of cost will appear as follows.



Overheads

Particulars	Product A	Product B	Total
Direct Materials	5,00,000	3,00,000	8,00,000
Direct Labor	3,00,000	2,00,000	5,00,000
Direct Expenses	1,00,000	2,00,000	3,00,000
Prime Cost [D.M.+ D.L.+ D.E.]	9,00,000	7,00,000	16,00,000
Overheads – 60% of Prime Cost	5,40,000	4,20,000	9,60,000
Works Cost	14,40,000	11,20,000	25,60,000

Note :- Overhead absorption rate is calculated as $9,60,000/16,00,000 \times 100 = 60\%$

- **Production Unit Method :-** This method is used when all production units are similar to each other in all respects. Total overhead expenses are divided by total production units for computing the rate per unit of overheads and overheads are absorbed in the product units. If a firm produces more than one products and if they are not uniform to each other, equivalent units are calculated to find out the rate of overheads per unit. The formula of absorption of overheads is as follows.

Overhead absorption rate = Budgeted or Actual Overheads/Production Units

- **Direct Labor Hour Method :-** Under this method, the rate of absorption is calculated by dividing the overhead expenses by the direct labor hours. The formula is as follows.

Budgeted or Actual Overhead Expenses/Direct Labor Hours

This method takes into account the time spent by the labor in production of each unit where the production units are not uniform or identical. However it is not suitable if the firm is capital intensive and highly mechanized.

- **Machine Hour Rate :-** Where machines are more dominant than labor, machine hour rate method is used. CIMA defines machine hour rate as 'actual or predetermined rate of cost apportionment or overhead absorption, which is calculated by dividing the cost to be appropriated or absorbed by a number of hours for which a machine or machines are operated or expected to be operated'. In other words, machine hour rate is the cost of operating a machine on per hour basis. The formula for calculating the machine hour rate is,

Budgeted or Actual Overhead Expenses/ Machine Hours – Actual or Budgeted

- **Selling Price Method :-** In this method, selling price of the products is used as a basis for absorbing the overheads. The logic used is that if the selling price is high, the product should bear higher overhead cost. Ratio of selling price is worked out and the overheads are absorbed.

Under/Over Absorption of Overheads

- **Meaning :-** We have seen in the absorption of overheads that by using any method, a rate of absorption is computed and then the overheads are charged to the products. The rate of absorption may be either predetermined or historical. The meaning of this is that there may be a predetermined rate which is based on budgeted overhead expenses and budgeted units of base. Alternatively the rate may be based on historical data, i.e. actual overhead costs and actual units of the base. The main



advantage of the historical rate is that there is no possibility of under/over absorption of overheads. If predetermined rate is used, there is every possibility of under or over absorption of overheads. The following illustration will clarify the point.

- **Illustration :-** A manufacturing company uses direct material cost as the basis for absorption of overheads. The absorption rate is worked out as follows.

Budgeted Overheads – Rs. 50,000/ Budgeted Material Cost Rs. 1,00,000 × 100 i.e. 50%

Now if the actual overheads are Rs. 70,000 and the actual direct material cost is Rs. 1,20,000, the overheads absorbed will be Rs. 60,000 i.e. 50% of the direct material cost and there will be under absorption of Rs. 10,000 as the actual overheads incurred are Rs. 70,000. Thus it can be seen that there is a possibility of over/under absorption of overheads if predetermined rates are used for absorption. The reason for this is that there is always a possibility that budgeted expenses and actual expenses may not be exactly the same. There is bound to be some variation in the same. In spite of this limitation, predetermined rate is widely used as it looks in the future and estimates the expenses while in case of historical rates, information is available after the period is over. It means that there is a post mortem examination. Once the under/over absorption is noticed, the following corrective steps are to be taken to rectify the same.

- **Use of supplementary Rate :-** The under/over absorption can be rectified by using the supplementary rate. This rate is calculated by dividing the under/over absorbed amount of overheads by the units of the base. The rate so arrived is known to be supplementary rate.
- **Carrying forward to future period :-** If the amount of under/over absorption of overheads is small, it may be carried forward to the future period hoping that it will be rectified in the future.
- **Writing off to Profit and Loss A/c :-** Amount of under/over absorption can be written off to Costing Profit and Loss Account and thus not reflected in the total costs.

Administration Overheads

1. **Meaning:** Administration cost is the cost of running the administration of a firm. In order to understand more clearly, let us understand the administrative functions of a business firm. Administrative functions include strategy and policy formulation, directing the organization towards the objectives determined by the top management and controlling various operations of the organization. Though these functions are not directly related to production, selling and distribution, they facilitate these functions. The expenditure incurred for carrying out these functions is called as 'Administration Overheads'. Examples of administrative overheads are, general office expenses, office salaries, printing and stationery, office lighting, audit fees, insurance of office equipments, depreciation of office equipments and building, rent, legal charges, repairs of office premises and machinery, traveling expenses of office staff etc. The accounting treatment of administration overheads is given below.
2. **Treatment in Cost Accounts:** There are three methods of treatment of administrative overheads in cost accounts.
 - I. **Transfer to Costing Profit and Loss Account:** Under this method, the administration overheads are treated as period costs and is written off to the Costing Profit and Loss Account. Thus these costs are not charged to jobs or production units as they are not directly related to the production



but are mainly concerned with formulating policy. However the main objection against this method is that due to exclusion of administrative costs from the cost of jobs will understate the cost of jobs. Similarly one more criticism on this method is that administrative is an important function and hence these costs should be charged to the cost units. They should not be excluded from costs on the ground of inadequacy of control.

- II. Apportionment to manufacturing and selling divisions:** Under this method, administration overheads are divided between manufacturing and selling divisions on some suitable basis. The main logic behind this method is that, many experts believe that there are only two functions of a business firm and these are production and selling and other functions like administration are auxiliary functions. Therefore the administration overheads should be merged with manufacturing and selling divisions. The ultimate effect of this method is that the administration overheads lose its identity. The main criticism of this method is that administration is an equally important function of an undertaking and its merger with other functions on some basis does not show the correct picture. Similarly as the administrative overhead lose its identity, it is difficult to control the same.
 - III. Separate functional element of cost:** Under this method, administration overhead is considered as separate charge to the cost to make and sell. The assumption under this method is that administration is a separate function. Accordingly, the cost of sales analysis sheet is prepared to show the manufacturing cost and is ultimately charged to the particular job or order.
3. **Control of Administration Overheads:** Administration overheads are mostly fixed in nature. They can also be termed as 'policy cost' as they arise out of a policy. Due to these reasons, the administrative costs are fixed in nature and are uncontrollable. However control on these costs can be exercised through preparation of budgets and use of standard costing. A budget can be developed for these costs and actual costs can be compared with the budget. Responsibility accounting principles can also be followed to control these overheads.

Selling and Distribution Overheads

1. **Meaning:** As the name suggests, selling overheads are the overheads that are incurred for the selling efforts required for selling the product. In other words, cost incurred for creating demand and securing order for the firm's product is known as selling overheads. There is a difference between selling and distribution functions. While selling function aims at creating the demand, the distribution functions object is to execute the demand. Thus distribution function has the object of reaching the goods. Distribution overheads are the costs incurred for executing the orders received. Advertising expenses, sales promotion costs, salesmen's salaries and commission, discounts offered are some of the examples of selling overheads. Warehouse rent, transportation, secondary packing are some of the examples of distribution costs. Selling and distribution overheads have no direct relationship with the production cost as these costs are bound to vary quite widely depending upon several factors like channels of distribution, sales promotion policy, availability of finance, the degree of competition and so on. These expenses are classified and are collected according to Cost Account Number so that it becomes easy for finally absorbing the same in the cost of product.
2. **Accounting of Selling and Distribution Overheads:** The ultimate aim of accounting of selling and distribution overheads is to absorb them in the product units. Therefore they are allocated to the



departments, territories, products etc to the extent possible. Wherever it is not possible to allocate them, they are apportioned on some suitable basis. After the apportionment, they are finally absorbed in the product. The following are various methods of accounting of selling and distribution overheads.

- i. Sales service departments and territories:* Selling and distribution costs are allocated to sales service departments and sales territories. Costs which cannot be allocated are apportioned to such departments by selecting some suitable basis like population coverage, net sales, sales quotas, floor space etc. The total selling and distribution costs of sales service departments are apportioned to sales territories on some basis. This exercise will help the organization to prepare a territory wise Profit and Loss Account by comparing the selling and distribution cost of each territory with the sales of each territory.
- ii. Salesmen wise analysis:* This method is followed for evaluating the performance of salesmen. The selling and distribution cost is analyzed by salesmen to ascertain their comparative ability. Under this method, the selling and distribution costs are allocated to each salesman wherever possible. Wherever it is not possible, they are apportioned to salesmen on some suitable basis.
- iii. Product wise analysis:* Under this method, all the direct costs are charged directly to each product line. On the other hand, indirect costs are charged/apportioned to the products on some suitable basis like net sales or other suitable base. This method is particularly useful when the management wants to find out the comparative profitability of each product line. Decisions like closing an unprofitable line or further pushing a profitable product line can be taken on the basis of such analysis.
- iv. Sales order wise analysis:* In this method, it is possible to find out the profit on sales order by charging all expenses to sales order. Direct costs are charged directly to the sales orders while indirect expenses are apportioned to sales orders on some suitable basis.
- v. Other methods:* In a departmental store, analysis of selling and distribution costs can be charged to each department so that it is possible to find out the profitability of each department. Costs that cannot be allocated are apportioned on some suitable basis. In retail establishments, if the management is interested in knowing the profitability of different lines of merchandise, costs can be allocated or apportioned to each line of merchandise like hardware, timber, coal, general merchandise, cosmetics, consumer durables, medicines etc.

Treatment of some Items of Expenses

The general principle in cost accounting is that if a particular expenditure can be identified with a particular department or product, the same should be charged to that department or product. However if the expense cannot be identified with the department or product, it should be allocated or apportioned to various departments and finally absorb in the product. The following is the treatment of some of the items of expenses.

- 1. Inspection Charges:* The inspection charges that can be identified with a product should be charged to that product. Inspection charges, which cannot be identified with a particular product should be treated as factory overheads and apportioned to production departments on some suitable basis like work done or inspection hours.
- 2. Design and Drawing Office Cost:* These costs are treated as direct costs if they can be identified with



Overheads

a particular job or product. However if these costs cannot be identified with a particular job, they are charged to different jobs on some suitable basis like number of drawings made, chargeable man hours etc. Drawing to be enclosed with sales orders may be treated as administration overheads.

3. **Carriage on Materials:** Normally the carriage paid on incoming materials is treated as purchase cost. However if the carriage charges cover a large number of individual materials, it may be treated as an item of production overheads and spread over the different materials. Similarly material handling and storage expenses may be apportioned on the basis of value, weight, volume of materials or number of material requisitions.
4. **Canteen Expenses:** Generally canteens in various firms are run on subsidized basis. In such case the costs are treated as an item of factory overheads and apportioned to different cost centers on suitable basis like number of employees, amount of wages, number of meals served etc. The canteen receipts are credited and net costs are apportioned. On the other hand, if the canteens are run on 'no profit no loss' basis, the question of cost apportionment does not arise at all.
5. **Training Costs:** The costs incurred on training of employees are collected under different standing order numbers. The treatment of these costs depends on the amount of training expenses. If the amount is small or negligible, they are apportioned to different on suitable basis like number of employees trained. On the other hand, if the amount is heavy, training department is treated as a separate service center and then it is apportioned to other production and service departments on some suitable basis.
6. **Installation Cost of Plant and Machinery:** When a new plant and machinery is installed, the cost of the installation of the same is capitalized and depreciation is charged as per the prescribed rates.
7. **Set up Cost:** This cost can be treated as a direct cost if it is for a particular job or production order. If it is a common cost which means that it is not possible to identify it with a particular job or production order, it is treated as production order and apportioned to different jobs on suitable basis like setting up time etc.
8. **Dismantling Cost of Plant and Machinery:** A plant and machinery may be dismantled due to sale as it may have become redundant or obsolete. This dismantling is permanent and hence the cost involved is added to the cost of asset dismantled and set off against any sale proceeds received on account of dismantling. On the other hand, if the dismantling is just for shifting the asset from one place to another, it may be treated as production overhead and apportioned/allocated to different cost centers.
9. **Compensatory Payment to Workers:** Compensatory payment can be made regularly like gratuity. This will be treated as an item of overheads. If this payment is not of regular nature and is paid occasionally, the payment of compensation is estimated in advance and a proportionate amount is charged to overheads in each period on uniform basis.
10. **Repairs and Maintenance Cost:** Repairs and maintenance cost if paid as preventive maintenance is treated as overhead. The amount may be collected and charged to a separate department of 'Repairs and Maintenance'. This department is treated as a separate service center and the amount is apportioned to other cost centers on some suitable basis. If repairs and maintenance is extremely heavy, it is capitalized and written off with the asset as depreciation.



11. **Lighting, heating, ventilation, air-conditioning Expenses:** This item is treated as an overhead and collected under a separate standing order number. If separate meters are installed in each department, this expenditure is allocated to various cost centers. On the other hand, if there are no separate meters, the amount is apportioned to various cost centers on some suitable basis like basis of wattage, number of electric points, floor area, cubic capacity, tonnage of air-conditioning, etc.
12. **Cost of Small Tools:** One of the methods of treatment of the cost of small tools is to capitalize the cost and write off depreciation on the same. Depreciation is treated as an item of overheads. If there are any difficulties in treating this cost as a capital cost due to difficulty in ascertaining the life of small tools, the method followed is to charge the purchase price of small tools to a separate standing order number and distribute to other departments on some suitable basis and finally absorbed by products.
13. **Medical Expenses:** Cost of medical services are collected under separate standing order number and is apportioned to various cost centers on suitable basis like number of employees etc. If the amount spent is heavy, there may be a separate medical service department and the costs collected under that department. This amount is finally apportioned to other cost centers on suitable basis.
14. **Royalties and Patent Fees:** When royalties are paid for the right of use of patent process or component in the course of manufacturing, it is treated as production cost. On the other hand, if it is paid for use of right to sell, it is treated as selling overheads. When it is partially for production and partially for sale, the amount is apportioned between production and selling costs.
15. **Director's Fees and Salaries:** This is part of administration overheads. However sometimes, this is apportioned between administration and selling and distribution overheads on the basis of time devoted.
16. **Market Research:** Market Research is an item of selling overhead as it is incurred for conducting study of market conditions and ascertainment of market potentiality. Cost of market research is apportioned to all the products produced by the firm if it is conducted for the entire organization. On the other hand, if it is incurred for a particular product, it may be treated as a direct charge for that product.
17. **Bad Debts:** Bad Debt is a selling overhead and included in the same. However abnormal bad debts are excluded from cost accounts.
18. **Advertising Cost:** Advertising expenditure incurred for a specific product is charged to that product. Cost of general advertisement is apportioned to different products on the basis of sales value. If the amount is heavy, the expenses may be treated as deferred revenue expenditure and can be charged in three or four years.



Illustrations

I. Primary and Secondary Distribution Summary

1. A company has three production departments A, B and C and two service departments, X and Y. The following data are extracted from the records of the company for a particular period.

Sr. No.	Particulars	Amount (Rs.)
01	Rent and Taxes	25,000
02	General lighting	3,000
03	Indirect Wages	7,500
04	Power	7,500
05	Depreciation of Machinery	50,000
06	Sundries	50,000

Additional Data

Particulars	Total	Dept. A	Dept. B	Dept. C	Dept. X	Dept. Y
Direct Wages (Rs.)	50,000	15,000	10,000	15,000	7,500	2,500
Horsepower of Machines	150	60	30	50	10	—
Cost of Machinery (Rs.)	12,50,000	3,00,000	4,00,000	5,00,000	25,000	25,000
Production hrs worked	—	6226	4028	4066	—	—
Floor space (sq.mtrs)	10,000	2,000	2,500	3,000	2,000	500
Lighting points (Nos.)	60	10	15	20	10	05

Service Departments' Expenses Allocation :-

Department	A	B	C	X	Y
X (%)	20	30	40	—	10
Y (%)	40	30	20	10	—

You are required to,

- A. Prepare primary and secondary distribution summary according to repeated distribution System.



Solution :

Primary Distribution Summary

Items	Basis of Apportionment	Total	Dept A	Dept B	Dept C	Dept X	Dept Y
Direct Wages	Actual (Only for service depts.)	10,000				7,500	2,500
Rent and Taxes	Floor Space	25,000	5,000	6,250	7,500	5,000	1,250
General Lighting	Light Points	3,000	500	750	1,000	500	250
Indirect Wages	Direct Wages	7,500	2,250	1,500	2,250	1,125	375
Power	Horse Power	7,500	3,000	1,500	2,500	500	---
Depreciation on Machinery	Cost of Machinery	50,000	12,000	16,000	20,000	1,000	1,000
Sundries	Direct Wages	50,000	15,000	10,000	15,000	7,500	2,500
	Total	1,53,000	37,750	36,000	48,250	23,125	7,875

Secondary Distribution Summary

Repeated Distribution Method

Dept	Total	Dept A	Dept B	Dept C	Dept X	Dept Y
From Primary Distribution	1,53,000	37,750	36,000	48,250	23,125	7,875
Dept X		4,625	6,937	9,250	(23,125)	2,313
Dept Y		4,075	2,038	3,056	1,019	(10,188)
Dept X		204	306	407	(1019)	102
Dept Y		41	20	31	10	(102)
Dept X		2	3	5	(10)	
Total	1,53,000	46,697	45,304	60,999		

2. A company has three production departments, A, B and C and two service departments, P and Q. The following figures are available from the primary distribution summary.

Department	Dept A	Dept B	Dept C	Dept P	Dept Q
From Primary Distribution (Rs.)	3,150	3,700	1,400	2,250	1,000

The expenses of the service departments are to be apportioned on a percentage basis as follows.

Department	Dept A	Dept B	Dept C	Dept P	Dept Q
P (%)	40	30	20	—	10
Q (%)	30	30	20	20	—

Prepare Secondary Distribution Summary as per the Simultaneous Equations Method.



Overheads

Solution :

Let X = total overhead of department P

Let Y = total overhead of department Q

Therefore, $X = 2,250 + 20/100 Y$ (1)

$Y = 1,000 + 10/100 X$ (2)

Thus, $10X = 22,500 + 2Y$ (3)

$10 Y = 10,000 + 1X$ (4)

Solving the above equations, we get values of X Rs. 2,500 and Y Rs 1,250

Now, the secondary distribution summary will be prepared in the following manner.

Particulars	Total	Dept A	Dept B	Dept C	Dept P	Dept Q
From Primary Distribution	11,500	3,150	3,700	1,400	2,250	1,000
Service Dept P		1,000	750	500	(2,250)	250
Service Dept Q		375	375	250	250	(1,250)
Total	11,500	4,525	4,825	2,150		

3. X, Y and Z has two production departments and three service departments. Expenses incurred for these departments and other available information is given below.

Particulars	Prod. Dept. A	Prod. Dept. B	Service Dept. Maintenance	Service Dept. Power	Service Dept. Personnel
As per Primary Distribution	1,20,000	1,50,000	20,000	48,000	40,000
Allocation Basis					
Maintenance Hours	80	20	—	40	20
KWH Consumed	4	16	2	—	2
Number of employees	60	30	30	18	

Allocate the cost of service departments to the production departments.



Solution :-

Statement showing the allocation of service department's cost to production departments.

Direct Method :-

Particulars	Prod. Dept A	Prod. Dept B	Service Dept. Maintenance	Service Dept. Power	Service Dept. Personnel	Total
As per Primary Distribution	1,20,000	1,50,000	20,000	48,000	40,000	3,78,000
Maintenance (Maintenance Hrs)	16,000	4,000	(20,000)			
Power (Kwh Consumed)	9,600	38,400		(48,000)		
Personnel (No. of employees)	26,667	13,333			(40,000)	
Total Costs Allocated	1,72,267	2,05,733				3,78,000

4. A company has two production departments and two service departments. The data relating to a period are as follows.

Particulars	Prod. Dept I	Prod. Dept II	Service Dept I	Service Dept II
Direct Materials	80,000	40,000	10,000	20,000
Direct Wages	95,000	50,000	20,000	10,000
Overheads	80,000	50,000	30,000	20,000
Power requirement at normal capacity operation (Kwh)	20,000	35,000	12,500	17,500
Actual power consumption (Kwh)	13,000	23,000	10,250	10,000

The power requirement of these departments are met by a power generation plant. The said plant incurred an expenditure which is not included above, of Rs. 1,21,875 out of which a sum of Rs. 84,375 was variable and the rest fixed.

After apportionment of power generation plant costs to the four departments, the service department overheads are to be redistributed on the following basis.

Departments	Prod. Dept I	Prod. Dept II	Service Dept I	Service Dept II
Service Dept I (%)	50	40	—	10
Service Dept II	60	20	20	—

You are required to,

- i. Apportion the power generation plant costs to the four departments
- ii. Reapportion service department cost to production departments
- iii. Calculate the overhead rate per direct labor hour of production departments, given that the direct wages rates of Production Dept I, II are Rs. 5 and Rs. 4 per hour respectively.



Overheads

Solution :-

Statement of Apportionment of Power Generation Plant Costs - Rs.

Particulars	Total Costs	Basis of Apportionment	Prod. Dept. I	Prod. Dept. II	Service Dept. I	Service Dept. II
Fixed Expenditure	37,500	Normal Capacity KWH 4:7:2.5:3:5	8,824	15,441	5,515	7,720
Variable Expenditure	84,375	Actual power consumption kwh 13:23:10:25:10	19,500	34,500	15,375	15,000
Direct Materials	30,000	Actual, only for service departments			10,000	20,000
Direct Wages	30,000	Actual, only for service departments			20,000	10,000
Overheads	1,80,000	Given	80,000	50,000	30,000	20,000
Total	3,61,875		1,08,324	99,941	80,890	72,720

Statement of Reapportionment of Service Dept. Cost to Production Departments

Particulars	Total Rs.	Prod. Dept I	Prod. Dept II	Service Dept I	Service Dept II
As per Primary Distribution	3,61,875	1,08,324	99,941	80,890	72,720
Overheads of Service Dept I as per given %	80,890	40,445	32,356	(-) 80,890	8,089
Overheads of Service Dept II as per given %	80,809	48,485	16,162	16,162	(-)80,809
Service Dept I	16,162	8,081	6,465	(-) 16,162	1,616
Service Dept II	1,616	970	323	323	(-) 1,616
Service Dept I	323	162	129	(-)323	32
Service Dept II	32	19.20	6.40	6.40	(-)32
Service Dept I	6.40	3.20	3.20	(-)6.40	-
Total	3,61,875	2,06,489.40	1,55,385.60	-	-

Computation of Overhead Rates per Direct Labor Hour of Production Department- Rs.

Particulars	Production Department I	Production Department II
Total Direct Wages	95,000	50,000
Direct Wages Rate Per Hour	5	4
Direct Labor Hours (Total Direct Wages/Direct Wages Rate Per Hour)	19,000	12,500
Overheads Rs.	2,06,489.40	1,55,385.73
Overhead Rate per Direct Labor hour	10.87	12.43



5. The production department of a factory furnishes the following information for the month of March, 2007.

Materials used Rs. 54,000

Direct Wages Rs. 45,000

Overheads Rs. 36,000

Labor hours worked - 36,000

Hours of machine operation - 30,000

For an order executed by the department during the period, the relevant information was as under.

Materials used Rs. 6,00,000

Direct Wages Rs. 3,20,000

Labor hours worked - 3,200

Machine hours worked - 2,400

Calculate the overhead charges chargeable to the job by the following methods, i. Direct materials cost percentage rate ii. Labor hour rate and iii. Machine hour rate.

Solution :-

i. Direct Material cost percentage rate :- $\frac{\text{Direct materials}}{\text{Overhead}} \times 100$
 = (Rs. 36,000/Rs. 54,000) \times 100 = 66.67%

Materials used on the order Rs. 6,00,000, so overheads will be @66.67% = Rs. 4,00,000

ii. Labor Hour Rate :- Overheads/ Direct Labor Hours = 36,000/36,000 = Re.1

Overheads will be @ Re. 1 = 3200 hrs \times 1 = Rs. 3,200

iii. Machine Hour Rate :- Overhead/ Machine Hours = Rs. 36,000/30,000 = Rs. 1.2

Overheads will be Rs.1.2 per hour \times 2,400 hours = Rs. 2,880

6. A machine was purchased on 1st January, 2007 for Rs. 5 lakhs. The total cost of all machinery inclusive of the new machine was Rs. 75 lakhs. The following further particulars were available.

Expected life of the machine – 10 years

Scrap value at the end of the life – Rs. 5,000

Repairs and maintenance for the machine during the year Rs. 2,000

Expected number of working hours of the machine per year 4,000

Insurance premium annually for all machines Rs. 4,00

Power consumption for the machine per hour @ Rs. 5 @ per unit = 25 units

Area occupied by the machine – 100 sq feet

Area occupied by other machines – 1,500 sq. feet

Rent per month of the department Rs. 800

Lighting charges for 20 points for the whole department out of which three points are for the new machine – Rs.120 per month

Compute the machine hour rate for the machine.



Solution :-

Computation of Machine Hour Rate

Particulars	Rs. Per annum	Rs. per hour
Standing Charges –	300	
Insurance – Rs. 4,500 × 5 lacs/ 75 lacs		
Repairs and Maintenance	2,000	
Rent Rs. 800 per month × 12 months × 5 lacs/ 75 lacs	640	
Lighting Charges Rs. 120 per month × 12 months = Rs. 1,440 × 3/20	216	
Total Standing Charges	3,156	3,156/4,000 hours= 0.789
Machine Expenses		
Depreciation	5,00,000 – 5,000/10= 49,500/4,000 hours	12.375
Electricity Consumption		75
25 units per hour @ Rs. 5 per unit		
Machine hour rate		88.16

Note :- The total cost of the machinery in the workshop is Rs. 75 lacs out of which the cost of this machine is Rs. 5 lacs and hence proportionate amount has been calculated in respect of expenses like insurance and rent.

7. The cost accounts of ABC Chemicals Ltd., determined the overhead recovery rate for the year 2006 –07 (based on direct labor hours) with the following estimates.

Indirect labor Rs. 1,15,000

Inspection Rs. 70,000

Factory supervision Rs. 50,000

Depreciation and maintenance Rs. 1,25,000

Total Factory Overheads Rs. 3,60,000

Direct labor hours - 75,000

Hourly wages rate - Rs. 15

The actual results for the year are as follows

Particulars	Amount in Rupees
Indirect labor	99,000
Inspection	73,000
Factory supervision	51,000
Depreciation and maintenance	1,15,000
Total actual factory overheads	3,38,000
Direct labor hours	Hrs 67,600
Hourly wage rate	Rs. 16



Calculate the predetermined overhead recovery rate and find out the amount of over/under absorption if any.

How will you treat the over/under absorption amounts in Cost Accounts?

Solution :-

For calculating the under/absorbed overheads, firstly the predetermined overhead rate will have to be calculated.

Predetermined overhead rate = Estimated overheads/ Estimated direct labor hours

Rs. 3,60,000/ 75,000 hours = Rs. 4.80 per hour

Overheads recovered = 67,600 hours × 4.8 = Rs. 3,24,480

Under absorption of overheads = Actual overheads – overheads absorbed

Rs. 3,38,000 – Rs. 3,24,480 = Rs. 13,520

Under/over absorption of overheads can be rectified with the help of the following methods.

Computing supplementary rate

Carrying forward to future period

Writing off to the Costing Profit and Loss A/c

In the current illustration, supplementary rate should be computed to rectify the under absorption of overheads. The following formula will be used for the computation

Supplementary Rate = Under/over absorption of overheads/ Direct labor hours

Rs. 13,520 (under absorption)/ 67,600 = Re. 0.20 per hour

The under absorption of overheads Rs. 13,520 will be charged to the production on the basis of supplementary overhead rate at Re. 0.20 per hour.

8. XYZ Ltd., uses a historical cost accounting system and absorbs overheads on the basis of predetermined rates. The following data are available for the year ended 31st March, 2007.

Particulars	Amount in Rupees
Manufacturing overheads	
Amount actually spent	1,70,000
Amount absorbed	1,50,000
Cost of goods sold	3,36,000
Stock of finished goods	96,000
Work in progress	48,000

Using two methods of disposal of under/absorbed overheads show the implication on the profits of the company under each method.



Overheads

Solution :-

It is clear from the example that there is under absorption of overheads to the tune of Rs. 20,000. It can be rectified by using any of the following two methods.

Writing off to Profit and Loss A/c. The entire amount of Rs. 20,000 (under absorption) can be written off to the Profit and Loss A/c. The amount of profit will be reduced by the amount as a result of this writing off.

Supplementary Rate :- A supplementary rate will be found out for rectifying the under absorption of overheads. The statement will be prepared as shown below.

Particulars	Amount Absorbed (in rupees)	Additional Amount to be charged (On the basis of supplementary rate)	Total Amount to be charged (In rupees)
Cost of goods sold	3,36,000	14,000	3,50,000
Stock of finished goods	96,000	4,000	1,00,000
Work in progress	48,000	2,000	50,000

Note : Adjustment to Cost of goods sold, stock of finished goods and work in progress is made as per the following formula.

- I. Cost of goods sold :- $3,36,000 / 4,80,000 \times 20,000 = \text{Rs. } 14,000$
 - II. Stock of finished goods :- $96,000 / 4,80,000 \times 20,000 = \text{Rs. } 4,000$
 - III. Work in progress :- $48,000 / 4,80,000 \times 20,000 = \text{Rs. } 2,000$
- a. In a certain factory, three products are made from different materials by similar processes. For a typical period, production costs are as under.

In Rupees

Particulars	Product A	Product B	Product C
Materials used	1,600	2,000	800
Direct labor cost	1,200	1,000	400
Overheads (Actual)	800	650	350

Overheads are charged to the cost of each product @ 25% on Prime Cost. Do you see anything wrong in principle in this method of charging overheads? If so, suggest a preferable method.

Solution :-

Calculation of under/over absorption of Overheads (Basis of absorption – Prime Cost)

In Rupees

Particulars	Product A	Product B	Product C
Actual overheads	800	650	350
Overhead absorbed 25% of Prime Cost	700	750	300
Over/(under) Absorption	(100)	100	(50)



The method of absorption followed in the example is Prime Cost. However it has resulted in under/over absorption of overheads. Actually all products use different materials though the production process is the same. Hence it is suggested that Direct Labor Cost method should be used for absorption rather than the Prime Cost. The overhead absorption rates based on Direct Labor Cost will be as follows.

Product A - $800/1200 \times 100 = 66.67\%$

Product B - $650/1000 \times 100 = 65\%$

Product C - $350/400 \times 100 = 87.5\%$

10. In a manufacturing unit, overhead was recovered at a predetermined rate of Rs. 20 per labor hour. The total factory overhead incurred and the labor hours actually worked were Rs. 45,00,000 and 2,00,000 respectively. During this period, 30,000 units were sold. At the end of the period 5,000 units were held in stock while there was no opening stock of finished goods. Similarly though there was no stock of uncompleted units at the beginning of the period, at the end of the period there were 10,000 incomplete units which may be reckoned as 50% complete.

On analyzing the reasons, it was found that 60% of the unabsorbed overheads were due to defective planning and rest were attributed to increase in overhead costs.

How would unabsorbed overheads be treated in cost accounts?

Solution :-

The statement of unabsorbed overheads is prepared as shown below.

Statement showing the unabsorbed overheads

Particulars	Amount in Rupees
Labor hours actually worked	2,00,000
Overhead Rate per hour	20
Overheads absorbed	40,00,000
Actual overheads incurred	45,00,000
Under absorption of overheads	5,00,000

Thus the total under absorption of overheads is to the tune of Rs. 5,00,000. As given in the example, 60% of this amount is due to defective planning and hence may be treated as abnormal overheads and written off to Costing Profit and Loss A/c.

Balance of unabsorbed overheads Rs. 2,00,000 is due to the increase in the overhead costs and hence can be adjusted in the accounts by computing the supplementary absorption rate.

11. The total overhead expenses of a factory are Rs. 4,46,380. Taking into account, the normal working of the factory, overhead was recovered in production at Rs. 1.25 per hour. The actual hours worked were 2,93,104. How would you proceed to close the books of accounts, assuming that besides 7,800 units produced of which 7,000 were sold, there were 200 equivalent units in work in progress.

On investigation, it was found that 50% of the unabsorbed overhead was on account of increase in the cost of indirect materials and indirect labor and the remaining 50% was due to factory inefficiency. Also give the profit implication of the method suggested.



Overheads

Solution :-

Particulars	Amount in Rupees
Overheads actually incurred	4,46,380
Overheads absorbed	3,66,380
Under absorbed overheads	80,000

Reasons for unabsorbed overheads

Particulars	Amount in Rupees
50% of the unabsorbed overhead was on account of increase in the cost of indirect materials and indirect labor	40,000
Balance 50% is due to inefficiency of factory	40,000

Treatment of unabsorbed overhead

As given in the example, 50% of the amount of unabsorbed overheads is due to increase in the cost of materials and labor. In order to rectify the same, a supplementary rate will have to be computed as shown below.

Supplementary Rate = Rs. 40,000 / 7,800 (completed units) + 200 (equivalent units) = Rs. 5 per unit

The amount of Rs. 40,000 will be divided to cost of sales, stock of finished goods and work in progress as shown below.

Cost of sales – 7000 units × Rs. 5 per unit = Rs. 35,000

Finished goods stock – 800 units × Rs. 5 per unit = Rs. 4000

Work in progress – 200 units × Rs. 5 per unit = Rs. 1000

Balance 50% of the unabsorbed overheads are due to the inefficiency of the factory and hence should be written off to Costing Profit and Loss Account.

12. A company produces a single product in three sizes, A, B and C. Prepare a statement showing the selling and distribution expenses apportioned over three sizes on the basis indicated and express the total appropriated to each size as,

I] Cost per unit sold II] A percentage of sales turnover and III] Cost per cubic meter of product sold.

The expenses and basis of apportionment are as follows,

Expenses	Amount Rs.	Basis of Apportionment
Sales salaries	10,000	Direct charge
Sales commission	6,000	Sales turnover
Sales office expenses	2,096	Number of orders
Advertising - specific	22,000	Direct charge
Advertising - general	5,000	Sales turnover
Packing	3,000	Size of product
Delivery expenses	4,000	Size of product



Expenses	Amount Rs.	Basis of Apportionment
Warehouse expenses	1,000	Size of product
Credit collection expenses	1,296	Number of orders
Total	54,392	

Data relating to the three sizes:

Particulars	Total	Size A	Size B	Size C
Number of salesmen, all paid same salary	10	4	5	1
Number of orders	1,600	700	800	100
% of specific advertising	100	30	40	30
Number of units sold	8,240	3,440	3,200	1,600
Sales turnover	Rs. 2,00,000	Rs. 58,000	Rs. 80,000	Rs. 62,000
Capacity in cubic m. per unit		5	8	17

Solution:-

Comparative Statement of Costs

Items	Basis	Total Rs.	Size A	Size B	Size C
Sales salaries	No. of salesmen	10,000	4000	5000	1000
Sales commission	3% on turnover	6,000	1740	2400	1860
Sales office expenses	No. of orders	2,096	917	1048	131
Specific advertising	3:4:3	22,000	6600	8800	6600
General advertising	2.5% on turnover	5,000	1450	2000	1550
Packing	Cubic capacity of units sold 17200: 25600: 27200	3,000	736	1097	1167
Delivery expenses	Same as above	4,000	980	1464	1556
Warehouse expenses	Same as above	1,000	245	366	389
Credit collection expenses	Number of orders	1,296	567	648	81
I] Total selling and distribution expenses		54,392	17,235	22,823	14,334
II] Units sold		8,240	3,440	3,200	1,600
❖ Cost per unit [I/II]		6.60	5.01	7.13	8.96
III] Turnover Rs.		2,00,000	58,000	80,000	62,000
❖ Cost as % of sales turnover I/ II X 100		27.20	29.72	28.53	23.12
IV] Capacity per unit [cubic m]			5	8	17
V] Cubic m. sold [II X IV]		70,000	17,200	25,600	27,200
❖ Cost per cubic meter [I/V]		0.777	1.002	0.892	0.527



13. XYZ Ltd. maintains three salesmen X, Y and Z in territory 1. The following information is obtained for the month of March 2007.

Salary of salesmen Rs. 2,500

Commission Rs. 400

Traveling expenses Rs. 600

Postage and stationery Rs. 200

Telephone and telegraphs Rs. 300

Territory 1 expenses Rs. 2,000

Net sales Rs. 20,000

Cost of sales 60% of sales

From the following additional information prepare a sales performance statement.

Salesmen	Sales	Salary	Commission	Traveling Expenses	Postage and Stationery	Telephone and Telegraph
X	8,000	1,150	200	400	100	150
Y	7,000	700	100	150	50	50
Z	5,000	650	100	50	50	100
Total	20,000	2500	400	600	200	300

Solution:-

Selling and Distribution Overhead Summary

Particulars	Total Rs.	Salesman X	Salesman Y	Salesman Z
Salary	2,500	1,150	700	650
Commission	400	200	100	100
Traveling	600	400	150	50
Postage and stationery	200	100	50	50
Telephone and telegraphs	300	150	50	100
Direct costs	4,000	2,000	1,050	950
Territorial overheads on the basis of net sales	2,000	800	700	500
Total S/D Costs	6,000	2,800	1,750	1,450

Sales Performance Statement

Particulars	Total Rs.	Salesman X Rs.	Salesman Y Rs.	Salesman Z Rs.
Salary	20,000	8,000	7,000	5,000
Less: Cost of sales	12,000	4,800	4,200	3,000
Gross profit	8,000	3,200	2,800	2,000
Less: S/D costs	6,000	2,800	1,750	1,450
Net profit	2,000	400	950	550



Particulars	Total Rs.	Salesman X Rs.	Salesman Y Rs.	Salesman Z Rs.
% of net profit to turnover	10	5	15	11
% of selling and distribution cost to turnover	30	35	25	29

Question Bank on Overheads

A] Essay Type Questions

1. What do you understand by 'overheads'? How will you classify them?
2. Write a detailed note on 'Collection and Codification of Overheads.'
3. Distinguish between 'Primary and Secondary Distribution of Overheads.'
4. What do you understand by 'Secondary Distribution Summary'? What are the methods of the same?
5. Distinguish between 'allocation and apportionment' of overheads.
6. Describe the different bases on which factory overheads can be apportioned.
7. What is 'absorption of overheads'? What are the methods used for absorption of overheads?
8. Explain a] Direct Material Cost and b] Prime Cost Method of absorption of overheads.
9. Discuss fully 'machine hour rate method' of absorption of overheads. How will you compute the machine hour rate?
10. Discuss the statement 'the impact of overheads under varying conditions of production and sales is of greater interest to the management than its method of apportionment and allocation.'
11. State in short the reasons for the use of predetermined rates for factory overheads absorption.
12. Distinguish between cost allocation, cost apportionment and cost absorption.
13. What is the meaning of 'under/over absorption of overheads'? What are the causes for the same?
14. How will you treat the 'under/over absorption of overheads' in cost accounts?
15. Explain the nature of administration overheads. How are they apportioned?
16. Discuss the methods of absorption of selling and distribution overheads.
17. 'Interest is a factor which cannot be disregarded by management'. Explain.
18. Set out the main arguments in favor of inclusion of interest on capital in cost accounts.
19. Discuss the treatment of the following items in cost accounts.
 - Capacity cost
 - Set-up time
 - Packing expenses
 - Blue print and design.



20. The level of production activity fluctuates widely in your company from month to month. Because of this the incidence of depreciation on unit cost varies considerably. The management decides that you find out a suitable method to correct this.

B] State whether each of the statement is True or False, give reasons in brief.

1. A term synonymous with factory overhead is 'other expenses.'
2. Allocation and apportionment of overheads is one and the same.
3. Service departments usually do not render services to each other.
4. When actual overheads are more than the absorbed overheads, it is called as over absorption of overheads.
5. Under/over absorption of overheads takes place only when a predetermined rate of overheads is used.
6. A blanket overhead rate means a single overhead rate for the entire factory.
7. Wages of delivery van drivers is a selling overhead.
8. The use of actual overhead absorption rates results in delay in determining cost of production of products.
9. Direct labor cost method of absorption of overheads is suitable only in those departments where work is done by manual labor.
10. Machine hour rate is not suitable for absorption of overheads if the work is done mainly by machines.
11. If the amount of under/absorption of overheads is significant, it is transferred to Costing Profit and Loss A/c.

C] Fill in the Blanks

1. Overhead is the aggregate of _____ and _____ and _____.
2. Overheads can be classified according to, _____, _____, _____ and _____.
3. Under absorption/over absorption of overheads takes place when _____ rate of absorption is used.
4. The term used for charging overheads to cost units is known as _____.
5. The capacity level, that smooth out high and low production is called as _____ capacity.
6. When the amount of under absorbed/over absorbed overheads is negligible, it is disposed of by transferring to _____.
7. The _____ rate is computed by dividing the overhead by the aggregate of the productive hours of direct workers.
8. Administration overheads are usually absorbed as a percentage of _____.
9. The difference between the practical capacity and the capacity based on sales expectancy is known as _____.
10. When a single overhead absorption rate is used for the entire factory, it is called as _____.



D] State the correct answer from the choices given, in each of the following cases.

1. The allotment of whole items of cost, to cost centers or cost units is called as,
 - I] Cost allocation.
 - II] Cost apportionment.
 - III] Overheads absorption.
 - IV] Cost classification.
2. Factory overheads includes,
 - I] All manufacturing costs.
 - II] All manufacturing costs except direct materials and direct labor.
 - III] Indirect materials but not indirect labor.
 - IV] Indirect labor but not indirect material.
3. Prime cost means,
 - I] Direct materials.
 - II] Direct labor.
 - III] Direct materials and direct labor.
 - IV] Direct materials, direct labor and direct expenses.
4. Added cost of new product will be,
 - I] Materials and labor.
 - II] Materials, labor and factory overheads.
 - III] Materials, labor, factory and administration overheads.
 - IV] Materials, labor and administration overheads.
5. The budgeted fixed overheads amounted to Rs. 84,000. The budgeted and actual production amounted to 20,000 and 24,000 units respectively. This means that there will be,
 - I] An under absorption of Rs. 16,800.
 - II] An under absorption of Rs. 14,000.
 - III] An over absorption of Rs. 16,800.
 - IV] An over absorption of Rs. 14,000.
6. Rent of the business premises is,
 - I] Fixed cost.
 - II] Variable cost.
 - III] Semi-variable cost.
 - IV] None of these.



Overheads

7. The insurance of buildings is best apportioned to cost centers using,
 - I] Floor area or cubic capacity.
 - II] The number of employees.
 - III] The replacement value of machinery and equipment.
 - IV] The number of kilowatt hours.
8. Depreciation of machinery should be apportioned to cost centers on the basis of,
 - I] Value of machinery.
 - II] Gross block.
 - III] Purchase cost of machinery.
 - IV] Utilization of machinery.
9. Apportionment of overheads of service departments to production departments is called as,
 - I] Primary distribution of overheads.
 - II] Secondary distribution of overheads.
 - III] Allocation of overheads.
 - IV] Absorption of overheads.
10. Packing cost is a,
 - I] Production cost.
 - II] Selling cost.
 - III] Distribution cost.
 - IV] None of these.

STUDY NOTE 5

Methods of Costing-Job, Batch and Contract Costing

Learning Objectives

After studying this chapter, you should be able,

1. To understand the meaning of 'Costing Methods.'
 2. To know various methods of costing.
 3. To understand the numerical problems relating to the costing methods.
-





5.1 Introduction

As mentioned in the first chapter, the term 'costing' refers to the techniques and processes of determining costs of a product manufactured or services rendered. The first stage in cost accounting is to ascertain the cost of the product offered or the services provided. In order to do the same, it is necessary to follow a particular method of ascertaining the cost. The methods of costing are applied in various business units to ascertain the cost of product or service offered. Different methods of costing are required to be used in different types of businesses. For example, costing methods used in a manufacturing business will differ from the methods used in a business that is offering services. Even in a manufacturing business, some business units may have production in a continuous process, i.e. output of a process is an input of the subsequent process and so on, while in some businesses production is done according to the requirements of customers and hence each job is different from the other one. Different methods of costing are used to suit these diverse requirements. These methods of costing are discussed in detail in this chapter.

5.2 Methods of Costing

As mentioned in the above paragraph, the methods of costing are used to ascertain the cost of product or service offered by a business organization. There are two principle methods of costing. These methods are as follows

- I] Job Costing
- II] Process Costing

Other methods of costing are the variations of these two principle methods. The variations of these methods of costing are as follows.

- I] Job Costing: Batch Costing, Contract Costing, Multiple Costing.
- II] Process Costing: Unit or Single Output Costing, Operating Costing, Operation Costing

The Job Costing and its variations are discussed in detail in the following paragraphs.

- I] **Job Costing:** This method of costing is used in Job Order Industries where the production is as per the requirements of the customer. In Job Order industries, the production is not on continuous basis, rather it is only when order from customers is received and that too as per the specifications of the customers. Consequently, each job can be different from the other one. Method used in such type of business organizations is the Job Costing or Job Order Costing. The objective of this method of costing is to work out the cost of each job by preparing the Job Cost Sheet. A job may be a product, unit, batch, sales order, project, contract, service, specific program or any other cost objective that is distinguishable clearly and unique in terms of materials and other services used. The cost of completed job will be the materials used for the job, the direct labor employed for the same and the production overheads and other overheads if any charged to the job. The following are the features of job costing.

- ❖ It is a specific order costing
- ❖ A job is carried out or a product is produced is produced to meet the specific requirements of the order
- ❖ Job costing enables a business to ascertain the cost of a job on the basis of which quotation for the job may be given.



- ❖ While computing the cost, direct costs are charged to the job directly as they are traceable to the job. Indirect expenses i.e. overheads are charged to the job on some suitable basis.
- ❖ Each job completed may be different from other jobs and hence it is difficult to have standardization of controls and therefore more detailed supervision and control is necessary.
- ❖ At the end of the accounting period, work in progress may or may not exist.

5.3 Methodology used in Job Costing

As discussed above, the objective of job costing is to ascertain the cost of a job that is produced as per the requirements of the customers. Hence it is necessary to identify the costs associated with the job and present it in the form of job cost sheet for showing various types of costs. Various costs are recorded in the following manner.

- ❖ **Direct Material Costs:** Material used during the production process of a job and identified with the job is the direct material. The cost of such material consumed is the direct material cost. Direct material cost is identifiable with the job and is charged directly. The source document for ascertaining this cost is the material requisition slip from which the quantity of material consumed can be worked out. Cost of the same can be worked out according to any method of pricing of the issues like first in first out, last in first out or average method as per the policy of the organization. The actual material cost can be compared with standard cost to find out any variations between the two. However, as each job may be different from the other, standardization is difficult but efforts can be made for the same.
- ❖ **Direct Labor Cost:** This cost is also identifiable with a particular job and can be worked out with the help of 'Job Time Tickets' which is a record of time spent by a worker on a particular job. The 'job time ticket' has the record of starting time and completion time of the job and the time required for the job can be worked out easily from the same. Calculation of wages can be done by multiplying the time spent by the hourly rate. Here also standards can be set for the time as well as the rate so that comparison between the standard cost and actual cost can be very useful.
- ❖ **Direct Expenses:** Direct expenses are chargeable directly to the concerned job. The invoices or any other document can be marked with the number of job and thus the amount of direct expenses can be ascertained.
- ❖ **Overheads:** This is really a challenging task as the overheads are all indirect expenses incurred for the job. Because of their nature, overheads cannot be identified with the job and so they are apportioned to a particular job on some suitable basis. Pre determined rates of absorption of overheads are generally used for charging the overheads. This is done on the basis of the budgeted data. If the predetermined rates are used, under/over absorption of overheads is inevitable and hence rectification of the same becomes necessary.
- ❖ **Work in Progress:** On the completion of a job, the total cost is worked out by adding the overhead expenses in the direct cost. In other word, the overheads are added to the prime cost. The cost sheet is then marked as 'completed' and proper entries are made in the finished goods ledger. If a job remains incomplete at the end of an accounting period, the total cost incurred on the same becomes the cost of work in progress. The work in progress at the end of the accounting period becomes the closing work in progress and the same becomes the opening work in progress at the beginning of the next accounting period. A separate account for work in progress is maintained.



5.4 Advantages of Job Costing

The following are the advantages of job costing.

- ❖ Accurate information is available regarding the cost of the job completed and the profits generated from the same.
- ❖ Proper records are maintained regarding the material, labor and overheads so that a costing system is built up
- ❖ Useful cost data is generated from the point of view of management for proper control and analysis.
- ❖ Performance analysis with other jobs is possible by comparing the data of various jobs. However it should be remembered that each job completed may be different from the other.
- ❖ If standard costing system is in use, the actual cost of job can be compared with the standard to find out any deviation between the two.
- ❖ Some jobs are priced on the basis of *cost plus basis*. In such cases, a profit margin is added in the cost of the job. In such situation, a customer will be willing to pay the price if the cost data is reliable. Job costing helps in maintaining this reliability and the data made available becomes credible.

5.5 Limitations of Job Costing

Job costing suffers from certain limitations.

These are as follows.

- ❖ It is said that it is too time consuming and requires detailed record keeping. This makes the method more expensive.
- ❖ Record keeping for different jobs may prove complicated.
- ❖ Inefficiencies of the organization may be charged to a job though it may not be responsible for the same.

In spite of the above limitations, it can be said that job costing is an extremely useful method for computation of the cost of a job. The limitation of time consuming can be removed by computerization and this can also reduce the complexity of the record keeping.

5.6 Format of Job Cost Sheet

The format of job cost sheet is given below.

XYZ LTD.		
JOB ORDER COST SHEET		
Customer Invoice No.	Selling Price Per Unit:	Cost Per Unit:
Date:	Job Order No:	Total Cost
Product Description		



Particulars	Dates and Ref. No.	Total Amount [Rs]	Per Unit [Rs]
Direct Materials: Dept I			
Dept II			
Dept III			
Total			
Direct Labor			
Overheads			
Total Costs			

5.7 Solved Problems

1. A factory uses a job costing system. The following data are available from the books at the year ending on 31st March 2007.

Particulars	Amount [Rs]
Direct Materials	180,0000
Direct Wages	150,0000
Profit	121,8000
Selling and Distribution Overheads	105,0000
Administrative Overheads	84,0000
Factory Overheads	90,0000

Required:

- A. Prepare a job cost sheet showing the prime cost, works cost, production cost, cost of sales and sales value.
- B. In the year 2007-08, the factory has received an order for a number of jobs. It is estimated that the direct materials would be Rs.240,0000 and direct labor would cost Rs.150,0000. What would be the price for these jobs if the factory intends to earn the same rate of profit on sales, assuming that the selling and distribution overheads have gone up by 15%. The factory recovers factory overhead as a percentage of direct wages and administrative and selling and distribution overhead as a percentage of works cost, based on the cost rates prevalent in the previous year.

Solution: The Job Cost Sheet is shown below

JOB COST SHEET OF XYZ LTD.

For the year ended 31st March, 2007

Particulars	Amount [Rs.]	Amount [Rs.]
Direct Costs: - Direct Materials	18,00,000	
Direct Labor	<u>15,00,000</u>	
Prime Cost [Direct Materials + Direct Labor]		33,00,000
Factory Overheads		9,00,000



Methods of Costing - Job, Batch and Contract Costing

Factory/Works Cost [Prime Cost + Factory Overheads]		42,00,000
Administrative Overheads		8,40,000
Cost of Production [Factory Cost + Administrative Overheads]		50,40,000
Selling and Distribution Overheads		10,50,000
Cost of Sales [Cost of Production + Selling and Distribution Overheads]		60,90,000
Profit [As Given]		12,18,000
Sales [Cost of Sales + Profit]		73,08,000

% of Factory Overheads to Direct Wages: $\text{Rs.}9,00,000/15,00,000 \times 100 = 60\%$

% of Administrative Overheads to Works Cost: $\text{Rs.}840,000/420,0000 \times 100 = 20\%$

% of Selling and Distribution Overheads to Works Cost: $\text{Rs.}10,50,000/42,00,000 \times 100 = 25\%$

B Statement showing Price Quotation for a Job

Particulars	Amount [Rs]	Amount [Rs.]
Direct Costs: Direct Materials	24,00,000	
Direct Labor	<u>15,00,000</u>	
Prime Cost [Direct Materials + Direct Labor]		39,00,000
Factory Overheads – 60% of Direct Labor		9,00,000
Works Cost [Prime Cost + Factory Overheads]		48,00,000
Administrative Overheads –20% of Works Cost		9,60,000
Cost of Production [Works Cost + Administrative Overheads]		57,60,000
Selling and Distribution Overheads 28.75% of Works Cost [25% + 15% = 28.75%]		16,56,000
Cost of Sales [Cost of Production + Selling and Distribution Overheads]		74,16,000
Profit 16.67 % of Sales [20% on cost]		14,83,200
Sales [Cost of Sales + Profit]		88,99,200

2. The following information for the year ended on 31st March 2007 is obtained from the books and records of a manufacturing company



Particulars	Completed Jobs Rs.	Work In Progress Rs
Raw material supplied from stores	88,000	32,000
Wages	1,00,000	40,000
Chargeable expenses	10,000	4,000
Material returned to stores	1,000	-----

Factory overheads are 80% of wages. Office overheads are 25% of factory cost and selling and distribution overheads are 10% of cost of production. The completed jobs realized Rs.4, 10,000.

Prepare: Work in Progress Ledger Control Account, Completed Job Ledger Control Account and Cost of Sales Account

Solution:

Consolidated Work-in-Progress Account

Dr.

Cr.

Particulars	Amount Rs	Particulars	Amount Rs
Raw materials consumed	32, 000		
Wages	40, 000		
Chargeable expenses	4,000		
Factory overheads [80% of wages]	32,000		
Factory cost	1,08, 000		
Administrative overheads [25% of Rs.1,08, 000]	27, 000		
Total	1,35,000		

Note: In the above account, selling and distribution overheads are not charged

Consolidated Completed Jobs Account is shown on the next page

Consolidated Completed Job Account

Dr.

Cr

Particulars	Amount [Rs]	Particulars	Amount [Rs]
Raw Materials: Rs.88, 000		Customer's Account	4,10,000
Less: Returns 1, 000	87,000		
Wages	1,00,000		
Chargeable Expenses	10,000		
Factory overheads [80% of direct wages]	80,000		
Factory Cost	2,77, 000		



Administration overheads [25% of Rs.2, 77, 000]	69,250		
Cost of production	3,46, 250		
Selling and distribution expenses	34, 625		
Net profit transferred to Profit and Loss A/c	29, 125		
Total	4,10, 000		4,10, 000

Cost of Sales Account shown on the next page

Cost of Sales Account

Dr.

Cr.

Particulars	Amount	Particulars	Amount
Materials consumed	87, 000	Balance c/d	3,80, 875
Wages	1,00, 000		
Direct charges	10,000		
Factory overheads [80% of wages]	80, 000		
Factory cost	2,77, 000		
Administrative overheads [25% of Rs.2,77, 000]	69, 250		
Cost of production	3,46, 250		
Selling and distribution 10% of Cost of production	34, 625		
Cost of sales	3,80, 875		3,80, 875

[Additional solved and unsolved problems at the end of this chapter]

II] **Batch Costing:** In the job costing, we have seen that the production is as per the orders of the customers and according to the specifications mentioned by them. On the other hand, batch costing is used where units of a product are manufactured in batches and used in the assembly of the final product. Thus components of products like television, radio sets, air conditioners and other consumer goods are manufactured in batches to maintain uniformity in all respects. It is not possible here to manufacture as per the requirements of customers and hence rather than manufacturing a single unit, several units of the component are manufactured. For example, rather than manufacturing a single unit, it will be always beneficial to manufacture say, 75, 000 units of the component as it will reduce the cost of production substantially and also bring standardization in the quality and other aspects of the product. The finished units are held in stock and normal inventory control techniques are used for controlling the inventory. Batch number is given to each batch manufactured and accordingly the cost is worked out.

Costing procedure in batch costing is more or less similar to the job costing in the sense that cost is worked out for each batch rather than job. Direct costs like direct materials, direct labor and direct



expenses are charged directly to the job as they are traceable to the job. The source documents used for them are material requisitions, labor records and records pertaining to the direct expenses. Indirect costs, i.e. overheads are allocated or apportioned to the batch on some suitable basis. Thus a batch cost sheet is prepared to show the total cost of the batch.

One of the important aspects of batch type production is to decide the batch size. Actually the determination of appropriate batch size of the production has conflicting views. If production is produced in large quantities, the impact of the setting up cost will be lower as the setting up cost is fixed per batch. But on the other hand if the production quantity is large, the inventory carrying cost will be high as more inventory will have to be carried over in the store. The carrying cost of the inventory includes cost of storage, risk of pilferage, spoilage, obsolescence and interest on the investments blocked in the inventories. Therefore the size of the batch should not be either too small or too large. On the basis of a trade off between large size and small size, an appropriate size of the batch should be decided. This batch size is known as Economic Batch Quantity that is similar to the concept of Economic Order Quantity. This quantity is determined with the help of the following formula.

$$\text{Economic Batch Quantity} = \sqrt{2AS / C}$$

Where A = Annual requirements of the product

S = Setting up cost per batch

C = Carrying cost per unit of inventory per annum.

III] **Contract Costing:** Contract Costing is a method used in construction industry to find out the cost and profit of a particular construction assignment. The principles of job costing are also applicable in contract costing. In fact Contract Costing can be termed as an extension of Job Costing as each contract is nothing but a job completed. Contract Costing is used by concerns like construction firms, civil engineering contractors, and engineering firms.

One of the important features of contract costing is that most of the expenses can be traced to a particular contract. Those expenses that cannot be traced to a particular contract are apportioned to the contract on some suitable basis. The cost computation in case of a contract is done on the following basis.

- A. **Material Cost:** Direct Material required for a particular contract is debited to the Contract Account. There may be some quantity of material which is returned back to the store. In such cases, material returned note is prepared and is either credited to the Contract Account or deducted from the material debited to the Contract Account. Similar treatment is given to the material transferred from one contract to another one. Material Transfer Note is prepared to record these transactions of transfer. Material remaining at the site at the end of a particular accounting period is shown as closing stock after valuation of the same and carried forward to the next period.
- B. **Labor Cost:** Wages paid to the workers engaged on a particular contract should be charged to that contract irrespective of the work performed by them. If there are common workers on more than one contract and/or if the workers are transferred from one contract to the other contract, time sheets must be maintained and wages may be distributed on the basis of time spent on each contract. Some of the workers may be working in the central office or central stores, their wages can be apportioned to a particular contract on suitable basis like time spent etc.



Methods of Costing - Job, Batch and Contract Costing

- C. **Expenses:** All expenses incurred for a particular contract should be charged to that contract. In case of any indirect expenses incurred for the organization as a whole, they should be charged to the contract on some suitable basis. Direct expenses can be charged directly to the contract.
- D. **Plant and Machinery:** Depreciation on the plant and machinery used for the contract is to be charged to the contract account. The depreciation may be charged on any of the following basis.
- ❖ If a plant is specially purchased for a particular contract and is expected to be used for the contract for long time, thus being exhausted at site, the total cost of the plant will be debited to the contract account. After the completion of the contract, if it is no longer required, it will be sold at the site itself and the sale proceeds are credited to the contract account. If it is not sold, the contract is credited with the depreciated [revalued amount value]. Thus the amount of depreciation is debited to the contract account. The main drawback of this method is that the debit side of the contract account is unnecessarily inflated with the cost of the plant value and thus the cost of contract is shown very high. For removing this drawback, the difference between the original cost at the commencement of the contract and the depreciated value at the end of the period is worked out and charged to the contract account as depreciation.
 - ❖ If a plant is used for a contract for a short period, there is no need of debiting the cost of the plant to the contract account. The amount of depreciation is worked out on the basis of per hour and charged to the contract on that basis. The hourly rate is calculated by dividing the depreciation and other operating expenses of the plant by the total estimated working hours of the plant.
 - ❖ Sometimes plants may be taken on hire for a particular contract. In such cases the amount of rent paid should be debited to the contract account.
- V. **Subcontract:** Sometimes due to certain situations, a sub contractor is appointed to carry out certain special work for the main contract. This special work done by the sub contractor becomes a direct charge to the main contract and accordingly debited to the contract account. The payments made to the sub contractor are charged to the main contract as direct expenses and no detailed break up of the same is required. Material supplied to the sub contractor without any charge, is debited to the contract account as direct material and machinery, tools etc supplied to him on rent should be depreciated on appropriate basis and debited to the contract account. Rent received for the use of such tools and machines should be credited to the contract account or deducted from the final bill of the sub contractor.
- VI. **Additional Work:** Sometimes additional work may be necessary in addition to the work originally contracted for. This forms a separate charge and if the amount involved is large, a subsidiary contract is generally entered into with the contract.
- VII. **Special Aspects Of Contract Account:** There are certain special aspects of contract accounts. These are discussed below.
- ❖ **Certified Work:** In contracts which are expected to continue for a long period of time, it is a normal practice that the contractor obtains certain sums from the contractee from time to time. This is done on the value of contract completed and certified by the architect/surveyor appointed by the contractee. The amount received by the contractor is not 100% of the value of the work certified but is less than the same, as the balance amount is kept as retention money. For recording this transaction, any of the following two methods may be used.



- I. In the first method, the contract account is credited with the value mentioned in the certificate and personal account of the contractee is debited. Cash received is credited with the contractee's account and the balance is shown as a debtor representing the retention money.
- II. In the second method, the contract account is credited with the value of the certificate and the contractee's account is debited with amount payable immediately and a special retention money account is debited with the amount so retained.
 - ❖ **Treatment of Profit on incomplete Profit:** Several contracts take more time than one financial year before they are complete. The questions arises as to whether the profits on such contracts should be taken into consideration after the completion of the contract or whether a portion of the same should be taken into accounts every year on certain basis. If profit is taken into consideration after the completion of contracts and if in a single year several contracts are completed, the profits shown will be very high while in another year, if none of the contracts are completed, amount of profits shown will be very low. Thus there will be distortions in the amount of profits. Therefore it becomes necessary to compute the amount of profit on partly completed contracts and take credit of appropriate amount in the profit and loss account by using the following guidelines.
 - ❖ Value of certified work only should be taken into consideration while determining the profit. Value of work not certified should not be taken into consideration.
 - ❖ In case of contracts which are less than 25% complete, no profits should be taken into consideration and consequently no credit should be taken to Profit and Loss Account.
 - ❖ In case of contracts which are more than 25% complete, but less than 50% complete, the following method should be used for computing the profit to be credited to the Profit and Loss Account.

$$\frac{1}{3} \times \text{Notional Profit} / \text{Cash Received} / \text{Work Certified}$$
 Notional profit is the difference between the value of work certified and cost of work certified. It is computed in the following manner.

$$\text{Notional Profit} = \text{Value of work certified} - [\text{cost of work to date} - \text{cost of work completed but not certified}]$$
 - ❖ In case of contracts complete between 50% and 90% [more than 50% but less than 90%] the following method is used for computing the profit to be credited to the Profit and Loss Account.

$$\frac{2}{3} \times \text{Notional Profit} \times \text{Cash Received} / \text{Work Certified}$$
 - ❖ In case of contracts completed 90% or more than that, it is considered to be almost complete. In such cases, the estimated total profit is first determined by deducting the total costs to date and additional expenditure necessary to complete the contract from the contract price. The portion of profit so arrived is credited to the Profit and Loss Account by using the following formula.
 - ❖ **Method I:-** $\text{Estimated Profit} \times \text{Work Certified} / \text{Contract Price}$
 - ❖ **Method II:-** $\text{Estimated Profit} \times \text{Work Certified} / \text{Contract Price} \times \text{Cash Received} / \text{Work Certified}$ or $\text{Estimated Profit} \times \text{Cash Received} / \text{Work Certified}$. The method II is preferable to the first one. In case, additional expenditure to complete the contract not mentioned, the amount of profit to be transferred to the Profit and Loss Account is determined using the following formula.
 - ❖ $\text{Notional Profit} \times \text{Work Certified} / \text{Contract Price}$



Methods of Costing - Job, Batch and Contract Costing

- ❖ If there is a loss, the total amount of loss should be transferred to the Profit and Loss Account by crediting the contract account.
- ❖ It will be observed that in case of incomplete contract, amount of profit credited to the Profit and Loss Account is reduced proportionate to the work certified and cash received. The reason is that this being unrealized profits should not be used for distribution of dividend. Similarly, the principle of conservatism should also be applied in computing and crediting the profits.

Illustration: Compute a conservative estimate of profit on a contract [80% complete] from the following particulars. Illustrate at least four methods of computing the profit.

Particulars	Amount [Rs.]
Total expenditure to date	1, 02,000
Estimated further expenditure to complete the contract [including contingencies]	20, 400
Contract price	1, 83,600
Work certified	1, 20,000
Work uncertified	10, 200
Cash received	97, 920

Solution: The amount of profit on incomplete contract can be computed according to any of the following four methods. Before computing the same, we will compute the amount of profit on the contract and then show the working of the methods.

- ❖ Profits on incomplete contract:
- ❖ Total Contract Price: Rs. 1, 83, 600
- ❖ Less: Expenditure to date: Rs. 1, 02, 000
- ❖ Estimated further expenditure: Rs. 20, 400
- ❖ Total expenditure Rs. 1, 22, 400
- ❖ Estimated Profits Rs.61, 200
 - o Amount of Profit to be taken to the Profit & Loss A/c
 - o **1st Method:** $\text{Rs.61, 200} / \text{Rs.183600} \times \text{Rs.120000} = \text{Rs.40, 000}$
 - o **2nd Method:** $\text{Estimated Profits} \times \text{Work Certified} / \text{Contract Price} \times \text{Cash Received} / \text{Work Certified}$
 - o $\text{Rs.61200} \times \text{Rs.120000} / \text{Rs.183600} \times \text{Rs.97920} / \text{Rs.120000} = \text{Rs.32640}$
 - o **3rd Method:** $\text{Estimated Profits} \times \text{Cost of Work to date} / \text{Estimated Total Cost}$
 - o $\text{Rs.61200} \times \text{Rs.102000} / \text{Rs.122400} = \text{Rs.51000}$
 - o **4th Method:** $\text{Estimated Profits} \times \text{Cost of Work to Date} / \text{Estimated Total Cost} \times \text{Cash Received} / \text{Work Certified}$
 - o $\text{Rs.61200} \times \text{Rs.102000} / \text{Rs.122400} \times \text{Rs.97920} / \text{120000} = \text{Rs.41616}$



Special Points in Contract:

- I. **Cost Plus Contracts:** This type of contract is generally adopted when the probable cost of contract cannot be ascertained in advance with reasonable accuracy. In this type of contract, the contractor receives his total cost plus a profit, which may be a percentage of cost. These types of contracts give protection to the contractor against fluctuations in profits as he is guaranteed about his profit irrespective of the actual costs. However in order to avoid any dispute in future, it is always advisable to specify the admissible costs in advance. Similarly the customer may also reserve the right of demanding 'cost audit' in order to check the reliability of the claim of the contractor regarding increase in the costs.
- II. **Target- price contracts:** In such cases, the contractor receives an agreed sum of profit over his pre-determined costs. In addition, a figure is agreed as the target figure and if actual costs are below this target, the contractor is eligible for bonus for the savings.
- III. **Escalation Clause:** In order to protect the contractor from the rise in the price, an escalation clause may be inserted in the contract. As per this clause, the contract price is increased proportionately if there is a rise in input costs like material, labor or overheads. The condition that may be laid down is that the contractor will have to produce a proof regarding the rise in the price.

Problems and Solutions

Contract Costing

1. M/s New Century Builders have entered into a contract to build an office building complex for Rs.480 lakhs. The work started in April 1997 and it is estimated that the contract will take 15 months to be completed. Work has progressed as per schedule and the actual costs charged till March 1998 was as follows.

Particulars	Amount Rs.in lakhs
Materials	112.20
Labor	162.00
Hire charges for equipment and other expenses	36.00
Establishment charges	32.40

The following information are available:

Particulars	Amount – Rs. in lakhs
Material in hand 31 st March 1998	10.50
Work certified [of which Rs.324 lakhs have been paid] as on 31 st March 1998	400.00
Work not certified as on 31 st March 1998	7.50

As per Management estimates, the following further expenditure will be incurred to complete the work.

Materials: Rs.10.50 lakhs

Labor: Rs.16.00 lakhs

Sub-contractor: Rs.20.00 lakhs



Methods of Costing - Job, Batch and Contract Costing

Equipments hire and other charges: Rs.3.00 lakhs

Establishment charges: Rs.6.90 lakhs

You are required to compute the value of work-in-progress as on March 31st, 1998 after considering a reasonable margin of profit and show the appropriate accounts. Make a provision for contingencies amounting to 5% of the total costs.

Solution: The following accounts are prepared.

Dr.		Contract A/c		Cr	
Particulars	Amount Rs.	Particulars	Amount Rs.		
To Materials	1,12,20,000	By Stock of materials	6,60,000		
To Labor	1,62,00,000	By Work-in-progress			
		Work certified: 4,00,00,000			
		Work uncertified: 7,50,000	4,07,50,000		
To Hire charges	36,00,000				
To Establishment charges	32,40,000				
To Profit c/d	71,50,000				
Total	4,14,10,000	Total	4,14,10,000		
To Profit & Loss A/c *	50,00,000	By Profit b/d	71,50,000		
To Reserve [Transfer]	21,50,000				
Total	71,50,000	Total	71,50,000		

Dr.		Contractee's A/c		Cr	
Particulars	Amount Rs.	Particulars	Amount Rs.		
To Contract A/c	4,00,00,000	By Bank A/c	3,24,00,000		
		By Balance c/d	76,00,000		
Total	4,00,00,000	Total	4,00,00,000		

*Amount of profit to be taken to the Profit and Loss A/c has been computed as shown below.

Particulars	Amount Rs.	Amount Rs.
Expenditure up to 31 st March 1998 Rs.3,42,60,000 [Total of debit side] – Rs.6,60,000		3,36,00,000
Add: Estimated expenditure to complete Materials: 10,50,000 + Closing stock Rs.6,60,000	17,10,000	
Labor	16,00,000	
Sub-contractor	20,00,000	
Hire charges on equipment	3,00,000	
Establishment charges	6,90,000	
Total		63,00,000
Add: 5% on total cost for contingencies, i.e. Rs.3,99,00,000 X 5/95		21,00,000



Total cost - estimated		4,20,00,000
Total profit - estimated		60,00,000
Contract price		4,80,00,000

Profit to be taken to the Profit and Loss A/c = Total Estimated Profits × Work Certified/Contract Price

$$\text{Rs.}60,00,000 \times \text{Rs.}4,00,00,000 / \text{Rs.}4,80,00,000 = \text{Rs.}50,00,000$$

2. Deluxe Ltd. undertook a contract for Rs.5,00,000 as on 1st July 2006. On 30th June 2007, when the accounts were closed, the following details about the contract were gathered.

Particulars	Amount Rs.'000s
Materials purchased	100
Wages paid	45
General expenses	10
Plant purchased	50
Materials on hand on 30 th June 2007	25
Wages accrued on 30 th June 2007	5
Work certified	200
Cash received	150
Work uncertified	15
Depreciation of plant	5

The above contract contained an escalation clause which read as follows.

'In the event of materials and rates of wages increase by more than 5% the contract price would be increased accordingly by 25% of the rise in the cost of materials and wages beyond 5% in each case'.

It was found that since the date of signing the agreement, the prices of materials and wage rates increased by 25%. The value of work certified does not take into account the effects of the above clause. Prepare Contract Account. Working should form part of your answer.

Solution: On next page.

Dr. **Contract A/c for the Year Ended 30th June 2007** Cr.

Particulars	Amount Rs.	Particulars	Amount Rs.
To Materials	1,00,000	By Work-in-progress A/c:	
To Wages paid	45,000	Work certified	2,00,000
To Wages outstanding	5,000	Work uncertified	15,000
To General expenses	10,000	Materials on hand	25,000
To Depreciation of Plant	5,000	Contract escalation *	5,000
To Balance c/d – notional profit	80,000		
Total	2,45,000	Total	2,45,000
To Profit and Loss A/c #	20,000	By Balance b/d	80,000



Methods of Costing - Job, Batch and Contract Costing

To Transfer to Reserve	60,000		
Total	80,000	Total	80,000

* Escalation:

Materials /wages increased by 25%

[a] Increase in material price [Rs.100000 – Rs.25000] × 25/125 = Rs.15,000

[b] Increase in wages Rs.50,000 × 25/125 = Rs.10,000

Total Increase = [a] + [b] = Rs.25,000

This increase is 5% of the contract price.

Escalation is 25% of the rise in the cost of materials and wages beyond 5% in each case.

25% increase = Rs.25,000 and hence 5% increase = Rs.5,000

Escalation = 25% of [Rs.25,000 – Rs.5,000] = Rs.5,000

Amount of profit to be credited to Profit and Loss A/c: As the contract is less than 50% complete, the following formula will have to be used for computing the amount of profit to be credited to the Profit and Loss A/c

$\frac{1}{3} \times \text{Cash Received/Work Certified} \times \text{Notional Profit}$

$\frac{1}{3} \times \text{Rs.1,50,000/2,00,000} \times \text{Rs.80,000} = \text{Rs.20,000}$

3. Construction Ltd. is engaged in two contracts, A and B during the year. Following information is available at the year-end.

Particulars	Contract A Rs.	Contract B Rs.
Date of commencement	April 1st	September 1st
Contract price	6,00,000	5,00,000
Materials delivered direct to site	1,20,000	50,000
Materials issued from store	40,000	10,000
Materials returned to store	4,000	2,000
Material on site on December 31st	22,000	8,000
Direct labor payments	1,40,000	35,000
Direct expenses	60,000	30,000
Architect's fees	2,000	1,000
Establishment charges	25,000	7,000
Plant installed at cost	80,000	70,000
Value of plant on 31st December	65,000	64,000
Accrued wages 31st December	10,000	7,000
Accrued expenses 31st December	6,000	5,000
Cost of contract not certified by architect	23,000	10,000
Value of contract certified by architect	4,20,000	1,35,000
Cash received from contractor	3,78,000	1,25,000



During the period, materials amounting to Rs.9, 000 have been transferred from contract A to contract B. You are required to show,

[a] Contract A/c, Contractee A/c and

[b] Extract from the Balance Sheet as on 31st December showing the calculation of WIP

Solution:

Dr.		Contract A A/c		Cr	
Particulars	Amount Rs.	Particulars	Amount Rs.		
To Direct materials	1,20,000	By Materials returned to stores	4,000		
To materials issued from stores	40,000	By Material transferred to contract B	9,000		
To Wages paid	1,40,000	By Stock of materials c/d	22,000		
To Direct expenses	60,000	By Work certified	4,20,000		
To Depreciation of Plant	15,000	By Work not certified	23,000		
To Architect's fees	2,000				
To Establishment charges	25,000				
To Wages accrued	10,000				
To Direct expenses accrued	6,000				
To Notional profit c/d	60,000				
Total	4,78,000	Total	4,78,000		
To Profit & Loss A/c *	36,000	By Notional profit c/d	60,000		
To Transfer to Reserve	24,000				
Total	60,000	Total	60,000		

Dr		Contractee A/c		Cr	
Particulars	Amount Rs.	Particulars	Amount Rs.		
To Value of work certified	4,20,000	By Cash received	3,78,000		
		By Balance c/d	42,000		
Total	4,20,000	Total	4,20,000		

* Amount of profit to be taken to Profit and Loss A/c is computed as shown below.

$$2/3 \times \text{Notional Profit} \times \text{Cash Received} / \text{Work Certified}$$

$$2/3 \times \text{Rs.60,000} \times \text{Rs.3,78,000} / \text{Rs.4,20,000} = \text{Rs.36,000}$$

As the contract is 75% complete, 2/3rd of notional profit is taken into consideration

Dr.		Contract B A/c		Cr	
Particulars	Amount Rs.	Particulars	Amount Rs.		
To Direct materials	50,000	By Materials returned to stores	2,000		
To materials issued from stores	10,000	By Stock of materials c/d	8,000		
To Material from A	9,000	By Work certified	1,35,000		



Methods of Costing - Job, Batch and Contract Costing

To Wages paid	35,000	By Work not certified	10,000
To Direct expenses	30,000	By Profit and Loss A/c - Loss	5,000
To Depreciation of Plant	6,000		
To Architect's fees	1,000		
To Establishment charges	7,000		
To Wages accrued	7,000		
To Direct expenses accrued	5,000		
Total	1,60,000	Total	1,60,000

Dr		Contractee A/c		Cr	
Particulars	Amount Rs.	Particulars	Amount Rs.		
To Value of work certified	1,35,000	By Cash received	1,25,000		
		By Balance c/d	10,000		
Total	1,35,000	Total	1,35,000		

Extracts from Balance Sheet is shown on the next page.

Balance Sheet as on 31st December

[Extract only for contract]

Liabilities	Amount Rs	Assets	Amount Rs.
Profit & Loss A/c		Fixed Assets:	
Profit of A: 36,000		Plant at cost: 1,50,000	
Loss of B: <u>5,000</u>		Less:	
Total	31,000	Depreciation: 21,000	1,29,000
Sundry Creditors		Current Assets	
Wages accrued: 17,000		Stock of Materials: 30,000	
Expenses accrued: <u>11,000</u>		Work-in-progress: <u>61,000</u>	91,000
Total	28,000		

4. A company undertook a contract for construction of a large building complex. The construction work commenced on 1st April 2005 and the following data are available for the year ended on 31st March 2006.

Particulars	Amount Rs.000s
Contract price	35,000
Work certified	20,000
Progress payment received	15,000
Materials issued to site	7,500
Planning and estimating costs	1,000
Direct wages paid	4,000



Materials returned from site	250
Plant hire charges	1,750
Wages related costs	500
Site office costs	678
Head office expenses apportioned	375
Direct expenses incurred	902
Work not certified	149

The contractors own a plant which originally cost Rs.20 lakhs has been continuously in use in this contract throughout the year. The residual value of the plant after 5 years of life is expected to be Rs.5 lakhs. Straight-line method of depreciation is in use. As on 31st March 2006, the direct wages due and payable amounted to Rs.2, 70, 000 and the materials at site were estimated at Rs.2, 00,000.

Required:

- [a] Prepare the contract account for the year ended 31st March 2006
- [b] Show the calculation of profits to be taken to the Profit and Loss A/c of the year
- [c] Show the relevant Balance Sheet entries.

Solution:

Dr. Contract A/c for the Year Ended 31st March 2006 Cr.

Particulars	Amount Rs. 000s	Particulars	Amount Rs. 000s
To Materials issued	7, 500	By Materials returned to site	250
To Direct wages paid	4, 000	By Material at site	200
To Wages related costs	500	By Work-in-progress Work certified: 20,000 Work uncertified: 149	20, 149
To Direct expenses	902		
To Plant hire charges	1, 750		
To Planning and Estimation Costs	1, 000		
To Site office costs	678		
To Head Office expenses apportioned	375		
To Depreciation of Plant *	300		
To Direct wages accrued	270		
To Notional profit c/d	3, 324		
Total	20, 599	Total	20, 599



Methods of Costing - Job, Batch and Contract Costing

Dr. Contract A/c [Continued From Previous Page] Cr

Particulars	Amount Rs.000s	Particulars	Amount Rs.000s
To Profit and Loss A/c – Transfer #	1, 662	By Notional Profit b/d	3, 324
To Work-in-progress - Reserve	1, 662		
Total	3, 324	Total	3, 324
1-4-2006 To Work-in-progress b/d		1-4-2006	
Work certified: 20, 000		By Work-in-progress A/c	1, 662
Work uncertified: 149	20, 149		
To Materials on site	200		

Balance Sheet as on 31st March 2006

[Extracts Only]

Liabilities	Amount Rs.000s	Assets	Amount Rs.000s
Profit and Loss A/c	1, 662	Plant at site: 2, 000	
		Less: Depreciation: 300	1, 700
Wages accrued	270	Material at site:	3, 487
		Work-in-progress: 20, 149	
		Less: Reserve: <u>1, 662</u>	
		18, 487	
		Less: Cash received: 15, 000	
			3,487

* Depreciation on plant is on straight- line method. The cost of plant is Rs.20 lakhs and the expected life is 5 years with a residual value of Rs.5 lakhs. Hence the amount of depreciation will be Rs.20 lakhs – Rs.5 lakhs divided by 5 years which comes to Rs.3 lakhs per year.

Since the contract completion is between 50% and 90%, 2/3rd of the notional profit subject to the proportion of cash received and work certified will be taken into consideration with the help of the following formula.

Notional Profit \times 2/3 \times Cash Received/Work Certified

Rs.3, 324 \times 2/3 \times Rs.15, 000/Rs.20, 000 = Rs.1, 662 [Rs.000s]

5. Prabhu Builders Ltd. commenced work on 1st April 2005 on a contract of which the agreed price was Rs. 5 lakhs. The following expenditure was incurred during the year up to 31st March 2006.

Particulars	Amount Rs.
Wages	1, 40, 000
Plant	35, 000
Materials	1, 05, 000
Head office expenses	12, 500



Materials costing Rs.10, 000 proved unsuitable and were sold for Rs.11, 500 and a part of plant was scrapped and sold for Rs.1, 700. Of the contract price Rs.2, 40, 000 representing 80% of work certified had been received by 31st March 2006 and on that date the value of the plant on the job was Rs.8, 000 and the value of materials was Rs. 3, 000. The cost of work done but not certified was Rs.25, 000.

It was decided to [a] Estimate what further expenditure would be incurred in completing the contract. [b] Compute from the estimate and the expenditure already incurred, the total profit that would be made on the contract and [c] Ascertain the amount of profit to be taken to the credit of Profit and Loss Account for the year ending on 31st March 2006. While taking profit to the credit of Profit and Loss A/c, that portion of the total profit should be taken which the value of work certified bears to the contract price. Details of the estimates are given below.

- i. That the contract would be completed by 30th September 2006
- ii. The wages to complete would amount Rs.84, 750
- iii. That materials in addition to those in stock on 31st March 2006 would cost Rs.50, 000
- iv. That further Rs.15, 000 would have to be spent on plant and the residual value of the plant on 30th September 2006 would be Rs.6, 000
- v. The head office expenses to the contract would be at the same annual rate as in 2005-06.
- vi. That claims, temporary maintenance and contingencies would require Rs.9, 000

Prepare contract account for the year ended 31st March 2006 and show your calculations of the sum to be credited to Profit and Loss A/c for the year.

Solution:

Dr. **Contract A/c for the Year Ended 31st March 2006** Cr

Particulars	Amount Rs.	Particulars	Amount Rs.
To Wages	1, 40, 000	By Plant in hand	8, 000
To Plant	35, 000	By Materials in hand	3, 000
To Materials	1, 05, 000	By Cash [Materials sold]	11, 500
To Head Office expenses	12, 500	By Cash [Plant sold]	1, 700
To Profit and Loss a/c [Profit on material sold]	1, 500	By Work-in-progress Work certified: 3,00,000 Work uncertified: 25,000	3, 25, 000
To Notional Profit c/d	55, 200		
Total	3, 49, 200	Total	3, 49, 200
To Profit & Loss A/c - Transfer *	36, 120	By Notional Profit b/d	55, 200
To Work-in-progress A/c - Reserve	19, 080		
Total	55, 200	Total	55, 200

*As given in the example, profit transferred to Profit and Loss A/c is computed with the help of the following formula.



Estimated Profit \times Work Certified / Contract Price

Rs.60, 200 \times Rs.3, 00, 000 / Rs.5, 00, 000 = Rs.36, 120

Note: The estimated profit is computed as shown in the Working Notes on the next page.

Working Notes:

I] Materials used during the year 2005-06

Particulars	Amount – Rs.
Materials used during the year	1,05,000
Less: Cost of materials sold during the year	10,000
	95,000
Less: Materials in hand at the end	3,000
Materials used during the year	92,000

II] Plant used during the year 2005-06

Particulars	Amount Rs.
Plant introduced at the beginning	35,000
Less: Sale of plant as scrap	1,700
	33,300
Less: Plant in hand at the end	8,000
Plant used during the year	25,300

III] Estimation of materials used during 6 months in 2006

Particulars	Amount Rs.
Material in hand at the beginning	3,000
Material further introduced during 6 months	50,000
Estimated materials used during 6 months	53,000

IV] Estimation of plant used during 6 months in 2006

Particulars	Amount Rs.
Plant in hand in the beginning	8,000
Plant introduced during the year	15,000
	23,000
Less: Plant in hand at the end of 6 months [Residual value]	6,000
Plant used during the year	17,000



V] Computation of Estimated Profit:

Particulars	Amount Rs.
Expenses during 2005-06	
Materials used	92,000
Plant used	25,300
Wages	1,40,000
Head office expenses	12,500
Total [a]	2,69,800
Estimated expenditure during 6 months in 2006	
Materials used [As per working note I]	53,000
Plant used [As per working note]	17,000
Wages	84,750
Head office expenses [Rs.12, 500 X 6/12]	6,250
Contingencies	9,000
Total [b]	1,70,000
Total estimated expenditure [a] + [b]	4,39,800
Estimated profit	60,200
Contract price	5,00,000

Job Costing

6. A company has two manufacturing shops. The shop floor supervisor presented the following cost for Job No. A to determine the selling price.

Particulars	Amount Rs. Per Unit
Material	70
Direct wages Department X –8 hours, Department Y – 6 hours = 14 hours @ Rs.2.50 per hour	35
Chargeable expenses [stores]	5
	110
Add: 33 ¹ / ₃ % for overheads	37
	147

Analysis of the Profit and Loss A/c shows the following

Dr Profit and Loss Account Cr

Particulars	Amount Rs.	Particulars	Amount Rs.
To Materials used	1,50,000	By Sales less returns	2,50,000
To Direct wages			
Department X	10,000		
Department Y	12,000		
To Stores expenses	4,000		



Methods of Costing - Job, Batch and Contract Costing

To Overheads			
Department X	5,000		
Department Y	9,000		
To Gross profit c/d	60,000		
Total	2,50,000	Total	2,50,000

It is noted that average hourly rates for the two departments, X and Y are similar. You are required to

- Draw up a job cost sheet
- Calculate the revised cost using overheads figures as shown in the profit and loss account as the basis of charging overheads to department X and Y.
- Add 20% of total cost to determine selling price.

Solution:

Calculation of Overhead Absorption Rates Based on Direct Labor Hour Rate

Particulars	Department X	Department Y
I] Direct wages as per Profit and Loss A/c	Rs.10,000	Rs.12,000
II] Direct wage rate per hour	Rs.2.50	Rs.2.50
III] Direct labor hours [I / II]	4,000 hours	4,800 hours
IV] Overheads	Rs.5000	Rs.9000
V] Overheads rate per labor hour [IV / III]	Rs.1.25	Rs.1.875

Calculation of Overhead Absorption Rates Based on Percentage of Direct Wages

Particulars	Department X	Department Y
Overheads	Rs.5000	Rs.9000
Direct wages	Rs.10,000	Rs.12,000
% of overheads to direct wages	50%	75%

Job Cost Sheet [Overheads absorption on the basis of Direct Labor Hour Rate]

Particulars	Amount Rs. Per Unit
Material	70.00
Direct wages:	
Department X: $Rs.2.50 \times 8 \text{ hours} = Rs.20.00$	
Department Y: $Rs.2.50 \times 6 \text{ hours} = Rs.15.00$	35.00
Chargeable expenses	5.00
Prime Cost [Material + Labor + Chargeable expenses]	110.00
Overheads:	
Department X: $Rs.1.25 \times 8 \text{ hours} = Rs.10.00$	
Department Y: $Rs.1.875 \times 6 \text{ hours} = Rs.11.25$	21.25



Total Cost	131.25
Add: Profit 20% on cost	26.25
Value of Job A	157.50

Job cost sheet [overhead absorption rate based on percentage of direct wages]

Particulars	Amount Rs. Per Unit
Material	70.00
Direct wages:	
Department X: Rs.2.50 X 8 hours = Rs.20.00	
Department Y: Rs.2.50 X 6 hours = Rs.15.00	35.00
Chargeable expenses	5.00
Prime Cost [Material + Labor + Chargeable expenses]	110.00
Overheads:	
Department X: 50% of Rs.20 = Rs.10.00	
Department Y: 75% of Rs.15 = Rs.11.25	21.25
Total Cost	131.25
Add: Profit 25% on cost	26.25
Value of job A	157.50



Question Bank

Job, Batch and Contract Costing

A. Essay Type

1. Discuss the nature, purposes and procedures adopted in job order cost system.
2. Discuss the importance of estimating in job costing.
3. How the different costs are recorded in job costing?
4. What do you understand by 'Batch' type of industries? What are the basic principles of batch costing?
5. What are the main features of job order costing? Give a pro-forma cost sheet under this cost system.
6. Explain the nature and use of batch costing. Describe the concept of economical batch with the help of a simple formula.
7. Discuss the nature and use of batch costing. Describe the procedure of recording costs under batch costing.
8. Discuss the nature of contract costing and explain the procedure of recording costs in contract costing.
9. In contract cost accounts, it may be necessary to make a charge for the use of a plant of machinery. Explain briefly two methods of dealing with the charge and state in what circumstances you would adopt each method.
10. What is a cost-plus- contract. Discuss this from the point of view of
 - a] manufacturer and
 - b] the buyer.
11. Explain the methods of computing the profits in case of an incomplete contract.
12. What do you understand by 'Escalation Clause'? Explain fully.

B] Fill in the blanks

1. Under job costing system, each job is assigned one identifying job ____.
2. In job costing, each ____ is a cost unit.
3. ____ is that size of the batch of production where total cost is minimum.
4. In contract costing, the cost unit is ____.
5. ____ contract provides for payment of actual cost plus a stipulated profit.
6. Work-in-progress appears on the ____ side of the contract account.
7. A job is a ____ contract and a contract is a ____ job.
8. Escalation clause in a contract is often provided as safeguard against any likely changes in ____.



9. Two industries where batch costing is used are ____ and ____.
10. Batch costing is used in ____ industries.

C] Indicate whether each of the following statements are True or False.

1. Job costing cannot be used in industries using standard costing.
2. Batch costing is a variant of job costing.
3. Concept of economic batch costing is similar to that of economic order quantity.
4. Batch costing may be used in boiler house.
5. Contract costing is only a variant of job costing.
6. Escalation clause in a contract provides that contract price is fixed.
7. In contract costing, each contract is a cost unit.
8. When cash ratio is 90%, retention money is 40%
9. There is no difference between notional profit and estimated profits.
10. No amount of profit is taken to the profit and loss account in case a contract is less than 25% complete.

STUDY NOTE 6

Process Costing

Learning Objectives

After studying this topic, you should be able,

1. To understand the nature and application of Process Costing.
 2. To understand the treatment of normal and abnormal loss/gain in the process cost accounts.
 3. To understand the concept of 'Equivalent Production' and its application in process cost accounts.
 4. To acquaint with the concept of 'Inter Process Profits' and its application.
-





6.1 Introduction

In one of the previous chapters we have discussed some of the methods of costing like, Job, Batch, and Contract costing. The methods of costing basically aim at finding out the cost of a product or service, which is offered by the organization. Process Costing is also a method of costing which is used in those industries where the production is in continuous process, i.e. the output of one process becomes the input of the subsequent process and so on. Examples of such industries are, paint works, chemical plants, food manufacturing, oil refining, paper mill, textile mills, sugar factories, fruit canning, dairy and so on. In such industries, the input is put in the first process and the output of each process becomes the input of the subsequent process till the final product emerges from the last process. This method is employed where it is not possible to trace the items of prime cost [which consists of all direct costs] to a particular order because its identity is lost in the continuous production. Thus it is not possible to compute the cost of say, 200 liters of oil or 200 kg of sugar produced as thousands of liters of oil or thousands of kg of sugar is manufactured at the same time. We can get the cost per liter or kg by dividing the total cost by the total production produced during that period. The features and intricacies of process costing are discussed in the subsequent paragraphs.

6.2 Features of Process Costing

We have discussed in the previous paragraph that process costing is employed in continuous production industries where the flow of production is in a sequence and the output of one process becomes the input of the subsequent one. The objective of process costing is to find out the cost of each process by identifying the direct costs with the particular process and apportioning the indirect costs i.e. overheads to each process on some suitable basis. The units coming out the process as the finished output are uniform in all the respects and hence the cost per unit is computed by dividing the total cost by the total production units. In case, some units are incomplete at the end of a particular period, equivalent units are worked out of such incomplete units and then the cost per unit is computed. The features of process costing are discussed in the following paragraphs.

- 1) The production is in continuous flow and is uniform. All units coming out as finished products are uniform with each other in all respects.
- 2) The product is manufactured in a continuous flow and hence individual units lose their identity.
- 3) The unit cost is obtained by dividing the total cost for a particular period by the total output. This is the average cost of the product units.
- 4) Cost per process is ascertained and cost of each process is transferred to the subsequent process until the finished product emerges.
- 5) In a particular process normal and abnormal losses emerge. Normal loss is a loss, which is inevitable in any process and thus cannot be avoided or controlled. Any loss, which, is over and above, the normal loss is called as abnormal loss and is to be accounted for separately. For example, if 1000 units are put in Process 1 and it is anticipated that there will be a normal loss of 1% in the process, the output expected is $1,000 - 1\% \text{ of } 1,000$ that is 990. If actual production is 980, there is an abnormal loss of 10 units. On the other hand if the production is 995, there is an abnormal gain of 5 units. Abnormal gain and abnormal loss are to be accounted for in the process cost accounts.



- 6) Sometimes each process may be treated as profit center and so while transferring the cost from one process to another, a percentage of profit is added in the cost of that process. This is known as inter process profit and needs to be accounted for in the process cost accounts.
- 7) Though the cost per unit is computed by dividing the total cost by the number of units, there can be a problem on incomplete units at the end of a particular accounting period. In such cases equivalent units have to be worked out for computing the cost per unit.

6.3 Preparing Process Cost Accounts

- 1) As explained above, the objective of process costing is to work out the cost of each process, transfer the same to the subsequent process and finally ascertain the total cost of production. Therefore it is necessary to charge various costs to each process. For this, the factory is divided into distinct processes or operations and an account is kept of each process to which all the costs are debited. The following are the various elements of cost, which are shown in the process accounts.
 - ❖ **Materials:** Raw materials required for each process is drawn from stores against material requisitions. Proper procedure like preparing and authorizing the requisition, pricing of the issues, return of materials to the stores, transfer of material from one process to another should be followed while issuing the materials. Cost of materials consumed should be computed as per the method employed for pricing of the issues and the cost should be debited to the process account.
 - ❖ **Labor:** Wages paid to workers and supervisory staff should be charged to the particular process if they can be identified with it. If workers work on two or more processes, proper allocation should be made according to some basis like time spent on each process.
 - ❖ **Direct Expenses:** If expenses are identifiable with a particular process, they should be charged to that process. For example, cost of electricity, depreciation may be charged directly to a process if they are identifiable with it.
 - ❖ **Overheads:** By nature, overheads are indirect expenses and hence cannot be identified with a particular process. These expenses can be apportioned on some suitable basis and charged to the process.
- 2) **Important aspects an Process Accounts:** While preparing process cost accounts, some important aspects are to be taken into consideration. These aspects are given below.
 - ❖ **Normal Loss:** Normal loss is a loss, which is inevitable in any process. Thus if the input is 100, the output may be 95 if the normal loss is anticipated as 5%. Accounting treatment of normal loss is explained and illustrated in the subsequent paragraphs.
 - ❖ **Abnormal Loss/Abnormal Gain:** If the actual output is less than the normal output [Normal output = Input – Normal Loss], the difference between the two is the abnormal loss. On the other hand if the actual output is more than the normal output, the difference between the two is abnormal gain. Thus in the example given above, the normal output is 95 which is 100 – 5% of 100 as the normal loss. If the actual output is 93 units, 2 units will be abnormal loss and if the actual output is 97 units, 2 units will be abnormal gain. Abnormal loss/gain is to be treated differently and is illustrated subsequently.



- ❖ **Inter Process Profits:** Sometimes, while transferring the cost of one process to the subsequent one, some percentage of profit is added in it. This is called as inter process profits. This is done when a process is treated as profit center. In such cases, unrealized profit is to be computed and shown separately. This is also illustrated separately.
- 3) **Pro Forma of Process Account [Without normal/abnormal loss/gain]:** A simple process account is prepared in the following manner.

Process I Account

Debit				Credit			
Particulars	Qty	Rate Rs.	Amount Rs.	Particulars	Qty	Rate Rs.	Amount Rs.
Direct Materials				Output Transferred To Process II			
Direct Labor							
Direct Expenses							
Production Overheads							
Total				Total			

Note: Process II and subsequent Process Accounts will be prepared in the same fashion. In the final process, the cost and output will be transferred to the finished goods stock account.

6.4 Illustrations

- 1) Product A is a product produced after three distinct processes. The following information is obtained from the accounts of the company for a particular period.

Particulars	Total Amount Rs.	Process I Rs	Process II Rs	Process III Rs
Direct Material	2,200	1,800	300	100
Direct Labor	400	100	200	100
Direct Expenses	500	300	—	200

Production overheads are incurred Rs.800 and is recovered at 200% of direct wages.

Production during the period was 100 kg. There was no opening or closing stock. Prepare Process Accounts assuming that there is no process loss.



Solution:

Process I Account

Output: 100 kg

Debit

Credit

Particulars	Qty Kg	Rate Rs.	Amount Rs.	Particulars	Qty Kg	Rate Rs.	Amount Rs.
Direct Materials	100	18.00	1,800	Output Transferred to Process II	100	24	2,400
Direct Labor		1.00	100				
Direct Expenses		3.00	300				
Production Overheads 200% of direct labor		2.00	200				
Total	100	24.00	2,400	Total	100	24	2,400

Process II Account

Output: 100 kg

Debit

Credit

Particulars	Qty Kg	Rate Rs.	Amount Rs.	Particulars	Qty Kg	Rate Rs.	Amount Rs.
Transferred From Process I	100	24.00	2,400	Output Transferred to Process II	100	33	3,300
Direct Materials		3.00	300				
Direct Labor		2.00	200				
Direct Expenses		—	—				
Production Overheads 200% of direct labor		4.00	400				
Total	100	33.00	3,300	Total	100	33	3,300



Process I Account

Output: 100 kg

Debit				Credit			
Particulars	Qty Kg	Rate Rs.	Amount Rs	Particulars	Qty Kg	Rate Rs.	Amount Rs.
Transferred From Process II	100	33.00	3,300	Output Transferred to Finished Stock	100	39	3,900
Direct Materials		1.00	100				
Direct Labor		1.00	100				
Direct Expenses		2.00	200				
Production Overheads 200% of direct labor		2.00	200				
Total	100	39.00	3,900	Total	100	39	3,900

In the above illustration, the assumption was that there is neither normal loss or abnormal loss/gain. However there can be normal and/or abnormal loss/gain and hence the treatment of such losses should be understood properly. The treatment of such losses is given below.

- ❖ **Normal Loss:** The fundamental principle of costing is that the good units should bear the amount of normal loss. Normal loss is anticipated and in a process it is inevitable. The cost of normal loss is therefore not worked out. The number of units of normal loss is credited to the Process Account and if they have some scrap value or realizable value the amount is also credited to the process account. If there is no scrap value or realizable value, only the units are credited to the process account.
- ❖ **Abnormal Loss:** If the units lost in the production process are more than the normal loss, the difference between the two is the abnormal loss. The relevant process of account is credited and abnormal loss account is debited with the abnormal loss valued at full cost of finished output. The amount realized from sale of scrap of abnormal loss units is credited to the abnormal loss account and the balance in the abnormal loss account is transferred to the Costing Profit and Loss Account.
- ❖ **Abnormal Gain:** If the actual production units are more than the anticipated units after deducting the normal loss, the difference between the two is known as abnormal gain. The valuation of abnormal gain is done in the same manner like that of the abnormal gain. The units and the amount is debited to the relevant Process Account and credited to the Abnormal Gain Account.

2) Product B is obtained after it passes through three distinct processes. The following information is obtained from the accounts for the week ending on 31st March 2006

Particulars	Total Amount	Process I	Process II	Process III
Direct material	Rs. 7,542	Rs. 2,600	Rs. 1,980	Rs. 2,962
Direct wages	Rs. 9,000	Rs. 2,000	Rs. 3,000	Rs. 4,000
Production overheads	Rs.9,000			



1,000 units @ Rs. 3 each were introduced in Process I. There was no stock of materials or work in progress at the beginning or at the end of the period. The output of each process passes direct to next process and finally to finished store. Production overheads are recovered on 100% of direct wages. The following additional data are obtained.

Particulars	Output during the week	% of normal loss to input	Value of scrap per unit
Process I	950 units	5%	Rs. 2
Process II	840 units	10%	Rs. 4
Process III	750 units	15%	Rs. 5

Prepare Process Cost Accounts and Abnormal Loss and Abnormal Gain Account.

Solution:

Process I Account

Debit				Credit			
Particulars	Units	Rate Per Unit Rs.	Amount Rs.	Particulars	Units	Rate Per Unit Rs.	Amount Rs.
Units introduced	1,000	3	3,000	Normal loss	50 *	2	100
Direct materials	—	—	2,600	Transferred to Process II	950	10	9,500
Direct wages	—	—	2,000				
Production overheads	—	—	2,000				
Total	1,000		9,600	Total	1000		9,600

* Normal loss is 5% of the units introduced i.e. 5% of 1000 units = 50 units.

The scrap value is given Rs.2 per unit and hence Rs.100 are credited to the Process I Account.

Process II Account

Debit				Credit			
Particulars	Units	Rate Per Unit Rs.	Amount Rs.	Particulars	Units	Rate Per Unit Rs.	Amount Rs.
Transfer from Process I	950	10	9,500	Normal loss	95 *	4	380
Direct materials	—	—	1,980	Abnormal loss	15 **	20	300
Direct wages	—	—	3,000	Transferred to Process III	840	20	16,800
Production overheads	—	—	3,000				
Total	950		17,480	Total	950		17,480



Process Costing

* Normal loss is 10% of the input i.e. 950 units = 95 units. The scrap value of the same is credited to the Process II Account.

** Abnormal loss is computed in the following manner.

- ❖ Units introduced – Normal loss = 950 – 95 = 855 units = normal production
- ❖ Actual production = 840 units, therefore abnormal loss = 15 units
- ❖ Valuation of abnormal loss = Cost – Scrap/Normal production
- ❖ Therefore Rs. 17,480 – Rs. 300/855 units = Rs. 20 per unit. (approx)

Process III Account

Debit

Credit

Particulars	Units	Rate Per Unit Rs	Amount Rs.	Particulars	Units	Rate Per Unit Rs.	Amount Rs.
Transfer from Process II	840	20	16,800	Normal loss	126 *	5	630
Direct materials	—	—	2,962	Transferred to Finished Stock	750	38	28,500
Direct wages	—	—	4,000				
Production overheads	—	—	4,000				
Abnormal gain **	36	38	1,368				
Total	876		29,130		876		29,130

* Normal loss is 15% of input i.e. 15% of 840 units which is 96 units

** Abnormal gain is computed as shown below.

- ❖ Units introduced – normal loss = normal production = 840 – 126 = 714 units
- ❖ Actual production is 750 units
- ❖ Abnormal gain is 750 units – 714 units = 36 units
- ❖ Valuation of abnormal gain = Cost – Scrap/Normal production
- ❖ Rs. 27,132 – Rs. 630/714 units = Rs. 38 (approx)



Abnormal Loss Account

Debit				Credit			
Particulars	Units	Rate Rs.	Amount Rs.	Particulars	Units	Rate Rs.	Amount Rs.
Process II	15	20	300	Debtor [Sale of scrap]	15	4	60
				Transfer to Costing Profit and Loss Account			240
Total	15	20	300	Total	15		300

Abnormal Gain Account

Debit				Credit			
Particulars	Units	Rate Rs.	Amount Rs.	Particulars	Units	Rate Rs.	Amount Rs.
Process III [Scrap]	36	5	180	Process III	36	38	1,368
Transfer to Costing Profit and Loss A/c			1,188				
Total	36		1,368	Total	36		1,368

6.5 Concept of Equivalent Production

In the illustrations given above, there was no stock of work in progress at the end of the particular period and hence the question of valuation of the same does not arise. However in practice it may happen that at the end of a particular period, there may be some incomplete units in the process. Further the degree of completion of the opening work in progress and closing work in progress may be different. These incomplete units will create problems in finding out the cost per unit, as all the units will not have the same degree of completion. In such cases, the equivalent units will have to be worked out for the incomplete units. The concept of equivalent units states that 2 units, each complete 50% will be treated as equivalent to 1 completed unit. This concept will have to be implemented for solving the problem of incomplete units. For this, degree of completion will have to be ascertained for each element of cost, i.e. material, labor and overheads. The following methods of pricing are used for valuing the equivalent units.

- ❖ **First In First Out Method [FIFO]:** In this method, the assumption is that the incomplete units from the opening stock are completed first and then the units introduced in the process are completed. The costs added in each process during the current period is prorated to the production necessary to complete the opening work in progress, to complete the units added in the process and units in the work in progress. The objective of the first in first out method is to value the inventory at the current costs and as such the main problem is to calculate the equivalent production under this method. [Illustration is given subsequently]



- ❖ **Average Method:** Process costs are sometimes computed on the basis of average costs. Where degree of completion of opening work in progress is not given, average method is used. The average process cost is obtained by adding the cost of opening work in progress in the cost of units introduced in the process during the current period and dividing this total cost by total equivalent units obtained by adding the number of units completed and equivalent units of the closing work in progress of each element, material, labor and overheads. The main object of average method is to even out the fluctuations in prices and hence is used when the prices fluctuate widely during a particular period.
- ❖ **Weighted Average Method:** If a manufacturing unit is manufacturing two or more products, which are quite dissimilar to each other, weighted average method is used. Under this method, weighted average is computed and used in valuation of the incomplete units.

6.6 Inter Process Profits

The output of one process is transferred to the subsequent process at cost price. However sometimes, the transfer is made at cost + certain percentage of profit. This is done when each process is treated as a profit center. In such cases, the difference between the debit and credit side of the process account represents profit or loss and is transferred to the Profit and Loss Account. The stocks at the end and at the beginning contain an element of unrealized profits, which have to be written back in this method. If the profit element contained in the closing inventory is more than the profit element in the opening inventory, profit will be overstated and vice versa. Profit is realized only on the goods sold, thus to obtain the actual profit the main task would be to calculate the profit element contained in the inventories. In order to compute the profit element, in closing inventory and to obtain the net realized profit for a period, three columns have to be shown in the ledger for showing the cost, unrealized profit and the transfer price.

Problems and Solutions:

1. In a manufacturing unit, raw material passes through four processes, I, II, III, and IV and the output of each process is the input for the subsequent process. The losses in the four processes are respectively 25%, 20%, 20% and 16 2/3 % respectively for I, II, III and IV processes of the input. If the end product at the end of the IV process is 40,000 kg, what is the quantity of raw material required to be fed at the beginning of Process I and the cost of the same at Rs. 5 per kg?

Solution:

Suppose the output in Process I is 100 kg.

Statement of Production in Different Processes Based on Input of 100 kg in Process I

Particulars	Process I	Process II	Process III	Process IV
Input	100 kg	75 kg	60 kg	48 kg
Loss %	25	20	20	162/3
Loss in kg	25	15	12	8
Output in kg	75	60	48	40

If output in process IV is 40 kg, input in process I = 100 kg

If output in process IV is 40,000kg, input in process I

$$= [40,000 \times 100] / 40 = 1,00,000 \text{ kg}$$



Cost of raw material required = 1,00,000 kg X Rs. 5 = Rs. 500,000

Effect: The input is 2.5 times of the final output. Therefore, for variation of every rupee in the cost of raw material the final effect will be Rs. 2.50

2. A product passes through two processes A and B. Prepare the process accounts from the following details.

Particulars	Process A	Process B
10,000 units introduced at a cost Rs.	20,000	—
Materials consumed Rs.	24,000	12,000
Direct labor Rs.	28,000	16,000
Manufacturing expenses Rs.	8,000	8,566
Normal wastages on input	5%	10%
Scrap value of normal waste Rs. Per 100 units	40	50
Output [units]	9,400	8,500

Also prepare the abnormal waste/effective account as the case may be with each process account.

Solution:

Process A Account

Debit

Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Units introduced	10,000	20,000	Normal waste *	500	200
Material		24,000	Abnormal waste **	100	840
Direct labor		28,000	Transfer to Process B A/c #	9,400	78,960
Manufacturing exp		8,000			
Total	10,000	80,000	Total	10,000	80,000

* Normal waste is 5% of the input, therefore the units of normal loss is 500, the scrap value of the same is Rs. 40 for 100 units which comes to Rs. 200.

** Abnormal waste is computed as follows.

❖ Normal output is input – normal waste = 10,000 – 500 = 9,500 units

❖ Actual output is given as 9,400 units, therefore abnormal waste is normal output – actual output = 9,500 – 9,400 = 100 units, the amount is computed by using the following formula. Cost – scrap / normal output = Rs. 80,000 – Rs. 200 / 9,500 = Rs. 8.40

The number of units and the amount shown are the balancing figures.



Process B Account

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Transfer from Process A A/c	9,400	78,960	Normal wastage *	940	470
Material		12,000	Finished Stock A/c	8,500	1,15,600
Direct labor		16,000			
Manufacturing exp		8,566			
Abnormal Effectives A/c #	40	544			
Total	9,440	1,16,070	Total	9,440	1,16,070

* Normal wastage is 10% of the input i.e. 940 units; the scrap value of the same is Rs.50 for 100 units is credited to the Process B Account.

Abnormal effectives are computed as under

- ❖ Normal output = Input – Normal wastage, = 9400 – 940 = 8460 units
- ❖ Actual output = 8500 units, so abnormal effectives are 8500 – 8460 = 40 units
- ❖ The amount is computed as, Cost – Scrap / Normal output, i.e.
- ❖ $\text{Rs.}78,960 + 12,000 + 16,000 + 8,566 - 470 / 8460 \text{ units} = \text{Rs.}13.60 \text{ unit}$
- ❖ Amount = 40 x Rs. 13.60 = Rs. 544

Abnormal Wastage Account

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Process A A/c	100	840	Cash/Debtors A/c	100	40
			Sale of scrap		
			Costing Profit & Loss A/c		800
	100	840		100	840

Abnormal Effectiveness Account

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Normal wastage A/c	40	20	Process B A/c	40	544
Costing Profit & Loss A/c		524			
Total	40	544		40	544



3. A material used for building is produced in three grades. The following information is available.

Particulars	Process I – Rs.	Process II – Rs.	Process III – Rs.
Raw material used [1000 tons]	1, 00, 000	—	—
Wages	87, 500	39, 500	10, 710
Weight lost [% of input]	5%	10%	20%
Scrap [sales price of Rs.50 per ton]	50 tons	30 tons	51 tons
Sale price per ton of finished goods	Rs.350	Rs.500	Rs.800

Management expenses were Rs.17,500 and selling expenses Rs.10,000. 2/3rd of output of process I and 50% of the output of process II is passed to the next process and remaining is sold. The entire output of process III is sold. Prepare Process Accounts and Statement of Profit.

Solution:

Process I Account

Debit

Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Materials	1000	1,00,000	Loss in weight	50	—
Wages		87,500	Scrap sales	50	2,500
Profit		43,336	Sales [1/3rd of output] *	300	1,05,000
			Transfer to Process II @ Rs.205.56 per unit **	600	1,23,336
Total	1000	2,30,836	Total	1000	2,30,836

* Output in Process I is 1,000 – [50 + 50] = 900 tons, 1/3rd sold i.e. 300 sold

** Cost of output = Rs.1,00,000 [material] + Rs. 87, 500 [labor] – Rs. 2,500 [scrap sale]/900 units = Rs. 205.56 per unit

Process II Account

Debit

Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Transfer from Process I	600	1,23,336	Loss in weight	60	—
Wages		39,500	Scrap sales	30	1,500
Profit		46,831	Sales [1/2 of output] *	255	1,27,500
			Transfer to Process III @ Rs.316.34 per unit **	255	80,667
Total	600	2,09,667	Total	600	2,09,667

* Output from Process II is 600 – [60 + 30] = 510 units, 50% is sold, i.e.255 tons are sold @ Rs.500 per ton

** Cost per unit of output is computed as, Rs.1,23,336 [material] + Rs. 39,500 [labor] – Rs.1,500 scrap value/510 units i.e. output = Rs. 316.34



Process III A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Process II A/c	255	80,667	Loss in weight	51	
Wages		10,710	Scrap sales	51	2,550
Profit		33,573	Sales @ Rs.800 Per ton	153	1,22,400
Total	255	1,24,950	Total	255	1,24,950

Statement of Profit:

Profit from Process I:	Rs. 43,336
Profit from Process II:	Rs. 46,831
Profit from Process III:	Rs. 33,573
Total profits:	Rs. 1,23,740
Less:	
Mgt.expenses:	Rs. 17,500
Selling expenses:	Rs. 10,000
Total expenses:	Rs. 27,500
Profit:	Rs. 96,240

3. Prepare necessary accounts from the following details.

Particulars	Process I	Process II
Materials – Rs.	30,000	3,000
Labor – Rs.	10,000	12,000
Overheads – Rs.	7,000	8,600
Input [Units]	20,000	—
Transfer from Process I [Units]		17,500
Normal loss	10%	4%
Sales value of wastage per unit – Rs.	Re.1	Rs.2

There was no opening or closing stock or work in progress

The final output from Process II was 17,000 units.



Solution:

Process I A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Units introduced	20,000	—	Normal loss *	2,000	2,000
Materials		30,000	Abnormal loss **	500	1,250
Labor		10,000	Transfer to Process II #	17,500	43,750
Overheads		7,000			
Total	20,000	47,000	Total	20,000	47,000

* Normal loss is 10% of input i.e. 2,000 units, sale price of wastage if Rs.10 per unit

** Abnormal loss is computed as shown below.

❖ Normal production is 20,000 input – normal loss 2,000 = 18,000 units

❖ Actual production is 17,500 and so abnormal loss is 18,000 – 17,500 = 500 units

❖ Value of the abnormal loss = Rs.47, 000 [total cost of process as debited] – Rs.2000 [scrap value] = 45,000/18, 000 = Rs.2.50 per unit

The transfer from Process I to Process II is at the cost of Rs.2.50 which is computed as shown above

Process II A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Transfer from Process I A/c	17,500	43,750	Normal loss *	700	1,400
Materials		3,000	Transfer to Finished Stock @ Rs. 3.925 per unit ***	17,000	66,735
Labor		12,000			
Overheads		8,600			
Abnormal gain @ Rs.3.925 per unit **	200	785			
Total	17,700	68,135	Total	17,700	68,135

* Normal loss is 4% of input, i.e. 4% of 17,500 units = 700 units. The sale value of wastage is Rs.2 per unit.

** Abnormal gain and its value is computed as under

❖ Normal production = 17,500 input – 700 normal loss = 16, 800 units

❖ Actual production is 17,000 units and hence abnormal gain is 17,000 – 16. 800 = 200 units

❖ Value of abnormal gain = Rs. 67,350 [cost debited to Process II A/c – Rs.1,400 [scrap value]= Rs.65,950/16,800 [normal production units] = Rs. 3.925 per unit (approx)



Normal Loss A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Process I A/c	2,000	2,000	Abnormal Gain A/c	200	400
Process II A/c	700	1,400	Bank A/c		
			2,000 X Re.1 = 2,000	2,500	3,000
			500 X Rs.2 = 1,000		
	2,700	3,400		2,700	3,400

Abnormal Loss A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Process II A/c	500	1,250	Bank A/c – sale of scrap	500	500
			Profit and Loss A/c		750
	500	1,250		500	1,250

Abnormal Gain A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Normal Loss A/c	200	400	Process II A/c	200	785
Profit and Loss A/c		385			
	200	785		200	785

4. AB Ltd is engaged in the process engineering industry. During the month, October 2007, 2000 units were introduced in process 'X'. The normal loss is estimated at 5% of input. At the end of the month, 1400 units had been produced and transferred to process 'Y', 460 were incomplete units, and 140 units had to be scrapped at the end of the process. The incomplete units reached the following degree of completion:

Material: 75%, Labor: 50%, overheads: 50%

Following are the further details regarding process X.

Cost of 2000 units introduced: Rs. 58,000

Additional material consumed Rs. 14,400

Direct labor: Rs. 33,400

Allocated overheads: Rs. 16,700

Note: The scrapped units fetched Rs.10 each.

Required: [As per First In First Out Method]

- A] Statement of equivalent production
- B] Statement of cost
- C] Statement of evaluation
- D] Process 'X' Account.



Solution:

A] Statement of Equivalent Production

First In First Out Method

Input [Units]	Particulars	Output [Units]	Equivalent Units Materials	%	Equivalent Units Labor & Overheads	%
2,000	Introduced					
	Normal loss 5%	100	—	—	—	—
	Units completed & transferred to Process Y	1,400	1400	100	1400	100
	Abnormal loss *	40	40	100	40	100
	Closing work in progress	460	345	75	230	50
2000		2000	1785		1670	

B] Statement showing cost of each element

Particulars	Cost [Rs.]	Equivalent Units	Cost per Unit [Rs.]
Materials – introduced	58,000		
Additional material	14,400		
Total	72,400		
Less: Scrap value [100 units @ Rs10]	1,000		
	71,400	1785	40
Labor	33,400	1670	20
Allocated Overheads	16,700	1670	10
Total	1,21,500		70

C] Statement of Evaluation of Cost [Apportionment of Cost]

Particulars	Element	Equivalent Production	Cost Per Unit Rs.	Cost Rs.	Total Cost Rs.
Units introduced and completed	Material	1400	40	56,000	98,000
	Labor	1400	20	28,000	
	Overheads	1400	10	14,000	
Abnormal Loss	Material	40	40	1600	2,800
	Labor	40	20	800	
	Overheads	40	10	400	
Closing Stock	Material	345	40	13,800	20,700
	Labor	230	20	4,600	
	Overheads	230	10	2,300	
Total					1,21,500



Process X A/c

Dr.			Cr.		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Units introduced	2,000		Normal Loss	100	1,000
Material		58,000	Abnormal Loss	40*	2,800
Additional Material		14,400	Process Y	1400	98,000
Labor		33,400	Closing Stock	460	20,700
Overheads		16,700			
Total	2,000	1,22,500	Total	2,000	1,22,500

* Balancing figure

Note: The % column in the table showed in A, shows the % degree of completion.

5. Prepare a Statement of Equivalent Production, Cost Statements, Statement of Valuation and Process Account from the following particulars using First In First Out Method
 - A] Opening work in progress – 900 units @ Rs.4,500, degree of completion, material –100%, labor and overheads – 60%
 - B] Input of materials: 9100 units @ Rs.27,300, expenses: Labor Rs.12, 300, overheads Rs.8,200
 - C] Finished units transferred to next process – 7,800
 - D] Normal scrap – 10% of input, scrap realization @ Rs.3 per unit
 - E] Units scrapped- 1,200 units, degree of completion: material 100%, labor and overheads: 70%
 - F] Closing work in progress – 1000 units, degree of completion: material 100%, labor and overheads 80%

Solution:

- I] Statement of Equivalent Production [FIFO Method]

Input	Units	Output	Units	Material Units	%	Labor and Overheads	%
Op. Stock	900	Normal Loss	1,000	—	—	—	—
Newly Introduced Units	9,100	Abnormal Loss	200	200	100	140	70
		Units Completed:	900			360	40
		From Stock					
		Newly Introduced Units *	6,900	6,900	100	6,900	100
		Closing Stock	1,000	1,000	100	800	80
Total	10,000		10,000	8,100		8,200	



II] Statement of Cost

Particulars	Cost – Rs.	Equivalent Units	Cost per Unit Rs.
Material: Rs.27, 000 Less: Scrap: 3, 000	24, 000	8, 100	3.00
Labor	12, 300	8, 200	1.50
Overheads	8, 200	8, 200	1.00

III] Statement of Valuation/ Apportionment of Cost

Particulars	Element of Cost	Equivalent Units	Cost per Unit – Rs.	Cost Rs.	Total Rs.
I] Cost of completing of opening stock	Material	—	—	—	
	Labor	360	1.50	540	
	Overheads	360	1.00	360	900
II] Units introduced and completed and transferred	Material	6, 900	3.00	20, 700	
	Labor	6, 900	1.50	10, 350	
	Overheads	6, 900	1.00	6, 900	37, 950
III] Abnormal loss	Material	200	3.00	600	
	Labor	140	1.50	210	
	Overheads	140	1.00	140	950
IV] Closing Stock	Material	1, 000	3.00	3, 000	
	Labor	800	1.50	1, 200	
	Overheads	800	1.00	800	5, 000
Total					44, 800

IV] Process A/c

Debit

Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Opening WIP	900	4, 500	Normal loss	1000	3,000
Units introduced	9100		Transfer to next process **	7800	43, 350
Material		27, 300	Abnormal loss	200	950
Labor		12, 300	Closing stock	1000	5, 000
Overheads		8, 200			
Total	10, 000	52, 300	Total	10, 000	52, 300

** Cost of units transferred to next process is computed as under

- ❖ Cost already incurred on opening stock: Rs.4, 500
- ❖ Costs incurred to complete opening stock: Rs.900
- ❖ Costs of units introduced, completed and transferred: Rs.37, 950
- ❖ Total cost: Rs.43, 350



V] Abnormal Loss A/c

Debit

Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Process I A/c	200	950	Bank A/c - scrap	200	600
			Profit & Loss A/c		350
Total	200	950	Total	200	950

7. From the following particulars, prepare the following in the books of X Ltd.

I] Statement of equivalent production

II] Statement of apportionment of cost

III] Process Account

A] Opening stock as on 1st August: 200 units @ Rs. 4 per unit

B] Degree of completion: Materials 100%, Labor and Overheads: 40%

C] Units introduced during August: 1,050 units

D] Output transferred to the next process: 1,100 units

E] Closing stock: 150 units

F] Degree of completion: Materials 100%, Labor and Overheads: 70%

G] Other relevant information regarding the process,

❖ Materials: Rs.3,150

❖ Labor: Rs.4,500

❖ Overheads: Rs.2,250

Solution:

I] Statement of Equivalent Production

Input Units	Particulars	Output Units	Material E.Units	% of Completion	Labor & Overheads E.Units	% of Completion
200	Opening Stock					
1,050	Units introduced					
	Output					
	Completion of work on opening stock	200	—	—	120	60
	Units introduced and completed	900	900	100	900	100
	Closing stock	150	150	100	105	70
1,250		1,250	1,050		1,125	



II] Statement Of Cost Of Each Element

Element of Cost	Cost Rs.	Equivalent Production	Cost Per Unit Rs.
Material	3, 150	1, 050	3
Labor	4, 500	1, 125	4
Overheads	2, 250	1, 125	2
Total	9, 900		9

III] Statement of Apportionment of Cost

Particulars	Elements	Equivalent Production	Cost Per Unit Rs.	Cost Rs.	Total Rs.
1] Cost incurred to complete the work on Opening Stock	Material	—			
	Labor	120	4	480	
	Overheads	120	2	240	720
2] Units introduced and completed	Material	900	3	2700	
	Labor	900	4	3600	
	Overheads	900	2	1800	8,100
3] Closing Stock	Material	150	3	450	
	Labor	105	4	420	
	Overheads	105	2	210	1,080
					9,900

IV] Process A/c

Debit

Credit

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Opening Stock	200	800	Transfer to next Process *	1,100	9,620
Units Introduced	1,050		Closing Stock [WIP]	150	1,080
Materials		3,150			
Labor		4,500			
Overheads		2,250			
Total	1,250	10,700	Total	1,250	10,700

* Transfer to next process is calculated as shown under

- ❖ Cost incurred on opening stock already: Rs. 800
- ❖ Cost incurred to complete the opening work in progress [stock]: Rs. 720
- ❖ Cost of completion of units introduced in this process: Rs. 8,100. Total Rs. 9,620



Process Costing

- 7] Vinal Ltd. produces Article B from a material, which passes through two processes, namely P and Q. The details relating to a month are as under,

Particulars	Process P	Process Q
Materials introduced - units	10,000	
Transferred to next process	9,000	
Work in progress: At the beginning of the month – units		600
At the end of the month - units		400
Expenses: Work in progress – beginning of the month		
Materials introduced at the beginning of the month	Rs. 1,20,000	Rs. 9,400
Labor and overheads:	Rs. 27,600	Rs. 18,200

Stage of completion of work in progress:

Process P: Closing work in progress 20% complete in respect of labor and overheads

Process Q: Opening work in progress 33 1/3% complete in respect of labor and overheads

Closing work in progress 25% complete in respect of labor and overheads

The finished output B, emerging out of Process Q is sold for Rs. 20 per unit

The management is considering an alternative by which the finished output B could be further processed by installing a new machine at a capital cost of Rs. 8 lakhs. In such an event, the final product known as article N produced by this operation could be sold at Rs. 25 per unit. The operating expenses of the aforesaid further treatment are estimated at Rs. 23, 000. The company desires a return on investment of 25%

Required:

- I] Prepare the process cost accounts for Process P and Q [Show the working of equivalent units and cost per equivalent unit in each process according to FIFO method]
- II] Prepare a statement of profitability of Product B as it emerges from Process Q
- III] Advise the management whether further treatment of Product B by installing the new machine should be taken up or not.

Solution:

- I. A] Statement showing equivalent units – Process P

Units	Particulars	Materials Equivalent Units	% of completion	Labor and Overheads Equivalent Units	% of completion
9,000	Units completed	9,000	100	9,000	100
1,000	Closing stock	1,000	100	200	20
	Equivalent units	10,000		9,200	
	Expenses	Rs.1,20,000		Rs. 27,600	
	Cost per equivalent unit	Rs.12		Rs. 3	



I B] Statement of Apportionment of Cost – Process P

- ❖ Units completed: 9000 units × Rs.15 per unit [Rs.12 material + Rs.3 labor and overheads] = Rs.1, 35, 000
- ❖ Closing stock: 1000 units × Rs.12 [material cost] + 200 units × Rs.3 [labor and overheads] = Rs.12, 600

I. C] Statement of Equivalent Units – Process Q

Units	Particulars	Materials Equi.Units	% of completion	Labor and Overheads	% of completion
600	Opening stock [work completed]			400	66 $\frac{2}{3}$ %
8600	Units completed [9000 – 400 closing stock]	8, 600	100	8, 600	100
400	Closing stock work done	400	100	100	25
9, 600		9, 000		9, 100	
	Expenses	Rs.1, 35, 000		Rs.18, 200	

Cost per equivalent unit: Rs.1, 35, 000/9000 = Rs.15 [material] Rs.2 [labor & overheads]

I. D] Statement of Apportionment of Cost

- ❖ Cost of completed units: Rs.9, 400 + Rs.1, 35, 000 + Rs.18, 200 – Rs.6, 200 [closing stock as shown below] = Rs.1, 56, 400
- ❖ Cost of closing stock: 400 units × Rs.15 + 100 units × Rs.2 per unit = Rs.6, 200

I. E] Process P A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Materials	10, 000	1, 20, 000	Transfer to Process Q	9, 000	1, 35, 000
Labor and Overheads		27, 600	Closing stock	1, 000	12, 600
Total	10, 000	1, 47, 600	Total	10, 000	1, 47, 600

I. F] Process Q A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Opening stock	600	9, 400	Transfer to finished stock [Product B]	9, 200	1, 56, 400
Process P - Transfer	9000	1, 35, 000	Closing stock	400	6, 200
Labor & Overheads		18, 200			
Total	9600	1, 62, 600	Total	9600	1, 62, 600



II] Profitability of Product B

- ❖ Sales: 9200 units @ Rs.20 per unit = Rs.1, 84, 000
- ❖ Cost of production [shown above] = Rs.1, 56, 400
- ❖ Profit per month = Rs.27, 600

III] Further processing of Product B to Final Product N

Particulars	Amount Rs.	Amount Rs.
Sales: 9200 units @ Rs.25 of N		2, 30, 000
Cost of production:		
Up to product B stage	1, 56, 400	
Further processing	23, 000	1, 79, 400
Profit per month		50, 600
Profit without further processing		27, 600
Additional profit by further processing		23, 000 per month
Desired return on fresh investment	25% on Rs.8, 00, 000 = Rs.2, 00, 000 p.a. = Rs.16, 667 per month	

Further processing results in:

Additional profit per month of Rs.23, 000, which comes to a return of 34.5% [$\text{Rs.23, 000} \times 12 \times 100 / \text{Rs}8, 00, 000$] on the investments as against a target return of 25%

In view of this, further processing of Product B is recommended subject to any other consideration.

9. Following information is available regarding Process A for the month of August 2007

Production Record:

- ❖ Units in process as on 1st August: 4,000 [All materials used, 25% complete for labor and overheads]
- ❖ New units introduced: 16, 000
- ❖ Units completed: 14, 000
- ❖ Units in process as on 31st August 2007: 6,000 [All materials used, 33 1/3% complete for labor and overheads]

Cost Records:

- ❖ Work in process as on 1st August 2007
- ❖ Materials: Rs.6,000
- ❖ Labor: Rs.1,000
- ❖ Overheads: Rs.1,000



Cost during the month:

- ❖ Materials: Rs. 25, 600
- ❖ Labor: Rs.15, 000
- ❖ Overheads: Rs.15, 000

Presuming that Average Method of inventory is used, prepare,

- I] Statement of equivalent production
- II] Statement showing cost for each element
- III] Statement of apportionment of cost
- IV] Process Account

Solution:

- I] Statement of Equivalent Production – Average Cost

Input Units	Particulars	Output Units	Material E.P.	% of Completion	Labor & Overheads E.P.	% of Completion
4000	Opening Stock					
16000	New units introduced					
	Units completed	14000	14000	100	14000	100
	Closing Stock	6000	6000	100	2000	33.33
20000	Total	20000	20000		16000	

- II] Statement Showing Cost for each element

Elements of Cost	Cost of Opening WIP Rs.	Cost In Process Rs.	Total Cost Rs.	Equivalent Production	Cost per Unit Rs.
Material	6,000	25, 600	31, 600	20, 000	1.58
Labor	1,000	15, 000	16, 000	16, 000	1.00
Overheads	1,000	15, 000	16, 000	16, 000	1.00
Total	8,000	55, 600	63, 600		3.58

- III] Statement of Apportionment of Cost

Items	Elements	Equivalent Production	Cost Per Unit – Rs.	Cost Rs.	Total Cost Rs.
Units completed	Material	14, 000	1.58	22, 120	50, 120
	Labor	14, 000	1.00	14, 000	
	Overheads	14, 000	1.00	14, 000	
Closing Stock	Material	6, 000	1.58	9, 480	13, 480
	Labor	2, 000	1.00	2, 000	
	Overheads	2, 000	1.00	2, 000	
Total					63, 600



IV] Process A/c

Debit			Credit		
Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
Opening Stock	4000	8000	Units completed and Transferred	14,000	50,120
Units introduced	16,000		Closing Stock	6,000	13,480
Material		25,600			
Labor		15,000			
Overheads		15,000			
Total	20,000	63,600	Total	20,000	63,600

9. The following information is given in respect of Process No.3 for the month of January 2001.
- Opening stock: 2000 units made of,
- Direct Material I: Rs.12,350
- Direct Material II: Rs.13,200
- Direct Labor: Rs.17,500
- Overheads: Rs.11,000
- Transferred from Process No.2: 20,000 units @ Rs.6 per unit
- Transferred to Process No.4: 17,000 units
- Expenditure incurred in Process No.3:
- Direct Materials: Rs.30,000
- Direct Labor: Rs.60,000
- Overheads: Rs.60,000
- Scrap: 1,000 units: Degree of completion: Direct Materials. 100%, Direct Labor: 60%, Overheads. 40%, normal loss 10% of production
- Scrapped units realized @ Rs. 4 per unit.
- Closing stock: 4,000 units, degree of completion: Direct Materials 80%, Direct Labor 60% and overheads 40%
- Prepare Process 3 A/c using average price method, along with necessary supporting statements.



Solution:

Statement Showing Equivalent Production

Particulars	Total Units	Material I % Units	Material II % Units	Labor % Units	Overheads % Units
Units processed completely	17,000	100 17000	100 17000	100 17000	100 17000
Normal loss *	1,800				
Abnormal gain	- 800	100 - 800	100 - 800	100 - 800	100 - 800
Closing stock	4,000	100 4000	80 3200	60 2400	40 1600
Total	22,000	20200	19400	18600	17800

Statement of Cost

Particulars	Cost Rs.	Equivalent Units	Rate/Equivalent Units Rs.
Material I			
Opening Balance 2000 units	12,350		
Cost of 20000 units @ Rs.6 per unit	1,20,000		
Less: Scrap realized	7,200		
1800 units @ Rs.4 per unit			
Total	1,25,150	20,200	6.1955
Material II			
Opening Stock	13,200		
In Process III	30,000		
Total	43,200	19,400	2.2268
Labor			
Opening Labor	17,500		
In Process III	60,000		
Total	77,500	18,600	4.1667
Overheads			
Opening Stock	11,000		
In Process III	60,000		
Total	71,000	17,800	3.9888
Total cost per unit			16.5778



Statement Of Evaluation

Particulars	Amount Rs.
Cost of 17000 finished goods units @ Rs.16.5778 per unit	2, 81, 822
Cost of 800 abnormal gain units @ Rs.16.5778 per unit	13, 262
Cost of 4000 closing work in progress units	
Material I: 4000 units @ Rs.6.1955 = Rs.24782.00	
Material II: 3200 units @ Rs.2.2268 = Rs.7125.76	
Labor: 2400 units @ Rs.4.1667 = Rs.10, 000.08	
Overheads: 1600 units @ Rs.3.9888 = Rs.6382.08	
Total	48, 289.92

Dr. Process III A/c Cr

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Opening WIP	2000	54,050	By Normal Loss	1,800	7,200
To Process II	20000	1,20,000	By Finished Goods Units	17,000	2,81,822
To Direct Material II		30,000	By Closing Stock	4,000	48,290
To Direct Labor		60,000			
To Overheads		60,000			
To Abnormal Gain	800	13,262			
Total	22,800	3,37,312	Total	22,800	3,37,312

* Normal loss given in the example is 10% of the production. The opening stock plus receipts minus closing stock of WIP will be the production and hence the production will be 2000 units + 20000 units – 4000 units = 18000 units and so the normal loss is 1800 units

Inter Process Profits:

11. The following are the details in respect of Process X and Process Y of a processing factory.

Particulars	Process X Rs.	Process Y Rs.
Material	10, 000	
Labor	10, 000	14, 000
Overheads	4, 000	10, 000

The output of Process X is transferred to Process Y at a price calculated to give a profit of 20% on the transfer price and the output of Process Y is charged to finished stock at a profit of 25% on the transfer price. The finished department realized Rs.1, 00, 000 for the finished goods received from Process Y.



You are required to prepare Process Account and show the total profits assuming that there was no opening and no closing work-in-progress.

Solution:

Dr.		Process X A/c		Cr.	
Particulars	Amount Rs.	Particulars	Amount Rs		
To Materials	10,000	By Transfer to Process Y	30,000		
To Labor	10,000				
To Overheads	4,000				
To Profit [20% of transfer price, i.e. 25% on cost]	6,000				
Total	30,000	Total	30,000		

Dr.		Process Y A/c		Cr.	
Particulars	Amount Rs.	Particulars	Amount Rs		
To Transfer from Process X A/c	30,000	By Transfer to Process Y	72,000		
To Labor	14,000				
To Overheads	10,000				
To Profit [25% of transfer price, i.e. on cost]	18,000				
Total	72,000	Total	72,000		

Dr.		Profit and Loss A/c		Cr	
Particulars	Amount Rs.	Particulars	Amount Rs		
To Cost of Sales	72,000	By Sales	1,00,000		
To Profit c/d	28,000				
Total	1,00,000		1,00,000		
To Total Profit	52,000	By Profit b/c	28,000		
		By Profit:			
		Process X	6,000		
		Process Y	18,000		
Total	52,000	Total	52,000		

12. A certain product passes through three processes before it is completed. The output of each process is charged to next process at a price calculated to give a profit of 20% on transfer price.[i.e. 25% on the cost price] The output of Process III is charged to finished goods stock account on a similar basis. There was no work in progress at the beginning of the year and overheads had been ignored. Stocks in each process have been valued at prime cost of the processes.



Process Costing

The following data are obtained at the end of December 2007

Particulars	Process I Rs.	Process II Rs.	Process III Rs.	Finished Stock Rs
Direct Material	30,000	20,000	40,000	
Direct Wages	20,000	30,000	10,000	
Stock as on 31st December	10,000	20,000	30,000	30,000
Sales during the year	—	—	—	1,70,000

From the above information prepare,

- Process cost accounts showing the profit element at each stage
- Actual realized profit
- Stock valuation as would appear in the Balance Sheet

Solution:

The Process Accounts are shown below.

Dr.				Process I A/c				Cr
Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.	
To Material	30,000	30,000	—	By Transfer to Process II A/c	50,000	40,000	10,000	
To Wages	20,000	20,000	—					
Total	50,000	50,000	—					
Less:								
Closing Stock c/d	10,000	10,000	—					
Prime Cost	40,000	40,000	—					
Gross Profit 25% on cost	10,000	—	10,000					
Total	50,000	40,000	10,000	Total	50,000	40,000	10,000	
Stock b/d	10,000	—	10,000					

Dr.				Process II A/c				Cr.
Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.	
To Transfer from Process I	50,000	40,000	10,000	By Transfer to Process III	1,00,000	72,000	28,000	
To Materials	20,000	20,000	—					
To Wages	30,000	30,000	—					
Total	1,00,000	90,000	10,000					
Less: Closing Stock c/d	20,000	18,000	2,000					



Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
Prime Cost	80,000	72,000	8,000				
Gross Profit 25% on cost	20,000	—	20,000				
Total	1,00,000	72,000	28,000	Total	1,00,000	72,000	28,000
Stock b/d	20,000	28,000	2,000				

Dr. Cr. **Process III A/c**

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To Transfer from Process II	1,00,000	72,000	28,000	By Transfer to Finished Stock	1,50,000	97,600	52,400
To Materials	40,000	40,000	-----				
To Wages	10,000	10,000					
Total	1,50,000	1,22,000	28,000				
Less: Closing Stock c/d	30,000	24,400	5,600				
Prime Cost	1,20,000	97,600	22,400				
Gross Profit – 25% on cost	30,000	-----	30,000				
Total	1,50,000	97,600	52,400	Total	1,50,000	97,600	52,400

Dr. Cr. **Finished Stock A/c**

Particulars	Total Rs.	Cost Rs.	Profit Rs.	Particulars	Total Rs.	Cost Rs.	Profit Rs.
To Transfer from Process III	1,50,000	97,600	52,400	By Sales	1,70,000	78,080	91,920
Less: Stock c/d	30,000	19,520	10,480				
Total	1,20,000	78,080	41,920				
Gross Profit 25% on cost	50,000	---	50,000				
Total	1,70,000	78,080	91,920	Total	1,70,000	78,080	91,920
Stock b/d	30,000	19,520	10,480				

A] Calculation of profit on closing stock;

The amount of profit included in the closing stock can be computed with the help of the following formula.

$$\text{Cost of stock} = [\text{Cost column} / \text{Total column}] \times \text{Stock}$$

$$\text{Process I} = \text{Amount of profit} = \text{nil}$$

$$\text{Process II} = [\text{Cost column} / \text{Total column}] \times \text{Stock}$$

$$\text{❖ Rs.90,000} / \text{Rs.1,00,000} \times 20,000 = \text{Rs.18,000}$$

$$\text{❖ Profit} = \text{Rs.20,000} - \text{Rs.18,000} = \text{Rs.2,000}$$



Process Costing

Process III = $\text{Rs.}1,22,000 / 1,50,000 \times 30,000 = \text{Rs.}24,400$

Profit = $\text{Rs.}30,000 - \text{Rs.}24,400 = \text{Rs.}5,600$

Finished Stock: $\text{Rs.}97,600 / \text{Rs.}1,50,000 \times \text{Rs.}30,000 = \text{Rs.}19,520$

Profit = $\text{Rs.}30,000 - \text{Rs.}19,520 = \text{Rs.}10,480$

B] Actual Realized Profit Is As Shown Below:

Particulars	Apparent Profit from Process Rs.	Unrealized Profit in Closing Stock Rs.	Actual Profit [Gross] Rs.
Process I	10,000	Nil	10,000
Process II	20,000	2,000	18,000
Process III	30,000	5,600	24,400
Finished Stock	50,000	10,480	39,520
Total	1,10,000	18,080	91,920

C] Stock Valuation for Balance Sheet purpose:

Particulars	Amount Rs.
Process I	10,000
Process II	18,000
Process III	24,400
Finished Stock	19,520
Total	71,920



Question Bank – Process Costing

A] Essay Type

1. Discuss the distinguishing features of process costing.
2. What do you understand by 'normal loss' and 'abnormal loss'? How would you treat them in process cost accounts?
3. What is equivalent production? What is its effect on computed unit costs?
4. In what type of industries, a process costing system is generally applied? What would influence a cost accountant in deciding whether to apply a process or job cost system?
5. Describe the general features of process costing. Name three industries where process costing can be applied.
6. State the fundamental principles of process costing.
7. Discuss with figures the method of treatment of process loss and wastages under process costing method.
8. How will you deal with scrap material in process costs? Give a concrete example.
9. How process costs are determined under weighted average method? Mention the difference between the First In First Out method with regards to process cost and valuation of closing stock.
10. Discuss the justification of inter-process profits. What difficulties are faced in preparing the final accounts?

B] State whether the following statements are True or False.

1. Process cost system is not applicable to paper mills and textile mills.
2. In process costing, cost unit is a process.
3. Normal loss in a process is not avoidable.
4. Normally normal loss in a process is borne by good units while abnormal loss is valued and is shown in the process accounts.
5. In process costing, costs are compiled process wise.
6. Process costing is generally used in small scale industries.
7. Normal loss is finally transferred to the Costing Profit and Loss Account.
8. Equivalent units are computed when some units remain incomplete at the end of a particular period.
9. Waste does not have any realizable market value.
10. In process costing, cost per unit is the average cost.



Process Costing

C] Fill in the Blanks:

- a) Normal loss in a process is _____.
- b) Abnormal process losses are transferred to _____.
- c) Sale proceeds from abnormal losses are credited to _____ A/c.
- d) Abnormal loss is written to the _____ side of Process A/c.
- e) In _____ method of computing equivalent production, the cost of opening work in progress is not kept separate but is added to the costs incurred during the period.
- f) _____ and _____ are examples of scrap.

STUDY NOTE 7

Joint Product and By- Products

Learning Objectives

After studying this chapter, you should be able to,

1. Understand the meaning of joint products and by-products.
 2. Distinguish between the joint products and by-products.
 3. Understand the meaning of joint costs.
 4. Understand the methods of apportioning of the joint costs.
 5. Understand the decision-making criteria regarding the further processing of joint product and by-products.
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7.1 Introduction

In several industries more than one product emerge from the manufacturing process. These products are sometimes produced intentionally while in some cases they emerge out of the main manufacturing process. Such products are termed as either joint products or by-products. Though sometimes these terms are used interchangeably, there is a major difference between the two and therefore it is necessary to understand clearly the difference between them. Similarly there is a difference between the accounting of the two and hence it is essential to define clearly the concepts of joint products and by-products. In this chapter, these aspects are discussed in detail along with the accounting treatment of the joint products and by products.

7.2 Definitions

The difference between the joint products and by-products should be understood clearly. Joint products can be defined as distinctly different major products that are inevitably produced simultaneously from common inputs or by common processing. Thus from this definition the following features of joint product emerge.

- ❖ Joint products are the result of utilization of the same raw material and same processing operations. The processing of a particular raw material may result into the output of two or more products.
- ❖ All the products emerging from the manufacturing process are of the same economic importance. In other words, the sales value of those products may be more or less same and none of them can be termed as the major product.
- ❖ The products are produced intentionally which implies that the management of the concerned organization has intention to produce all the products.
- ❖ Some of joint products may require further processing or may be sold directly after the split off point.
- ❖ The manufacturing process and raw material requirement is common up to a certain stage of manufacturing. After the stage is crossed, further processing becomes different for each product. This stage is known as 'split off' point. The expenditure incurred up to the split off point is called as joint cost and the apportionment of the same to different products is the main objective of the joint product accounting.
- ❖ The management has little or no control over the relative quantities of the various products that will result.
- ❖ Joint products are commonly produced in industries like, chemicals, oil refining, mining, meat-packing, automobile etc. In oil refining, fuel, oil, petrol, diesel, kerosene, lubricating oil are few examples of the joint products.
- ❖ By-Product: The term 'by-products' is sometimes used synonymously with the term 'minor products'. The by-product is a secondary product, which incidentally results from the manufacture of a main product. By-products are also produced from the same raw material and same process operations but they are secondary results of operation. The main difference between the joint product and by-product is that there is no intention to produce the by-product while the joint products are produced



intentionally. The relationship between the by-product and the main product changes with changes in economic or industrial conditions or with advancement of science. What was once a by-product of an industry may become a main product and one time main product may become a by-product subsequently. For example, during the Second World War, glycerin, a by-product in soap making was in such a demand that it became virtually the main product while the soap was reduced to the by-product. What is by-product of one industry may be a main product of another industry. Normally in continuous process industry, the by-products emerge. Some of the examples of by-products are given below:

- ❖ In sugar manufacturing, bagasse [residual of sugarcane after the juice is extracted], molasses [residual of sugarcane juice after the impurities are taken out] and press mud are the three by-products, which emerge at different stages of manufacturing.
- ❖ In cotton textile, the cotton-seed, which is taken out before the manufacturing process, is a by-product.
 - The term 'multi product' or 'co-products' is occasionally used synonymously with the term joint products. However the difference between the multi-products and co-products is that co-products do not necessarily arise from the same process. Similarly change in the production of the co-product will not necessarily result in change in the production of the other. In this chapter, we have focused on joint product and by-products only.

7.3 Important Terms

Before we proceed to discuss the methods of accounting in case of joint products and by-products, it will be necessary to understand certain terms clearly. These terms are explained below:

- **Split Off Point:** This is a point up to which, input factors are commonly used for production of multiple products, which can be either joint products or by-products. After this point, the joint products or by-products gain individual identity. In other words, up to a certain stage, the manufacturing process is the same for all the products and a stage comes after which, the individual processing becomes different and distinct. For example, in a dairy, several products like, milk, ghee, butter, milk powder, ice-cream etc. may be produced. The common material is milk. The pasteurization of milk is a common process for all the products and after this process, each product has to be processed separately. This point is of special significance in the accounting of joint product and by-products because the joint cost incurred before this point is to be apportioned appropriately in the joint products.
- **Joint Costs:** Joint cost is the pre separation cost of commonly used input factors for the production of multiple products. In other words, all costs incurred before or up to the split off point are termed as joint costs or pre separation costs and the apportionment of these costs is the main objective of joint product accounting. Costs incurred after the split off point are post separation costs and can be easily identified with the products.

7.4 Accounting for Joint Product Cost

We have discussed earlier in this chapter that joint products means two or more products produced intentionally and with same inputs and having more or less the same economic value. In case of joint products, the main objective of accounting of the cost is to apportion the joint costs incurred up to the



split off point. As discussed earlier, the manufacturing process is same up to a certain stage and after crossing that stage; each product has distinct manufacturing process. Therefore the main problem is apportionment of the joint cost or the cost incurred up to the split off point. The total cost of production of the joint product will be cost incurred up to the split off point duly apportioned plus the cost incurred after the split off point. There is no problem of charging the cost incurred after the split off point as the cost can be identified easily. The main problem therefore is that of apportionment of the joint cost and the following methods are used for apportioning the same.

➤ **Methods of Apportionment of Joint Costs to Joint Products:** The following methods are used for apportionment:

I. **Physical Quantity Method:** Under this method, cost apportionment is made in proportion to the volume of production. These physical measures may be units, pounds, liters, kilos, tones, gallons etc. The following example will clarify the point.

Product	Quantity - kg	Proportion to total	Cost allocated	Cost per kg
A	30,000	1/2	Rs.1,80,000	Rs.6
B	20,000	1/3	Rs.1,20,000	Rs.6
C	10,000	1/6	Rs.60,000	Rs.6
Total	60,000		Rs.3,60,000	Rs.6

II. **Average Unit Cost Method:** Under this method, the joint cost is apportioned to the joint products by computing the average unit cost of the product units. The average unit cost is computed by dividing the total manufacturing cost by the total number of units produced of all products. This method is useful where all the products produced are uniform with each other in all the respects. This method will not be useful if the production units are not similar with each other.

III. **Weighted Average Method:** Under this method, weights are assigned to each unit based upon size of the units, difference in type of labor employed, material consumption, market share, efforts of labor required and so on. The joint cost is apportioned on the basis of the weights assigned to each product. This method is highly useful if the weights assigned are on objective basis. If subjective element creeps in, the method may not give accurate results.

IV. **Selling Price Method:** Under this method, the joint cost is apportioned on the basis of sales value at the split off point. The logic is that a product should bear the share of the joint cost according to its sale price. If sales price is higher than that of the other products, more share of joint cost should be charged to that product and if it is comparatively less than that of other products, less share of joint cost should be charged to the same. Though logically this method seems to be sound, in practice, charging higher share of joint cost to the product with higher sales value may not be justified due to the fact that lesser efforts are required for manufacturing of the same.

[All the above methods are illustrated in 'Solved Problems']

7.5 Accounting for by-products

By-products are jointly produced products of minor importance and do not have separate costs until the split off point. They are not produced intentionally but are emerging out of the manufacturing process of the main products. The following methods are used for accounting of by-products. The methods are broadly divided into Non-Cost Methods and Cost Methods.



- **Non-Cost Methods:** The following methods are included in this category.
 - I. **Other income or miscellaneous income method:** Under this method, sales value of by-products is credited to the Profit and Loss Account and no credit is given in the cost accounts. The credit to the profit and loss account is treated as other income or miscellaneous income. No effort is made for ascertaining the cost of the product. No valuation of inventory is made and all costs and expenses are charged to the main product. This is the least scientific method and is used where the sales value of the by-product is negligible.
 - II. **Total sales less total cost:** Under this method, sales value of by-product is added to the sales value of the main product. Further the total cost of the main product including the cost of the by-product is deducted from the sales revenue of the main product and by-product. All costs and expenses are charged to the main product.
 - III. **Total cost less sales value of by-product:** In this method, the total cost of production is reduced by the sales value of the by-product. This method seems to be more acceptable because like waste and scrap, by-product revenue reduces the cost of major products.
 - IV. **Total cost less sales value of by-products after setting off selling and distribution overheads of by-products:** Sales value of the by-product minus the selling and distribution overheads of by-product is deducted from the total cost. Selling and distribution overheads are charged against by-products actually sold.
 - V. **Reverse cost method:** This method is based on the view that the sales value of the by-product contains an element of profit. It is agreed that this element of profit should not be credited to the profit and loss account. The cost of by-product is arrived at by working backwards. Selling price of the by-product is deflated by an assumed gross profit margin. Thus under this method, sales value of the by-product is first reduced by, an estimated profit margin, selling and distribution expenses and then the post split off costs and then the cost of the main product is thus reduced by this net figure.
- **Cost Methods:** The following methods are included in this category.
 - I. **Replacement or opportunity cost method:** If the by-products are consumed captively, they are valued at the opportunity cost method or replacement cost method. This means the cost which would have been incurred had the by-product been purchased from outside. For example, bagasse, which is one of the main by-product of sugar industry and which is used for the factory as a fuel in the boiler is valued at the market value, i.e. the price that would have been paid if it would have been purchased from outside.
 - II. **Standard cost method:** Under this method, the by-product is valued at the standard cost determined for each product. The standard cost may be based on technical assessment. Standard cost of the by-product is credited to the process account of the main product. Accordingly, the cost control of main product can be exercised effectively.
 - III. **Joint cost proration:** Where the by-product is of some significance, it is appropriate that the joint costs should be apportioned between the main products and by-products on a most suitable and acceptable method. Thus in this method, no distinction is made between the joint product and by-product. Industries, where the by-products are quite important, use this method. For example, in a petroleum refinery, gas was earlier considered as a by-product. Now it has assumed the importance like petrol, diesel etc. and is being treated as joint product. Accordingly, the joint cost is prorated between the joint product and the by-product.



Joint Product and By-products

Problems and Solutions:

1. X Ltd. manufactures Product A, which yields two by-products B and C. The actual joint expenses of manufacture for a period were Rs.8, 000.

It was estimated that the profits on each product as a percentage of sales would be 30%, 25% and 15% respectively. Subsequent expenses were as follows:

Particulars	Product A	Product B	Product C
Materials	Rs.100	Rs.75	Rs.25
Direct wages	200	125	50
Overheads	150	125	75
Total	450	325	150
Sales	Rs. 6,000	Rs. 4,000	Rs. 2,500

Prepare a statement showing the apportionment of the joint expenses of manufacture over the different products. Also presume that selling expenses are apportioned over the products as a percentage to sales.

Solutions:

Statement showing the Apportionment of Cost

Particulars	Product A	Product B	Product C
Sales	Rs. 6,000	Rs. 4000	Rs. 2,500
Less: Profit [30%, 25%, 15% respectively]	1,800	1,000	375
Cost of Sales	4,200	3,000	2,125
Less: Selling Expenses *	192	128	80
Cost of Production	4,008	2,872	2,045
Less: Subsequent Expenses [As given]	450	325	1,50
Apportionment of Joint Costs [Rs.8000]	3,558	2,547	1,895

* Selling expenses are apportioned in the following manner

Total cost of sales: [Rs. 4200 + Rs. 3000 + Rs. 2125] = Rs. 9325

Total cost of production

[Total joint cost Rs. 8000 + subsequent expenses Rs. 925] = Rs. 8925

Apportioned in the ratio of sales: 12:8:5

2. In the course of manufacture of the main product 'P', A and B also emerge. The joint expenses of manufacture amount to Rs.1, 19, 550. All the products are processed further after separation and sold as per details given below.



Particulars	Main Product P Rs.	By-Product A Rs.	By – Product B Rs.
Sales	90,000	60,000	40,000
Cost beyond split off point	6,000	5,000	4,000
Profit as percentage of sales	25%	20%	15%

Selling and administration overheads are absorbed as a percentage of cost of sales. Prepare a statement showing the apportionment of joint cost to the main product and by-products. Also prepare main product 'P' account.

Solution:

Statement showing the Apportionment of Joint Costs

Particulars	Main Product P Rs.	By-product A Rs.	By-product B Rs.	Total
Sales	90,000	60,000	40,000	1,90,000
Less: Profit [25%, 20% and 15% respectively for P, A, and B]	22,500	12,000	6,000	40,500
Cost of Sales	67,500	48,000	34,000	1,49,500
Less: Selling Expenses [675:480: 340]	6,750	4,800	3,400	14,950*
Cost of production	60,750	43,200	30,600	1,34,550
Less: Cost after split off point	6,000	5,000	4,000	15,000
Value at split off point	54,750	38,200	26,600	1,19,550

P [Main Product] Account

Particulars	Amount –Rs.	Particulars	Amount – Rs.
To joint expenses of manufacture	1,19,550	By transfer of shares in joint expenses	
		By-product A	38,200
		By-product B	26,600
To separate expenses	6,000	By cost of product of P	60,750
Total	1,25,550	Total	1,25,550
To cost of product A	60,750	By Sales	90,000
To selling and administration expenses	6,750		
To profit	22,500		
Total	90,000	Total	90,000



Joint Product and By-products

3. In manufacturing the main product A, a company processes the resulting waste material into two by-products, M1 and M2. Using the method of working back from sales value to an estimated cost, you are required to prepare a comparative Profit and Loss Statement of the three products from the following data.

I] Total cost up to separation point was Rs.1, 36, 000

II] Additional data

Particulars	Product A	Product M1	Product M2
Sales [All production]	Rs.3,28,000	Rs.32,000	Rs.48, 000
Cost after separation	—	Rs.9,600	Rs.14, 400
Estimated net profit percentage to sales value	—	20%	30%
Estimated selling expenses as percentage of sales value	20%	20%	20%

Solution:

Statement showing Apportionment of Joint Costs

Particulars	By-product M1 – Rs.	By-product M2 –Rs.
Sales Value	32,000	48,000
Less: Estimated net profit: For M1: 20% of sales value For M2: 30% of sales value	6,400	14,400
Total cost of sales	25,600	33,600
Less: Estimated selling expenses [20% of sales value]	6,400	9,600
	19,200	24,000
Less: Cost after separation	9,600	14,400
Total cost up to separation	9,600	9,600

- ❖ Total cost up to separation point of main process: Rs.1, 36, 000
- ❖ Cost up to separation point as shown above:
- ❖ By-product M1: Rs.9, 600
- ❖ By-product M2: Rs.9, 600
- ❖ Total cost up to separation of the by-products: Rs.19, 200
- ❖ Cost up to separation for main product M2: Rs.1, 16, 800

Statement Showing Comparative Profit And Loss Account

Particulars	Total – Rs.	Main Product A –Rs.	By-Product M1- Rs.	By-Product M2 – Rs.
Cost up to separation	1,36,000	1,16,800	9,600	9,600
Cost after separation	24,000	v-	9,600	14,400



Particulars	Total – Rs	Main Product A –Rs	By-Product M1- Rs.	By-Product M2 – Rs.
Total cost [1]	1,60,000	1,16,800	19,200	24,000
Sales [2]	4,08,000	3,28,000	32,000	48,000
Gross profit [2-1]	2,48,000	2,11,200	12,800	24,000
Less: Selling expenses 20% of sales value	81,600	65,600	6,400	9,600
Net profit	1,66,400	1,45,600	6,400	14,400

4. In a concern engaged in process industry, four products emerge from a particular process of operation. The total cost of input for the period ended 30th September 2002 is Rs.2, 53, 500. The details of output, additional cost after 'split off point' and sales value of the products are appended below.

Product	Output - kg	Additional processing cost after split-off point – Rs.	Sales value Rs.
A	8, 000	60, 000	1,68,000
B	5, 000	10, 000	1,10,000
C	3, 000	—	60,000
D	4, 000	20, 000	90,000

If the products are sold at 'split off point' without further processing, the sales value would have been,

A: Rs.1, 15, 000

B: Rs.90, 000

C: Rs.55, 000

D: Rs.80, 000

You are required to prepare a statement of profitability based on the products being sold:

I] After further processing, and

II] At the split off point.

Solution:

Statement of Profitability after Further Processing

Product	Sales Value Rs.	Additional Processing Cost – Rs.	Equivalent Sales Value at Split off Point – Rs.	Share in Joint Cost Rs. *	Total Cost Rs.	Profit Rs
A	1, 68, 000	60, 000	1, 08, 000	81, 000	1, 41, 000	27, 000
B	1, 10, 000	10, 000	1, 00, 000	75, 000	85, 000	25, 000
C	60, 000	---	60, 000	45, 000	45, 000	15, 000



Joint Product and By-products

D	90,000	20,000	70,000	52,500	72,500	17,500
Total	4,28,000	90,000	3,38,000	2,53,500	3,43,500	84,500

*Joint cost is apportioned on the basis of equivalent sales value at the split off point.

Statement of Profitability if sold at Split off Point

Product	Sales Value – Rs.	Joint Cost Rs.#	Profit – Rs.
A	1,15,000	85,743	29,257
B	90,000	67,103	22,897
C	55,000	41,007	13,993
D	80,000	59,647	20,353
Total	3,40,000	2,53,500	86,500

Joint cost has been apportioned on the basis of sales value of different products.

5. JB Ltd. produces four joint products, A, B, C and D, all of which emerge from the processing of one raw material. The following are the relevant data:

Production for the period:

Joint Product	Number of Units	Selling Price per Unit Rs
A	500	18.00
B	900	8.00
C	400	4.00
D	200	11.00

The company budgets for a profit of 10% on sales value. The other estimated costs are:

Carriage inwards: Rs.1,000

Direct wages: Rs.3,000

Manufacturing overheads: Rs.2,000

Administration overheads: 10% of the sales value

You are required to,

- I] Calculate the maximum price that may be paid for the raw material
- II] Prepare a comprehensive cost statement for each of the products allocating the materials and other costs based up on: Number of units and Sales value.

Solution:

Note: First, the total cost of joint products will have to be find out and then the maximum price can be computed. For computing the total cost, the sales value is computed.

❖ Computation of Sales Value



Joint Product	Number of Units	Selling Price Per Unit – Rs.	Sales Value Rs.
A	500	18	9,000
B	900	8	7,200
C	400	4	1,600
D	200	11	2,200
Total			20,000

❖ Total Cost of Joint Products:

❖ Total Sales: Rs.20,000 – Rs.2,000 [Budgeted profit 10% of sales] = Rs.18,000

I] Computation of Maximum Price that may be paid for Raw Material:

Particulars	Amount – Rs.	Amount – Rs.
Cost of joint products [As shown above]		18,000
Less: Other Costs:	1,000	
❖ Carriage inwards	3,000	
❖ Direct wages	2,000	
❖ Manufacturing overheads	2,000	
❖ Administration overheads		
Total		8,000
Maximum price to be paid for the raw material		10,000

II] [a] Comprehensive Cost Statement Based on Units

Particulars	Joint Product A	Joint Product B	Joint Product C	Joint Product D	Total
Units	500	900	400	200	2000
	Rs.	Rs.	Rs.	Rs.	Rs.
Raw Material	2500	4500	2000	1000	10000
Carriage	250	450	200	100	1000
Direct wages	750	1350	600	300	3000
Manufacturing overheads	500	900	400	200	2000
Administration overheads	500	900	400	200	2000
Total cost	4500	8100	3600	1800	18,000

[b] Comprehensive Cost Statement [Based on Sales Value]

Particulars	Joint Product A	Joint Product B	Joint Product C	Joint Product D	Total
Units	500	900	400	200	2000
	Rs.	Rs.	Rs.	Rs.	Rs.



Joint Product and By-products

Raw Material	4500	3600	800	1100	10000
Carriage	450	360	80	110	1000
Direct wages	1350	1080	240	330	3000
Manufacturing overheads	900	720	160	220	2000
Administration overheads	900	720	160	220	2000
Total cost	8100	6480	1440	1980	18,000

6. A company purchases raw materials worth Rs.11.04 lakhs and processes them into four products, P, Q, R and S, which have a unit sales value of Rs.3, Rs.9, Rs.16 and Rs.60 respectively at split-off point, as they could be sold as such to other processors. However, during a year, the company decided to further process and sell products P, Q and S while R was not be processed further but sold at split off point to other processors. The processing of raw materials into the four products cost Rs.28 lakhs to the company. The other data for the year were as under:

Product	Output -Units	Sales Rs. in lakhs	Additional processing costs after split off [All variable costs] Rs. in lakhs
P	10,00,000	46.00	12.00
Q	20,000	4.00	2.40
R	10,000	1.60	-----
S	18,000	12.00	.40

You are required to work out the following information for managerial decision- making.

- I] If the joint costs are allocated amongst the four products on the basis of 'Net Realizable Value' at split off point, what would be the company's annual income?
- II] If the company had sold off all other three products at split off stage, identify the increase/ decrease in the company's annual income as compared to I above.
- III] What sales strategy could the company have planned to maximize its profit in the year?
- IV] Identify the net increase in income if the strategy at III is adopted, as compared to I above?

Solution:

I] Statement of Annual Income

Rs. In Lakhs

Product	Sales	Share of Joint Cost *	Additional Pro-cessing Cost After Split-off	Total Cost	Net Income
P	46.00	27.20	12.00	39.20	6.80
Q	4.00	1.28	2.40	3.68	0.32
R	1.60	1.28	—	1.28	0.32
S	12.00	9.28	0.40	9.68	2.32
Total	63.60	39.04	14.80	53.84	9.76



II] Statement of Annual Income if all Products are sold at Split-off Point

Rs. In lakhs

Particulars	Product P	Product Q	Product R	Product S	Total
Output Units	10, 00, 000	20, 000	10, 000	18, 000	
Sales value per unit Rs.	3	9	16	60	
Total sales value Rs.	30.00	1.80	1.60	10.80	44.20
Joint Cost Rs.	27.20	1.28	1.28	9.28	39.04
Net Profit	2.80	0.52	0.32	1.52	5.16

III] Suggestion: If the company accepts alternative II, it is clear that the annual income will be reduced by Rs.4.60 lakhs as compared to alternative I and hence the following alternatives can be suggested.

- ❖ Product P and S can be sold after further processing as they earn more profit as compared to if sold at split off point.
- ❖ Product Q could be sold at the split off point as it earns more profit if sold at the split off point.
- ❖ Product R could be sold at split off point as it earns the same profit under both the alternatives.

IV] Statement Showing Annual Income Under Suggestions in III

Rs. In lakhs

Particulars	Product P	Product Q	Product R	Product S	Total
Sales Value	46.00	1.80	1.60	12.00	61.40
Less: Costs					
Joint Cost	27.20	1.28	1.28	9.28	39.04
Additional Processing Cost after Split off	12.00	—	—	.40	12.40
Total Cost	39.20	1.28	1.28	9.68	51.44
Net Income [Sales Value – Total Cost]	6.80	.52	.32	2.32	9.96

It will be seen that the amount of profits has increased from Rs.9.76 lakhs in alternative I to Rs.9.96 lakhs and hence this option is recommended.

* The joint cost is apportioned to P,Q, R and S on the basis of Net Realizable Value as shown below.



Joint Product and By-products

Rs. In lakhs

Products	Sales Value	Additional Processing Cost	Net Realizable Value at Split off point	Joint Cost Determination
P	46.00	12.00	34.00	$39.04 \times 34.00 / 48.80 = 27.20$
Q	4.00	2.40	1.60	$39.04 \times 1.60 / 48.80 = 1.28$
R	1.60	—	1.60	$39.04 \times 1.60 / 48.80 = 1.28$
S	12.00	0.40	11.60	$39.04 \times 11.60 / 48.80 = 9.28$
Total				39.04

7. A firm manufactures three joint products, A, B, C and a by-product X by processing a common stock of material, which cost Rs.8 per kg. The details of output, market price and the initial processing cost for an input of 10,000 kg of raw material is as follows:

Product	Output - kg	Current Market Price/kg Rs.	Initial Processing Cost
A	5000	18	Direct labour 1000 hours @ Rs.20
B	2500	20	Variable overheads: 80% of direct labour
C	1500	24	Fixed overheads: Rs.21, 000
X	500	4	

The company apportions common cost among joint products on physical units basis.

All the by-products can be further processed further and sold at a higher market price, with some sales promotion efforts. The estimated processing cost, marketing cost and the final selling price are given below:

Product	Further processing cost per kg – Rs.	Further marketing cost per kg –Rs.	Final price per kg – Rs.
A	4	2	28
B	5	2	26
C	6	2	34
X	2	1	6

Required:

- Cost of joint products at the point of separation after initial processing. Comment on the method of apportioning joint costs.
- Profit or loss if the products are sold without further processing.
- Which of the products have to be processed further for maximizing profits? Show working.



Solution:

[a] Statement showing Cost of Joint Products at the Point of Separation

Particulars	Amount – Rs.
Raw material: 10,000 kg @ Rs.8 per kg	80,000
Direct labour: 1000 hours @ Rs.20 per hour	20,000
Variable overheads: 80% of variable overheads	16,000
Fixed overheads	21,000
Total Cost	1,37,000
Less: Sales value of by-product	2,000
Cost of joint product at the separation point	1,35,000

[b] Statement of Profit or Loss if the Products are sold without further Processing

Product	Quantity Kg	Proportion %	Joint Cost Allocation Rs.	Sales per Kg	Sales * Rs.	Profit # Rs.
A	5000	55.55	75,000	18	90,000	15,000
B	2500	27.78	37,500	20	50,000	12,500
C	1500	16.67	22,500	24	36,000	13,500
Total	9000	100.00	1,35,000		1,76,000	41,000

* Sales figures are computed by multiplying the quantity by the sales per kg

Profit is computed by deducting the joint cost from sales.

[c] Evaluation of Products to be Processed further for maximizing Profits

Product	Further Processing Cost Rs.	Incremental Revenue Rs.	Incremental Profit/Loss Rs.
A	6	10	4
B	7	6	[1]
C	8	10	2
D	3	2	[1]

Product A and C are giving incremental profit of Rs.4 and Rs.2 respectively if they are further processed and hence they can be processed further. Product B and D have loss if they are processed further. In this situation, they can be sold at split off point instead of further processing.



Question Bank – Joint Products and By-products

A] Essay Type

1. Define 'by-product' and 'joint products'. What is the difference between them? Give examples.
2. State the main objectives of analysis of costs and accounting of joint and by-products.
3. What is the basic cost accounting problem in dealing with joint products? Mention various methods of accounting for joint products.
4. In making a product, a valuable by-product is made. This by-product can be sold in the form in which it is produced or can be subjected to further processing, after which it is saleable at a higher price. Explain how you would present information to management to show the best way of dealing with the by-product.
5. Discuss the methods used for apportioning the joint costs in case of joint products.
6. What do you understand by 'split off point'? Explain with examples.
7. Discuss the methods of accounting of by-products in cost accounts.
8. Explain the distinction between co-products, by-products and waste. The method of accounting of by-products can be grouped under two broad type-non cost methods and cost methods. Outline four methods of valuing and costing by-products selecting two methods from each of the type mentioned above.
9. Discuss the methods of stock valuation in cost and financial accounts.
10. Explain fully the 'joint costs'

B] State whether the following statements are True or False

1. True joint costs are indivisible.
2. There is no clear distinction between joint products and by-products.
3. Joint products and co-products are one and the same.
4. Meat packing industry is a classic example of joint product costing.
5. Management may treat a joint product as a by-product.

STUDY NOTE 8

Inter-locking Accounts - Cost Control Accounts

Learning Objectives

After studying this topic, you should be able to understand,

1. Integrated and Non-integrated systems of cost accounting
2. Maintenance of cost accounting records under non-integrated system of cost accounting
3. Passing of journal and ledger entries under non-integrated system of cost accounting





8.1 Introduction

In cost accounting, the cost books are basically maintained under the following two systems. I] Non-integral or non-integrated cost accounting and II] Integral or integrated cost accounting. Where cost and financial accounts are maintained in a combined way, the system is called as integrated while if the records are maintained separately, the system is called as non-integrated system of maintaining accounts. Under the non-integrated system, separate ledgers are maintained for financial transactions while the cost accounts department is responsible for maintaining cost accounts. This system is discussed in the following paragraphs in detail.

8.2 Maintenance of Accounts

As maintained above, the finance department is responsible for maintaining the financial ledgers. This department maintains the following ledgers.

- **General ledger:** It includes all real, nominal and personal accounts except debtors and creditors accounts.
- **Debtors Ledger:** It contains the personal accounts of trade debtors.
- **Creditors Ledger:** It contains the personal accounts of trade creditors.

On the other hand, the cost accounting department maintains the following cost ledgers.

- Stores ledger for recording all stores transactions
- **Work-in-progress ledger:** Cost of materials, labour and overheads of all jobs, which are in progress, are posted to this account.
- **Finished goods/stock ledger:** This ledger has the record of finished goods/stock.
- **Cost ledger:** This ledger maintains the accounts relating to income and expenditure. The following accounts are maintained in this ledger.

A. Cost control accounts: These accounts are maintained to exercise control over the three subsidiary ledgers maintained above and also to complete the double entry in cost accounts. The important cost control accounts are as follows.

- I. Stores ledger control a/c
- II. Work-in-progress ledger control a/c
- III. Finished goods ledger control a/c
- IV. General ledger adjustment a/c

B. Other accounts: They include all other impersonal accounts [real as well as nominal] which effect costs, e.g. wages control account, factory overhead accounts, administration overhead account, selling and distribution overhead account, cost of sales account etc. Depending upon the requirement, the following additional accounts may also be maintained.

- Overhead suspense account
- Capital orders account
- Service orders account.



8.3 Treatment of Elements of Cost

The following treatment is given to the various elements of cost.

- **Materials:** Certain transactions relating to material are recorded in the financial accounts also. Examples of such transactions are purchase of material, return of materials. These transactions are recorded in financial as well as cost accounts. On the other hand, certain transactions like issue of materials from stores, transfer of material from one job to the other one, return of excess materials to stores are recorded in cost accounts only.
- **Labour:** Wages paid are recorded in the cost accounts through wages control account and the general ledger adjustment account.
- **Overheads:** Various types of overheads like production, administration and selling and distribution are absorbed to the products on some suitable basis. The production overhead accounts is credited with the amount of overheads absorbed and the work in progress account is credited. In case of administrative overhead account, the amount absorbed is credited to the administrative overhead account and finished stock account is debited. Selling and distribution overheads are credited to the selling and distribution overhead account and corresponding debit is given to the cost of sales account. Finally, the amount of under/over absorbed overheads is transferred to the Costing Profit and Loss A/c.

Problems and Solutions:

1. Pass Journal Entries in the Cost Books [non-integrated systems] for the following transactions.

[I] Materials worth Rs.25, 000 returned to stores from job

[II] Gross total wages paid Rs.48, 000. Employer's contribution to PF and State Insurance amount to Rs.2000. Wages analysis book detailed Rs.20, 000 direct labor, Rs.12, 000 towards indirect factory labour, Rs.10, 000 towards salaries to office staff and Rs.8, 000 for salaries to selling and distribution staff.

Solution:

Journal Entries

Date	Particulars	J.F.	Debit –Rs.	Credit- Rs.
01	Stores Ledger Control A/c Dr To Work-in-progress Control A/c [Being material returned from stores]		25, 000	25, 000
02	Wages Control A/c Dr To General Ledger Adjustment A/c To Provident Funds and Employees State Insurance A/c [Being gross total wages paid]		50, 000	48, 000 2, 000



Inter-locking Accounts - Cost Control Accounts

Date	Particulars	J.F.	Debit -Rs.	Credit- Rs.
03	Work-in-progress Control A/c Dr		20,000	
	Factory Overheads Control A/c Dr		12,000	
	Office Overheads Control A/c Dr		10,000	
	Selling Overheads Control A/c Dr		8,000	
	To Wages Control A/c			50,000
	[Being wages allocated]			

2. XYZ Ltd. is maintaining separate set of books for financial accounts and cost accounts. You are required to prepare accounts in cost books and trial balance for the year ended 31st March 2006.

Information Available From Financial Accounts:

- ❖ Sales: Rs.6,30,000
- ❖ Indirect wages: Production Rs.38,000, Administration Rs.22,000, Sales and distribution Rs.30,000
- ❖ Materials purchased: Rs.1,50,000
- ❖ Direct factory wages: Rs.2,30,000
- ❖ Production overheads: Rs.70,000
- ❖ Selling and distribution overheads: Rs.60,000
- ❖ Administration overheads: Rs.48,000

The data available from cost accounts for the period include the following:

- ❖ Raw materials issued to production as indirect material Rs.20,000
- ❖ Stores issued to production as direct materials Rs.1,15,000
- ❖ Raw materials of finished production Rs.4,05,000
- ❖ Cost of goods sold at finished goods stock valuation Rs.4,00,000
- ❖ Standard rate of production overhead absorption Re.0.50 per operating hour
- ❖ Rate of administration overhead absorption 20% of cost of production
- ❖ Rate of sales and distribution overhead absorption 10% of sales
- ❖ Actual operating hours worked 2,40,000



❖ There is no balance of stock on 1-4-2005

Solution:

Cost Ledger Control A/c

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
--	To Sales A/c		6, 30, 000		By Material Control A/c		1, 50, 000
	To Balance c/d		80, 000		By Wages Control A/c		3, 20, 000
					By Production Overheads Control A/c		70, 000
					By Administration Overhead Control A/c		48, 000
					By Selling & Distribution Overhead Control A/c		60, 000
					By Costing Profit & Loss A/c		62, 000
	Total		7, 10, 000		Total		7, 10, 000

Dr. Material Control A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Cost Ledger Control A/c		1, 50, 000		By Production Overhead Control A/c		20, 000
					By Work-in-progress Control A/c		1, 15, 000
					By Closing Stock – Raw Material		15, 000
	Total		1, 50, 000		Total		1, 50, 000

Dr. Wages Control A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Cost Ledger Control A/c		3, 20, 000		By Production Overhead Control A/c		38, 000
					By Administrative Overheads Control A/c		22, 000
					By Selling & Distribution Overhead Control A/c		30, 000



Dr.				Cr.			
Work-in-Progress Control A/c							
Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Material Control A/c		1, 15, 000		By Finished Goods Control A/c		4, 05, 000
	To Wages Control A/c		2, 30, 000		By Closing Work-in-progress		60, 000
	To Production Overhead Control A/c		1, 20, 000				
	Total		4, 65, 000		Total		4, 65, 000

Dr.				Cr.			
Finished Goods Control A/c							
Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Work-in-progress Control A/c		4,05,000		By Cost of Sales Control A/c		4,00,000
					By Closing Stock- Finished Goods		5,000
	Total		4,05,000		Total		4,05,000

Dr.				Cr.			
Cost of Sales Control A/c							
Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Administrative Overhead Control A/c		80,000		By Costing Profit & Loss A/c		5,43,000
	To Selling & Distribution Overhead Control A/c		63,000				
	To Finished Goods Control A/c		4,00,000				
	Total		5,43,000		Total		5,43,000

Dr.				Cr.			
Sales A/c							
Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Costing Profit & Loss A/c		6,30,000		By Cost Ledger Control A/c		6,30,000
	Total		6,30,000		Total		6,30,000



Inter-locking Accounts - Cost Control Accounts

Dr. Over/under absorbed Overhead A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Production Overhead Control		8,000		By Administrative Overhead Control A/c		10,000
	To S & D Overheads		27,000		By Costing P & L A/c		25,000
	Total		35,000		Total		35,000

Dr. Costing Profit and Loss A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Cost of Sales A/c		5,43,000		By Sales A/c		6,30,000
	To Over/under absorbed overhead A/c		25,000				
	To Cost ledger control A/c [Profit]		62,000				
	Total		6,30,000		Total		6,30,000

Trial Balance as on 31st March, 2006

Particulars	Debit Rs.	Credit Rs.
Cost ledger control A/c		80,000
Stock of Materials	15,000	
Work-in-progress	60,000	
Finished goods stock	5,000	
Total	80,000	80,000

3. The Profit and Loss Accounts is shown in the financial books of a company for the year ended 30th September, 2002 together with a statement of reconciliation between the profit as per financial and cost accounts is given below.

Profit and Loss Account for the Year Ended 30/9/2002

Particulars	Amount Rs.	Particulars	Amount Rs.
Opening Stock –R.M.	90,000	Sales	15,00,000
Opening Stock - WIP	50,000	Closing Stock – R.M.	98,000
Opening Stock - FG	70,000	Closing Stock - WIP	53,000
Raw material purchases	5,00,000	Closing Stock – F.G.	72,000
Direct wages	2,00,000	Miscellaneous receipts	45,000



Particulars	Amount Rs.	Particulars	Amount Rs.
Factory overheads	2, 00, 000		
Administrative expenses	1, 70, 000		
Selling and Distribution expenses	2, 20, 000		
Preliminary expenses written off	75, 000		
Debenture interest	30, 000		
Net profit	1, 63, 000		
Total	17, 68, 000	Total	17, 68, 000

Statement of Reconciliation of Profit as per Financial and Cost Accounts

Particulars	Amount Rs.	Amount Rs.
Profit as per financial accounts		1, 63, 000
I] Difference in valuation of stock		
Add: Raw materials –closing stock	1, 200	
Work-in-progress –opening stock	1, 300	
Finished goods – opening stock	2, 000	
Closing stock	1, 500	
Total [A]	5, 500	
Less: Raw materials – opening stock	1, 650	
Work – in –progress –closing stock	750	
Total [B]	2, 400	
A - B		3, 100
II] Other items		
Add: Preliminary expenses written off	75, 000	
Debenture interest	30, 000	
Less: Miscellaneous receipts	45, 000	60, 000
Profit as per Cost Accounts		2, 26, 100

You are required to prepare the following accounts as they would appear in the Costing Ledger

- i. Raw Material Control A/c
- ii. Work –in – progress Control A/c
- iii. Finished Goods Control A/c
- iv. Cost of Sales A/c
- v. Costing Profit and Loss A/c



Inter-locking Accounts - Cost Control Accounts

Solution: The following basic computations are made before preparing the ledger accounts.

Particulars	As Per Financial Accounts – Rs.	Valuation Difference – Rs.	As Per Cost Accounts – Rs.
Raw Materials			
Opening Stock	90,000	+ 1650	91,650
Closing Stock	98,000	+ 1200	99,200
Work-in-progress			
Opening Stock	50,000	- 1300	48,700
Closing Stock	53,000	- 750	52,250
Finished Goods			
Opening Stock	70,000	- 2000	68,000
Closing Stock	72,000	+ 1000	73,000

Dr. Raw Material Control A/c Cr.

Date	Particulars	J.F.	Amount	Date	Particulars	J.F.	Amount
	To Balance b/d		91,650		By WIP Control		4,92,450 *
	To G.L.Adjustment		5,00,000		By Balance c/d		99,200
	Total		5,91,650		Total		5,91,650

* Balancing figure

Dr. WIP Control A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To balance b/d		48,700		By Finished goods control A/c [Balancing figure]		8,88,900
	To Raw Material Control A/c		4,92,450		By Balance c/d		52,250
	To wages control A/c		2,00,000				
	To Factory overhead control A/c		2,00,000				
	Total		9,41,150		Total		9,41,150



Dr.				Cr.			
Finished Goods Control A/c							
Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Balance b/d		68,000		By Cost of Sales A/c [Balancing figure]		10,53,900
	To WIP Control A/c		8,88,900		By Balance c/d		73,000
	To Administrative Overheads Control A/c		1,70,000				
	Total		11,26,900		Total		11,26,900

Dr.				Cr.			
Cost of Sales A/c							
Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Finished Goods Control A/c		10,53,990		By General Ledger Adjustment A/c		15,00,000
	To Selling and Distribution Control A/c		2,20,000				
	To Profit transferred to Profit & Loss A/c		2,26,100				
	Total		15,00,000		Total		15,00,000

Dr.				Cr.			
Costing Profit & Loss A/c							
Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
	To Balance transferred to General Ledger Adjustment A/c		2,26,100		By Cost of Sales A/c		2,26,100
	Total		2,26,100		Total		2,26,100



Question Bank

Cost Control Accounts

A] Essay Type Questions

1. What do you understand by integral and non-integral system of accounting? What is a general ledger adjustment account?
2. What procedure you would adopt in order to reconcile, at the end of an accounting period, the overheads charged in cost accounts with that shown in the financial accounting?
3. Explain a] General ledger adjustment account. b] Stores ledger control account. c] Work in progress ledger control account. d] Finished goods ledger control account.
4. What are the advantages of control accounts?
5. A] State the advantages of maintaining a cost ledger.
B] Insert specimen entries in the following accounts of a cost ledger, explaining from what sources such entries are normally obtained, stores ledger control account, work in progress ledger control account, finished stock ledger control account, cost of sales account.

B] State whether the following statements are True or False

1. The purpose of cost control accounts is to control the cost of production.
2. Cost control accounts is a system of integrating cost and financial accounts.
3. Cost control accounts are prepared on the fundamental principles of double entry book-keeping.
4. Selling and distribution costs incurred are credited to selling and distribution overheads accounts.
5. Posting in wages control accounts are made from wage analysis sheet.
6. Debit balance in administration overhead account represents over absorbed overheads.
7. Finished goods ledger control account will always have a debit balance.

C] Fill in the blanks:

1. In _____ ledger, an account is maintained for each job.
2. _____ is the principal ledger of the costing department in which impersonal accounts are maintained.
3. The balance of _____ account represents in total the balances of the stores accounts.
4. The balance in cost of sales account is transferred to _____ .
5. The balance in overhead adjustment account is transferred to _____ account.



D] Select the correct answer in each of the following.

1. In non-integrated system of accounting, the main emphasis is on A] Personal accounts B] Real Accounts C] Nominal accounts D] None of these.
2. Costing Profit and Loss A/c does not record the, A] Sales value of the goods B] Balance of overhead adjustment account C] Balance of cost of sales account D] Balance of stores ledger control account.
3. The closing balance of cost of sales account is transferred to A] Cost ledger control account B] Selling and distribution overhead account C] Costing Profit and Loss A/c
4. Which of the following accounts makes the cost ledger self-balancing? A] Overhead adjustment account B] Costing Profit and Loss A/c C] Cost ledger control account D] None of these.

STUDY NOTE 9

Integrated Accounting System

Learning Objectives

After studying this topic, you should be able to,

1. Understand the meaning and nature of Integrated Accounting System
2. Understand the various types of integrated accounts maintained
3. Understand the benefits accruing from such a system of accounting.





9.1 Introduction

In the integrated accounting system, separate set of accounts under cost accounting and financial accounting systems are not maintained. The accounts are integrated and only a single set of accounts are maintained. This enables a firm to eliminate separate Profit and Loss Accounts under financial accounting and cost accounting systems and only one Profit and Loss Account is prepared. Thus there is no question of two separate amounts of profits being disclosed from the two different set of books. The need for reconciliation of profits shown by cost accounts and financial accounts is therefore is eliminated. This chapter proposes to discuss the mechanics of this integrated system of accounting.

9.2 Meaning and Features

As mentioned above, under this system of preparing accounts, financial and cost accounts are integrated. In other words, a single book keeping system, which contains both financial and cost accounts is known as integral accounting system. The need for reconciliation between the profits shown by cost accounts and financial accounts is eliminated totally as only one set of books of accounts is maintained. The benefits of this system are as follows.

9.3 Benefits from Integrated Accounting System

The benefits of integrated accounting system are as follows:

- A. As only one set of accounting records is kept, the need for reconciliation between the profits shown by the two records is eliminated.
- B. The duplication of work is eliminated, thus the cost of operating this system is reduced.
- C. This method is simple to understand and easy to operate. Unnecessary complications are eliminated.
- D. Cost data can be available promptly and regularly.
- E. There is a cross checking of various figures in cost as well as financial accounts. This ensures accuracy of figures of cost and financial data.
- F. Use of mechanized accounting methods can be made.

9.4 Working Mechanics of Integrated Accounting System

Before accepting this system, the management has to decide about the degree of integration that is planned. Some of the firms integrate accounts up to the stage of prime cost or factory cost. Sometimes the entire record is integrated. The following accounts are normally maintained under this system.

- A. **Main Accounts:** The following accounts are mainly kept.
 - I. **Stock Control Accounts:** This accounts is prepared for the following items:
 - a. **Raw Materials:** Opening stock and purchases are debited to this account while the materials issued are credited. The balance represents the raw material on hand at the end of the period.



- b. **Work-in-progress:** The opening stock of work-in-progress and factory overheads are debited to this account while the cost of finished goods is credited. The closing stock, if any, is carried forward to the next period.
 - c. **Finished Stock:** This account is known as finished goods account also. It is debited with the finished goods and credited with cost of sales.
- II. **Cost of Sales Account:** The Cost of goods sold is debited to this account and the finished goods account is credited.
 - III. **Assets Accounts:** These accounts are opened for each of the fixed assets possessed by the firm. For example, accounts are maintained for assets like Plant and Machinery, Furniture and Fixtures, Land and Building, Vehicles and other such fixed assets owned by the firm. Transactions connected with the fixed assets are entered in these accounts. For example, the purchases are debited while depreciation as well as any disposal of such assets is credited to these accounts.
 - IV. **Debtors and Creditors Control Account:** Transactions connected with debtors and creditors are recorded in these accounts. The balance shown by debtors account should tally with the sales ledger while the balance shown by creditors account should tally with the purchase ledger.
 - V. **Prepaid Expenses and Outstanding Expenses Account:** These accounts are maintained for recording any prepaid expenses or any expenses due but not paid, i.e. outstanding expenses. The prepaid amount is debited to the prepaid account and credited to overhead control accounts. Thus it is ensured that the expenses, which is related to the period only is charged to the work-in-progress account. In case of outstanding expenses, the outstanding expenses account is credited and the overhead control account is debited. At the time of actual payment, the expenses outstanding account is debited and corresponding credit is given to either cash account or bank account or it is adjusted through overhead control account.
 - VI. **Direct Wages and Overhead Costs Control Accounts:** When these costs are incurred, the appropriate control accounts are debited and cash account is credited. Thus, when direct wages are paid, they are debited to direct labor control account and transferred to the work-in-progress account on the debit side. Appropriate overhead control account is credited. In case the actual payment do not tally with the expenditure related to that period, appropriate adjustment is made.
 - VII. **Cost Center Account:** An account is kept for each department or cost center. This helps in knowing the cost of a department and controlling costs associated with different departments.
 - VIII. **Cash Account:** All cash receipts and payments are recorded in this account.

9.5 Interlocking Accounts

Cost and Financial Accounts are said to be interlocked, when independent set of books are maintained for each of them. These accounts are interlocked through control accounts maintained in the two sets of books. Cost Ledger Control Account is maintained in the financial books and a General Ledger Adjustment Account is maintained in costing books. In this manner, connection between the two sets of books is maintained. In costing books, all entries relating to fixed assets, cash etc. are posted in General Ledger Adjustment Account. In case it is desired to integrate the two trial balances into one, the Cost Ledger Control Account and General Ledger Adjustment Account can be omitted because they are maintained on 'contra' principle.



The 'integration' as discussed in the above paragraphs, aims at maintenance of only one set of books in which all transactions are recorded. By eliminating, cost ledger, all control accounts are maintained in the general ledger. The main benefit of integration is elimination of two sets of records and thus the need for reconciliation is eliminated. Integration is beneficial from economy angle also as considerable cost can be saved through maintaining only one set of records. However due to some difficulties, that may crop up in the implementation of the same, sometimes 'interlocking' of accounts is preferred. For example, a separate Cost Accounting Department may become necessary considering the growing importance of cost accounting and hence an 'interlocking' accounting system may have to be operated.

9.6 Accounting Entries

The journal entries under integral and non-integral accounting systems are given in the following table.

Items	Non-integrated System Financial Books	Non-integrated System Cost Books	Integrated Systems
1. Purchase of Materials	Purchase A/c Dr To Purchase Ledger To Purchase Ledger Control A/c [or creditors]	Stores Ledger Control A/c – Dr. To General Ledger Adjustment A/c	Stores Ledger Control A/c To Creditors A/c
2. Issue of materials for production	No entry	Work-in-progress Ledger Control A/c Dr To Stores Ledger Control A/c	Work-in-progress A/c Dr To Stores Ledger Control A/c
3. Payment of wages	Wages A/c Dr To Cash/bank A/c	Wages A/c/ Wages Control A/c Dr. To General Ledger Adjustment A/c	Wages A/c / Wages Control A/c Dr To Cash A/c
4. Analysis and distribution of wages	No entry	Work-in-progress Control A/c Dr [Direct labor] Factory overhead Control A/c Dr [Factory indirect labour] Administration Overhead Control A/c Dr [Admn.indirect labour] S & D overhead Control A/c Dr To wages Control A/c	Work-in-progress Control A/c Dr Factory overhead A/c Dr Administration Overhead Control A/c Dr S & D Overhead Control A/c Dr To Wages Control A/c



Items	Non-integrated System Financial Books	Non-integrated System Cost Books	Integrated Systems
5. Payment for indirect expenses like power, repairs etc.	Expenses A/c Dr To Cash A/c To Creditors A/c	Factory/Adm/S & D Overhead A/c Dr To General Ledger Adjustment A/c	Factory/Adm/S & D Overhead A/c Dr To Cash A/c To Creditors A/c
6. Recording of Factory Overheads at pre determined rates	No entry	Work-in-progress Control A/c Dr To Factory Overheads Control A/c	Work-in-progress Control A/c Dr To Factory Overheads Control A/c
7. Factory Overheads over absorbed	No entry	Factory Overhead Control A/c Dr To Costing Profit & Loss A/c	Factory Overhead Control A/c Dr To Costing Profit & Loss A/c
8. Jobs completed	No entry	Stock Ledger Control A/c Dr To work-in-progress Ledger Control A/c	Stock Ledger Control A/c Dr To work-in-progress Ledger Control A/c
9. Interest paid	Interest A/c Dr To Cash A/c	No entry	Interest A/c Dr To Cash A/c
10. Rent of own premises	No entry	Works Overhead A/c To General Ledger Adjustment A/c	Works Overhead A/c Dr To Rent [notional] A/c
11. Abnormal idle time	No entry	Costing P & L A/c Dr To Wages A/c	P & L A/c Dr To Wages A/c
12. Sales [Credit]	Sales Ledger Control A/c Dr To Sales A/c	General Ledger Adjustment A/c Dr To Cost of Sales A/c	Sales Ledger Control A/c Dr To Sales A/c



Problems and Solutions

1. Journalize the following transactions in the integrated books of account in the books of XYZ Ltd.

Particulars	Amount Rs.
Credit purchases	12, 00, 000
Production wages paid	7, 00, 000
Stocks issued to production orders	8, 00, 000
Work expenses charged to production	4, 50, 000
Finished goods transferred from production orders	18, 00, 000
Administration expenses charged to production	1, 50, 000
Work expenses outstanding	1, 20, 000
Work expenses paid	4, 60, 000

Solution: The journal entries passed are as under:

Journal Entries Under Integral System of Accounting

Date	Particulars	L.F.	Debit – Rs.	Credit – Rs.
01	Store Ledger Control A/c – Dr. To Sundry Creditors A/c [Being goods purchased on credit]		12, 00, 000	12, 00, 000
02	Wages Control A/c – Dr To Cash/Bank A/c [Being wages paid]		7, 00, 000	7, 00, 000
03	Work-in-progress Control A/c Dr To Stores Ledger Control A/c [Being stores issued against production orders]		8, 00, 000	8, 00, 000
04	Work-in-progress Control A/c – Dr. To Production Overhead Control A/c [Being the work expenses allocated to production/ jobs]		4, 50, 000	4, 50, 000
05	Finished Goods Ledger Control A/c – Dr To Work-in-progress Ledger Control A/c [Being goods finished during the year transferred to finished goods account]		18, 00, 000	18, 00, 000



Date	Particulars	L.F.	Debit – Rs.	Credit – Rs.
06	Work-in-progress Control A/c – Dr. To Administration Overhead Control A/c [Being administrative overheads charged to production]		1, 50, 000	1, 50, 000
07	Production Overhead Control A/c – Dr. To Outstanding Works Overheads A/c [Being outstanding production overheads recorded in the books]		1, 20, 000	1, 20, 000
08	Overhead Control A/c – Dr. To Cash/Bank A/c [Being the works expenses paid]		4, 60, 000	4, 60, 000

2. Journalize the following transactions assuming that the cost and financial accounts are integrated.

- ❖ Raw materials purchased: Rs.40, 000
- ❖ Direct materials issued to production: Rs.30, 000
- ❖ Wages paid [30% direct]: Rs.24, 000
- ❖ Direct wages charged to production: Rs.16, 800
- ❖ Manufacturing expenses incurred: Rs.19, 000
- ❖ Manufacturing overheads charged to production: Rs.18, 400
- ❖ Selling and distribution costs: Rs.4, 000
- ❖ Finished products [At cost] : Rs.40, 000
- ❖ Sales: Rs.58, 000
- ❖ Closing stock: Nil
- ❖ Receipts from debtors: Rs.13, 800
- ❖ Payment to creditors: Rs.22, 000



Solution:

Journal Entries

Date	Particulars	L.F.	Debit – Rs.	Credit – Rs.
01	Stores Ledger Control A/c – Dr. To Sundry Creditors A/c [Being materials purchased]		40,000	40,000
02	Work-in-progress ledger control A/c Dr To Stores Ledger Control A/c [Being material issued to production]		30,000	30,000
03	Wages Control A/c – Dr. To Bank A/c [Being wages paid including 30% indirect wages]		24,000	24,000
04	Factory Overheads A/c – Dr. To Wages Control A/c [Being the indirect wages charged to production]		7,200	7,200
05	Work-in-progress Ledger Control A/c Dr To Wages Control A/c [Being the direct wages charged to the production]		16,800	16,00
06	Factory Overheads A/c – Dr. To Bank A/c [Being the manufacturing overheads incurred]		19,000	19,000
07	Work-in-progress Ledger Control A/c Dr To Factory Overheads A/c [Being the overheads charged to production]		18,400	18,400
08	Selling and Distribution Overheads A/c Dr To Bank A/c [Being selling and distribution costs incurred]		4,000	4,000
09	Finished Stock Ledger Control A/c Dr To Work-in-progress Ledger Control A/c [Being cost of production transferred to Finished Stock Ledger Control A/c]		40,000	40,000



Date	Particulars	L.F.	Debit – Rs.	Credit – Rs.
10	Cost Of Sales A/c Dr To Finished Stock Ledger Control A/c To Selling And Distribution Overheads A/c [Being the cost of finished units] *		44, 000	40, 000 4, 000
11	Sales Ledger Control A/c – Dr To Cost of Sales A/c [Being the amount of Sales]		58, 000	58, 000
12	Bank A/c Dr To Sales Ledger Control A/c [Being amount received from debtors]		13, 800	13, 800
13	Bought Ledger Control A/c Dr To Bank A/c [Being the amount paid to sundry creditors]		2, 200	2, 200

* On the assumption that all units produced are sold and selling and distribution overheads are charged to production.

3. From the following transactions, pass the journal entries under an integral accounting system
- Issued materials Rs.3, 00, 000 out of which Rs.2, 80, 000 [standard Rs.2, 40, 000] is direct material
 - Net wages paid Rs.70, 000, deductions being Rs.12, 000 [standard Rs.75, 000]
 - Gross salaries payable for the period Rs.26, 000 [standard Rs.25, 000] deductions Rs.2, 000
 - Sales [credit] Rs.8, 00, 000
 - Discount allowed Rs.5, 000
 - Salaries and wages allocation Rs.60, 000 –direct and out of balance of Rs.42, 000, 50% production, 30% administration and 20% selling and distribution overheads

Solution:

Journal Entries

Date	Particulars	L.F.	Debit – Rs.	Credit – Rs.
01	Work-in-progress Control A/c Dr Material Price Variance A/c Dr Production Overheads Control A/c Dr To Stores Ledger Control A/c [Being the issue of materials and the work in progress control account is debited with standard cost]		2, 40, 000 40, 000 20, 000	3, 00, 000



Date	Particulars	L.F.	Debit – Rs.	Credit – Rs.
02	Wages Control A/c Dr Wage Variance A/c Dr To Deductions A/c To Cash A/c [Being the net wages paid Rs. 70,000, standard wages debited to wages control account Rs.75,000 and difference debited to the wage variance account]		75,000 7,000	12,000 70,000
03	Salaries Control A/c Dr Salaries Variance A/c Dr To Deductions A/c To Cash A/c [Being gross salaries control account debited with standard salaries, variance debited to salaries variance account and net salaries paid credited to cash account]		25,000 1,000	2,000 24,000
04	Debtors Control A/c Dr To Sales A/c [Being the goods sold on credit]		8,00,000	8,00,000
05	Selling Overheads A/c Dr To Debtors A/c [Being discount allowed to debtors]		5,000	5,000
06	Work-in-progress Control A/c Dr Production Overheads A/c Dr Administration Overheads A/c Dr Selling and Distribution Overheads A/c Dr To Wages Control A/c To Salaries Control A/c To Wages Variance A/c [Being the allocation of salaries and wages in direct and indirect and charging of the same to the appropriate accounts]		62,000 20,000 12,000 8,000	75,000 25,000 2,000



4. The following are the extracts of balances of X Co Ltd. in its integrated ledgers as on 1st January 2007.

Particulars	Debit – Rs.	Credit – Rs.
Stores Control A/c	36,000	
Work-in-progress A/c	34,000	
Finished goods A/c	26,000	
Cash at bank	20,000	
Creditors Control A/c		16,000
Fixed Assets A/c	1,10,000	
Debtors Control A/c	24,000	
Share Capital A/c		1,60,000
Depreciation Provision A/c		10,000
Profit & Loss A/c		64,000
Total	2,50,000	2,50,000

Transactions for the twelve months ended on 31st December 2007 were as follows:

- ❖ Direct wages: Rs.1, 74, 000
- ❖ Indirect wages: Rs.10, 000
- ❖ Stores purchased on credit: Rs.2, 00, 000
- ❖ Stores issued to repair order: Rs.4, 000
- ❖ Stores issued to production: Rs.2, 20, 000
- ❖ Goods finished during the period at cost: Rs.4, 30, 000
- ❖ Goods sold at sales value [on credit]: Rs.6, 00, 000
- ❖ Goods sold at cost: Rs.4, 40, 000
- ❖ Production overhead recovered: Rs.96, 000 #
- ❖ Production overheads: Rs.80, 000 #
- ❖ Administration overheads: Rs.24, 000 #
- ❖ Selling and Distribution overheads: Rs.28, 000 #
- ❖ Depreciation [works]: Rs.2, 600
- ❖ Payment to suppliers: Rs.2, 02, 000 paid by cheque
- ❖ Payments by customers: Rs.5, 80, 000 paid by cheque
- ❖ Rates prepaid included in production overheads incurred: Rs.600
- ❖ Purchases of fixed assets: Rs.4, 000 #



Integrated Accounting System

- ❖ Charitable donation: Rs.2, 000 #
- ❖ Fines paid: Rs.1, 000 #
- ❖ Interest on bank loan: Rs.200 #
- ❖ Income Tax: Rs.40, 000 # [Note # indicates paid by cheque]

You are required to write up the accounts in the integral ledger and make out a trial balance. The administration overhead is written off to the Profit and Loss A/c

Solution: Integral Ledger of X Co. Ltd.

Dr. Stores Control Account Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Jan 1	To Balance B/d		36, 000	Dec. 31	By work-in-progress		2, 20, 000
Dec. 31	To Creditors Control A/c		2, 00, 000	Dec. 31	By Production Overheads		4, 000
				Dec. 31	By Balance c/d		12, 000
	Total		2, 36, 000		Total		2, 36, 000

Dr. Wages Control A/c Cr.

Date	Particulars	L.F.	Amount Rs.	Date	Particulars	L.F.	Amount Rs.
Dec. 31	To Bank A/c		1, 84, 000	Dec. 31	By work in progress a/c		1, 74, 000
				Dec. 31	By Production Overhead Control A/c		10, 000
	Total		1, 84, 000		Total		1, 84, 000

Dr. Production Overhead Control A/c Cr.

Date	Particulars	L.F.	Amount Rs.	Date	Particulars	L.F.	Amount Rs.
Dec. 31	To Wages Control A/c		10, 000	Dec. 31	By Prepayments A/c -Rent		600
Dec. 31	To Stores Control A/c		4, 000	Dec. 31	By Work-in-progress A/c		96, 000
Dec. 31	To Bank A/c		80, 000				
Dec. 31	To Depreciation Provision A/c		2, 600				
	Total		96, 600		Total		96, 600



Dr. Administration Overheads A/c Cr.

Date	Particulars	L.F.	Amount Rs.	Date	Particulars	L.F.	Amount Rs.
Dec.31	To Bank A/c		24,000	Dec. 31	By Costing Profit & Loss A/c		24,000
	Total		24,000		Total		24,000

Selling and Distribution Overhead A/c

Date	Particulars	L.F.	Amount Rs.	Date	Particulars	L.F.	Amount Rs.
Dec. 31	To Bank A/c		28,000	Dec. 31	By Cost of Sales A/c		28,000
	Total		28,000		Total		28,000

Work- in- Progress A/c

Date	Particulars	L.F.	Amount Rs.	Date	Particulars	L.F.	Amount Rs.
Jan 1	To Balance b/d		34,000	Dec. 31	By Finished Goods A/c		4,30,000
Dec. 31	To Wages Control A/c		1,74,000				
Dec. 31	To Stores Control A/c		2,20,000				
Dec. 31	To Production Overhead A/c		96,000	Dec. 31	By Balance c/d		94,000
	Total		5,24,000		Total		5,24,000
Jan 1	To Balance b/d		94,000				

Dr. Finished Goods Account Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Jan 1	To Balance c/d		26,000	Dec.31	By Cost of Sales A/c		4,40,000
Jan 1	To Work in progress A/c		4,30,000	Dec.31	By Balance c/d		16,000
	Total		4,56,000		Total		4,56,000



Dr. Cost of Sales A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Dec.31	To Finished Goods A/c		4, 40, 000	Dec.31	By Costing Profit & Loss A/c		4, 68, 000
Dec.31	To Selling & Distribution Overheads A/c		28, 000				
	Total		4, 68, 000		Total		4, 68, 000

Costing Profit & Loss A/c for the year ended 31st December 2007

Dr. Cr.

Particulars	Amount Rs.	Particulars	Amount Rs.
To Cost of Sales A/c	4, 68, 000	By Debtors Control A/c	6, 00, 000
To Administration Overheads A/c	24, 000		
To Profit & Loss A/c	1, 08, 000		
Total	6, 00, 000	Total	6, 00, 000

Profit & Loss A/c for the year ended 31st December 2007

Dr. Cr.

Particulars	Amount Rs.	Particulars	Amount Rs.
To Charitable donation	2, 000	By Balance b/d	64, 000
To Fines	1, 000	By Costing Profit & Loss A/c	1, 08, 000
To Interest on bank loan	200		
To Income tax	40, 000		
To Net Profit for the year	1, 28, 800		
Total	1, 72, 000	Total	1, 72, 000

Dr. Prepayment A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Dec. 31	To Production Overhead a/c		600	Dec. 31	By Balance c/d		600
	Total		600		Total		600



Dr. Depreciation Provision A/c Cr

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Dec. 31	To Balance c/d		12,600	Jan. 1	By Balance b/d		10,000
				Dec. 31	By Production Overhead a/c		2,600
	Total		12,600		Total		12,600

Dr. Creditors Control A/c Cr

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Dec. 31	To Bank		2,02,000	Jan. 1	By Balance b/d		16,000
Dec. 31	To Balance c/d		14,000	Dec.31	By Stores Control a/c		2,00,000
	Total		2,16,000		Total		2,16,000

Dr. Debtors Control A/c Cr

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Jan. 1	To Balance b/d		24,000	Dec.31	By Bank A/c		5,80,000
Dec. 31	To Cost of Sales A/c		6,00,000	Dec.31	By Balance c/d		44,000
	Total		6,24,000		Total		6,24,000

Dr. Bank Account Cr

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Jan. 1	To Balance b/d		20,000	Dec. 31	By Wages Control A/c		1,84,000
Dec. 31	To Debtors Control A/c		5,80,000	Dec. 31	By Fixed asset A/c		4,000
				Dec. 31	By Production overheads A/c		80,000
				Dec. 31	By Administration overhead A/c		24,000
				Dec. 31	By Selling & distribution overhead A/c		28,000
				Dec. 31	By Creditors control A/c		2,02,000



Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
				Dec. 31	By Fines		1,000
				Dec. 31	By Charitable donation		2,000
				Dec. 31	By Interest on bank loan		200
				Dec. 31	By Income tax		40,000
				Dec. 31	By Balance c/d		34,800
	Total		6,00,000		Total		6,00,000

Dr. Fixed Assets A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Jan. 1	To Balance b/d		1,10,000	Dec. 31	By Balance c/d		1,14,000
Dec. 31	To Bank A/c		4,000				
	Total		1,14,000		Total		1,14,000

Dr. Share Capital A/c Cr.

Date	Particulars	J.F.	Amount Rs.	Date	Particulars	J.F.	Amount Rs.
Dec. 31	To Balance c/d		1,60,000	Jan. 1	By Balance b/d		1,60,000
	Total		1,60,000		Total		1,60,000

Trial Balance is shown on the next page

Trial Balance

Particulars	Debit – Rs.	Credit – Rs.
Stores Control A/c	12,000	
Work-in-progress A/c	94,000	
Finished goods A/c	16,000	
Cash at bank	34,800	
Creditors control A/c		14,000
Fixed assets A/c	1,14,000	
Debtors control A/c	44,000	
Share capital A/c		1,60,000
Depreciation provision A/c		12,600



Particulars	Debit – Rs.	Credit – Rs.
Prepayments A/c	600	
Profit and Loss A/c		1, 28, 800
Total	3, 15, 400	3, 15, 400

5. From the following particulars, you are required to pass Journal entries in the books of X Ltd.

- ❖ Materials purchased on credit: Rs.1, 48, 000
- ❖ Wages paid: Rs.1, 68, 000
- ❖ Wages productive: Rs.1, 48, 000
- ❖ Wages unproductive: Rs.20, 000
- ❖ Materials issued to production: Rs.1, 28, 000
- ❖ Works express incurred: Rs.65, 000
- ❖ Works expenses charged to production: Rs.86, 000
- ❖ Office and administration expenses paid: Rs.44, 000
- ❖ Office and administration expenses charged to production: Rs.43, 500
- ❖ Selling overheads paid: Rs.45, 000
- ❖ Selling overheads charged to sales: Rs.45, 000
- ❖ Sales credit: Rs.3, 90, 000

Journal Entries

Date	Particulars	L.F.	Debit Rs.	Credit Rs.
01	Stores Ledger Control A/c Dr. To Creditors A/c [Being the stores purchased on credit]		1, 48, 000	1, 48, 000
02	Wages Control A/c Dr. To Cash A/c [Being wages paid]		1, 68, 000	1, 68, 000
03	Work-in-progress Control A/c Dr. To Wages Control A/c [Being the wages charged to production]		1, 48, 000	1, 48, 000
04	Works Expenses Control A/c Dr To Wages Control A/c [Being the indirect wages charged to the works expenses account]		20, 000	20, 000



Integrated Accounting System

Date	Particulars	L.F.	Debit Rs.	Credit Rs.
05	Work –in- progress Control A/c Dr To Stores Ledger Control A/c [Being materials issued to production]		1, 28, 000	1, 28, 000
06	Works Expenses Control A/c Dr To Cash A/c [Being the works expenses paid]		65, 000	65, 000
07	Work-in-progress Control A/c Dr. To Works Expenses Control A/c [Being the works expenses charged to production]		86, 000	86, 000
08	Office and Administrative Control A/c Dr. To Cash A/c [Being the office and administrative expenses paid]		44, 000	44, 000
09	Work-in-progress Control A/c Dr. To Office and Administrative Control A/c [Being office and administrative expenses charged to the production]		43, 500	43, 500
10	Cost of Sales A/c Dr. To Work-in-progress A/c [Being the finished goods transferred]		3, 00, 000	3, 00, 000
11	Selling Expenses Control A/c Dr. To Cash A/c [Being the selling expenses incurred]		45, 000	45, 000
12	Cost of Sales A/c Dr. To Selling Expenses Control A/c [Being selling expenses charged to sales]		45, 000	45, 000
13	Debtors A/c Dr. To Sales A/c [Being sales made on credit]		3, 90, 000	3, 90, 000



Question Bank

A. Essay Type

1. What do you understand by 'integrated accounts'? What are the principles involved in the same? State the advantages of 'integrated accounts'.
2. Write a short essay on 'integration of cost and financial accounts.'
3. It is proposed to integrate the cost and financial accounts in a company in which they have been previously separate. State the advantages to be derived from this process and the main adjustments to procedure, which will be needed. Also show how the process might affect the organization of the cost departments and its relation to other departments.
4. Basically there are two methods of keeping the books of account – explain these two methods.

STUDY NOTE 10

Reconciliation of Cost and Financial Accounts

Learning Objectives

After studying this topic, you should be able to,

1. Understand the concept of reconciliation between the cost and financial accounts.
2. Understand the need for the reconciliation.
3. Understand the methodology to be used for preparing the reconciliation statements.





10.1 Introduction

In financial accounting, a bank reconciliation statement is prepared to reconcile between the bank balance as shown by the pass- book and cash- book of a business organization. This statement is prepared when there is a difference between the balances as shown by both these books. On the same principle, a reconciliation statement is prepared in cost accounts for reconciling the profits shown by the cost accounts and financial accounts. Obviously this is required when the profits shown by both the methods differ. Profit shown by the cost accounts and financial accounts differ when accounts are kept on non-integrated system, which means that cost accounts and financial accounts are prepared separately and independently of each other. In such a case, profit disclosed by one accounting system will differ from the profit shown by the other and need for reconciliation will arise. The reasons for this difference and the method of preparing the reconciliation is discussed in this chapter.

10.2 Reasons for Difference in Profit

The profit shown by financial accounts and cost accounts differ on account of the following reasons.

- I] ***Items of Financial Nature not recorded in Cost Accounts:*** The following items are not recorded in cost accounts as they are of purely financial nature and consequently the profits differ as these items are recorded in the financial accounts.
- Interest received on bank deposits.
 - Dividend, interest received on investments.
 - Rent received
 - Losses on sale of assets
 - Bad debts written off, recovered
 - Transfer fees received
 - Interest on proprietor's capital
 - Fines and penalties payable
 - Compensation payable.
- II] ***Items Charged to Profit and Loss Account but not Recorded in Cost Accounts:*** The following items are found in the cost accounts but not recorded in the financial accounts.
- Corporate taxes
 - Appropriations out of profits, such as transfer of profits to reserves
 - Certain payments like dividend
 - Additional provisions of depreciation
 - Certain amounts written off such as goodwill, patents, preliminary expenses, underwriting commission etc.
- III] ***Items Peculiar in Cost Accounts:*** The items described below are peculiar in cost accounts while their treatment in financial accounts is different. Hence there is a difference between the profits shown by both the systems



- **Overheads:** In cost accounts, overheads are finally absorbed in the products by computing the predetermined rate of absorption. In such cases, there may be under/over absorption of overheads. This means that the overheads actually incurred will not tally with the overheads charged to the product. In financial accounts overheads are always taken at actual basis irrespective of under/over absorption of the same. In such cases the profits shown by both the systems will differ. However, if the under/over absorbed overheads are charged to the costing profit and loss account, the profits shown by financial accounts and cost accounts will not differ.
- **Valuation of Closing Stock and Work-in-Progress:** The principle of valuation of closing stock in financial statements is cost price or market price whichever is less. However, in cost accounts, valuation of closing stock may be made on the basis of marginal costing where only the variable costs are taken into consideration while valuing the closing stock. Thus the closing stock valuation may differ. Work-in-Progress in cost accounts is often valued on the basis of prime cost and sometimes variable manufacturing overheads are added in the same. On the other hand, in financial accounting, work-in-progress may be valued after taking into consideration administrative expenses also. Due to this difference in valuation, profits shown by cost accounts and financial accounts differ.
- **Abnormal Losses and Gains:** In cost accounts, abnormal losses and gains are computed and transferred to the Costing Profit and Loss A/c. No such computation is made in the financial accounts. This results in difference between the profits shown by cost accounts and financial accounts.

10.3 Methodology for Preparing Reconciliation Statement

Reconciliation between the profits shown by cost accounts and financial accounts is made by the same method as is followed in the Bank Reconciliation Statement. Beginning to this statement may be made from either the profits as per the financial accounts or cost accounts. The items, which are responsible for the difference between the two are either added or deducted from the profits taken in the beginning. After addition or deduction, the profit as shown by the other method is arrived at. Thus if the beginning is made from profits as shown by cost accounts, we will arrive at the profits as shown by the financial accounts and vice versa. The following steps are to be taken for preparing this statement.

- The starting point may be either profit shown by cost accounts or financial accounts.
- If the profit as taken in the beginning is reduced due to the various causes given, these items should be added in the profits.
- If the profit as taken in the beginning is increased due to the various causes given, these items should be deducted from the profits.
- After completion of these additions and deductions, we will arrive at the profit as shown by the other system, i.e. if profits as per cost accounts is taken in the beginning, we will arrive at the profit as shown by financial accounts and vice versa.



Reconciliation of Cost and Financial Accounts

Reconciliation of Cost and Financial Accounts

Problems and Solutions

1. Prepare a Reconciliation Statement from the following particulars:

Particulars	Amount – Rs.
Profit as per cost accounts	2,91,000
Works overheads under-recovered	19,000
Administration overheads under - recovered	45,500
Selling overheads over - recovered	39,000
Overvaluation of opening stock in cost accounts	30,000
Overvaluation of closing stock in cost accounts	15,000
Interest earned during the year	7,500
Rent received during the year	54,000
Bad debts written off during the year	18,000
Preliminary expenses written off during the year	36,000
Profit as per financial accounts	2,88,000

Solution:

Reconciliation Statement

Particulars	Amount – Rs.	Amount – Rs.
Profit as per cost accounts		2,91,000
Add:		
❖ Over-recovery of selling overheads	39,000	
❖ Over-valuation of opening stock in cost accounts		
❖ Interest earned not recorded in cost a/cs	30,000	
❖ Rent received not recorded in cost a/cs	7,500	
❖ Total	54,000	1,30,500
Total		4,21,500
Less:		
❖ Under recovery of work overheads	19,000	
❖ Under recovery of administrative overheads		
❖ Over-valuation of closing stock in cost a/cs	45,500	
❖ Bad debts not recorded in cost a/cs	15,000	
❖ Preliminary expenses written off not recorded in cost a/cs	18,000	
❖ Total	36,000	1,33,500
Profit as per Financial Accounts		2,88,000



2. The following information is available from the financial books of a company having a normal production capacity of 60, 000 units for the year ended 31st March 2007.
- Sales Rs.10, 00, 000 [50, 000 units]
 - There was no opening and closing of finished units.
 - Direct material and direct wages cost were Rs.5, 00, 000 and Rs.2, 50, 000 respectively
 - Actual factory expenses were Rs.1, 50, 000 of which 60% are fixed
 - Actual administration expenses were Rs.45, 000, which are completely fixed.
 - Actual selling and distribution expenses were Rs.30, 000 out of which, 40% are fixed.
 - Interest and dividends received Rs.15, 000.

You are required to,

- Find out profits as per financial books for the year ended 31st March 2007.
- Prepare cost sheet and ascertain the profit as per the cost accounts for the year ended 31st March 2007.
- Prepare a statement reconciling profits shown by financial and cost books.

Solution:

A] Computation of Profit as per Financial Accounts

Profit and Loss A/c

For the Year ended 31st March 2007

Debit		Credit	
Particulars	Amount – Rs.	Particulars	Amount – Rs.
To Direct Material	5, 00, 000	By Sales – 50, 000 units	10, 00, 000
To Direct Wages	2, 50, 000	By Interest & Dividends	15, 000
To Factory Expenses	1, 50, 000		
To Administrative Expenses	45, 000		
To Selling & Distribution Expenses	30, 000		
To Net Profit	40, 000		
Total	10, 15, 000	Total	10, 15, 000



Reconciliation of Cost and Financial Accounts

B] Cost – Sheet

Particulars	Amount – Rs.	Amount – Rs.
❖ Direct Materials		5,00,000
❖ Direct Wages		2,50,000
• Prime Cost		7,50,000
❖ Factory Overheads		
➤ Variable	60,000	
➤ Fixed: Rs.90,000 X 5/6	75,000	
➤ Total		1,35,000
• Works Cost		8,85,000
❖ Administrative Expenses: Rs.45000 × 5/6		37,500
• Cost of Production		9,22,500
❖ Selling & Distribution Overheads		
➤ Variable	18,000	
➤ Fixed Rs.12,000 × 5/6	10,000	
➤ Total		28,000
• Cost of Sales		9,50,500
❖ Profit		49,500
❖ Sales		10,00,000

C] Statement of Reconciliation

Particulars	Amount – Rs.	Amount – Rs.
Profit as per Cost Accounts		49,500
Add: Income from interest and dividends excluded in Cost Accounts	15,000	15,000
Total		64,500



Particulars	Amount – Rs.	Amount – Rs.
Less:		
Factory overheads undercharged in Cost Accounts	15, 000	
Administrative overheads undercharged in Cost Accounts	7, 500	
Selling & Distribution overheads undercharged in Cost Accounts	2, 000	
Total		24, 500
Profits as per Financial Accounts		40, 000

3. From the following particulars, prepare

- a] A statement of cost of manufacture for the year,
- b] A statement of profit as per cost accounts
- c] Profit and Loss Accounts in financial books and,
- d] Reconciliation of the difference in the profits as shown by b] and c] above,

Opening stock of raw materials: Rs.1, 00, 000

Closing stock of raw materials: Rs.1, 50, 000

Opening stock of finished product: Rs.2, 00, 000

Closing stock of finished product: Rs.50, 000

Purchases of raw materials: Rs.6, 00, 000

Wages: Rs.2, 50, 000

Charge factory overhead at 25% on prime cost. Office overheads will be levied at 75% on factory overheads. Actual works expenditure amounted to Rs.1, 93, 750 and actual office expenses amounted to Rs.1, 52, 500. The selling price was fixed at 25% above cost price.

Solution:

A] Statement of Cost of Production

Particulars	Amount Rs.	Amount Rs.
Material consumed:		
Opening Stock	1, 00, 000	
Add: Purchases	6, 00, 000	
Less: Closing Stock	1, 50, 000	5, 50, 000
Wages		2, 50, 000



Reconciliation of Cost and Financial Accounts

Particulars	Amount Rs.	Amount Rs.
Prime Cost [Material consumed + wages]		8,00,000
Factory overheads 25% on prime cost		2,00,000
Works Cost		10,00,000
Office Overheads 75% on factory overheads		1,50,000
Cost of Production		11,50,000

B] Statement Showing Profit as per Cost Accounts

Particulars	Amount – Rs.
Opening Stock – finished goods	2,00,000
Add: Cost of production [Statement A]	11,50,000
	13,50,000
Less: Closing stock – finished goods	50,000
Cost of goods sold	13,00,000
Profit 25% on cost	3,25,000
Sales	16,25,000

C] Profit and Loss Account- [Financial Books]

Debit

Credit

Particulars	Amount – Rs.	Particulars	Amount – Rs.
To Opening Stock		By Sales	16,25,000
Raw Material	1,00,000		
Finished Stock	2,00,000	By Closing Stock	
		Raw Materials	1,50,000
To Purchases	6,00,000	Finished Stock	50,000
To Wages	2,50,000		
To Works Expenditure	1,93,750		
To Office Expenses	1,52,500		
To Profit	3,28,750		
Total	18,25,000	Total	18,25,000



D] Statement of Reconciliation of Profit

Particulars	Amount – Rs.
Profit as per Financial Books	3, 28, 750
Add: Office overheads under-absorbed in cost accounts	2, 500
Total	3, 31, 250
Less: Factory overheads over-absorbed in cost accounts [Rs.2, 00, 000 – Rs.1, 93, 750]	6, 250
Profit as per Cost Accounts	3, 25, 000

4. The Profit and Loss A/c of XYZ Ltd. for the year ended 31st March, 2007 was as follows:

Profit and Loss A/c for the Year ended 31st March 2007

Debit

Credit

Particulars	Amount – Rs.	Particulars	Amount – Rs.
To Materials	4, 80, 000	By Sales	9, 60, 000
To Wages	3, 60, 000	By Work-in-progress	
To Direct Expenses	2, 40, 000	Materials	30, 000
To Gross Profit	1, 20, 000	Wages	18, 000
		Direct Expenses	12, 000
		By Closing Stock	1, 80, 000
Total	12, 00, 000	Total	12, 00, 000
To Administration Expenses	60, 000	By Gross Profit	1, 20, 000
To Net Profit	66, 000	By Dividends Received	6, 000
Total	1, 26, 000	Total	1, 26, 000

As per the cost records, the direct expenses have been estimated at a cost of Rs.30 per kg and administration expenses at Rs.15 per kg. During the year production was 6000 kg and sales were 4 800 kg.



Reconciliation of Cost and Financial Accounts

Prepare a statement of Costing Profit and Loss A/c and reconcile the profit with financial profit.

Solution:

Statement Showing Profit as per cost Accounts

Particulars	Amount – Rs.	Amount – Rs.
Purchase of materials:	4, 80, 000	
Less: Work-in-progress	30, 000	4, 50, 000
Wages	3, 60, 000	
Less: Work-in-progress	18, 000	3, 42, 000
Direct expenses: Rs.30 per kg × 6000 kg		1, 80, 000
Administrative expenses: Rs.15 per kg × 6000 kg		90, 000
Cost of production of 6000 units		10, 62, 000
Less: Closing stock – 1200 units *		2, 12, 400
Cost of goods sold – 4800 units		8, 49, 600
Sales		9, 60, 000
Profit as per cost accounts		1, 10, 400

* Value of closing stock is computed as shown below:

For 6000 units, the cost of production is Rs.10, 62, 000, so for 1200 units, the cost of production will be, Rs.10, 62, 000 /6000 × 1200 = Rs.2, 12, 400

B] Reconciliation Statement

Particulars	Amount – Rs.
Profit as per Cost Accounts	1, 10, 400
Add: Over-absorption of administrative overheads in cost accounts *	30, 000
Add: Dividends received recorded in financial accounts only	6, 000
Total	1, 46, 400
Less: Over valuation of closing stock: Rs.32, 400 **	
Under absorption of direct	
Expenses in cost accounts: Rs.48, 000 ***	
Total	80, 400
Profit as per financial accounts	66, 000

* Administration overheads incurred are Rs.60,000 as per the financial accounts. However, in cost accounts, the amount charged is Rs.90, 000 as the per unit administrative overheads are Rs.15per kg and the total production during the year was 6000 kg, which means the administrative overheads recovered in cost accounts are Rs.90, 000 thus resulting in over-absorption of Rs.30, 000.

** Closing stock as per financial accounts is Rs.1, 80, 000 while as per cost accounts the value comes as Rs.2, 12, 400, hence over valuation of Rs.32, 400 in cost accounts.

*** Direct expenses as per financial accounts are Rs.2, 28, 000 [Rs.2, 40, 000 – Rs.12, 000 WIP] while in cost accounts, the amount recovered is Rs.1, 80, 000.



5. From the following Profit and Loss A/c, prepare a Memorandum Reconciliation Account, showing the profit as per the Cost Accounts.

Profit And Loss A/c

Debit		Credit	
Particulars	Amount – Rs.	Particulars	Amount – Rs.
To office salaries	11, 282	By gross profit	54, 648
To office expenses	6, 514	By dividends received	400
To salesmen’s salaries	4, 922	By interest received	150
To sales expenses	9, 304		
To distribution expenses	2, 990		
To loss on sale of machinery	1, 950		
To fines	200		
To discount on debentures	100		
To net profit	17, 936		
Total	55, 198	Total	55, 198
To income tax	8, 000	By net profit	17, 936
To reserve	1, 000		
To dividend	4, 000		
To balance c/d	4, 936		
Total	17, 936	Total	17, 936

The Cost Accountant of the company has ascertained a profit of Rs.19, 636 as per his books.



Reconciliation of Cost and Financial Accounts

Solution:

Memorandum Reconciliation Statement

Debit		Credit	
Particulars	Amount – Rs.	Particulars	Amount – Rs.
To expenses not debited to Cost Accounts		By profit as per cost accounts	19,636
Fines	200	By income not credited to cost accounts	
Discount on debentures	100	Dividend received	400
Loss on sale of machinery	1,950	Interest received	150
Income tax	8,000		
Reserve	1,000		
Dividend	4,000		
Net profit as per financial accounts	4,936		
Total	20,186	Total	20,186

6. The following figures have been extracted from the financial accounts of a manufacturing firm from the first year of its operation.

Particulars	Amount – Rs.
Direct material consumption	50,00,000
Direct wages	30,00,000
Factory overheads	16,00,000
Administrative overheads	7,00,000
Selling and distribution overheads	9,60,000
Bad debts	80,000
Preliminary expenses written off	40,000
Legal charges	10,000
Dividends received	1,00,000
Interest received on deposits	20,000
Sales [1,20,000 units]	1,20,00,000
Closing stock: Finished goods	3,20,000
Work-in-progress	2,40,000

The cost accounts for the same period reveal that the direct material consumption was Rs.56,00,000. Factory overhead is recovered at 20% on prime cost. Administration overhead is recovered at Rs.6 per unit of production. Selling and distribution overheads are recovered at Rs.8 per unit sold.



Prepare Profit and Loss Account both as per financial records and as per cost records. Reconcile the profits as per the two records.

Solution:

A] Profit and Loss Account

Debit

Credit

Rs. in 000s

Particulars	Amount – Rs.	Particulars	Amount – Rs.
To direct materials	5,000	By sales 1,20,000 units	12,000
To direct wages	3,000	By closing stock	
		WIP	240
		Finished goods 4800 units	320
To factory overheads	1,600		
To gross profit	2,960		
Total	12,560	Total	12,560
To administrative overheads	700	By gross profit	2,960
To S & D overheads	960	By dividends	100
To legal charges	10	By interest	20
To preliminary expenses written off			
	40		
To bad debts	80		
To net profit	1,290		
Total	3,080	Total	3,080

B] Statement Showing Cost and Profits as per Cost Records

Particulars	Amount – Rs.
Direct material	56,00,000
Direct wages	30,00,000
Prime Cost [Direct material + Direct wages]	86,00,000
Factory overheads: 20% on prime cost	17,20,000
	1,03,20,000
Less: Closing Work-in-progress	2,40,000



Reconciliation of Cost and Financial Accounts

Particulars	Amount – Rs.
Works cost – 1, 24, 000 units	1, 00, 80, 000
Administration overheads [Rs.6 per unit × 124000 units]	7, 44, 000
Cost of production	1, 08, 24, 000
Less: Finished stock [4000 units × Rs.87.29 *]	3, 49, 160
Cost of goods sold	1, 04, 74, 840
Selling and distribution expenses [Rs.8 × 1, 20, 000 units]	9, 60, 000
Cost of sales	1, 14, 34, 840
Sales	1, 20, 00, 000
Profit	5, 65, 160

* Rs.1, 08, 24, 000 / 1, 24, 000 units = Rs.87.29

C] Reconciliation Statement

Particulars	Amount – Rs.	Amount – Rs.
Profit as per cost accounts		5, 65, 160
Add: Excess expenses charged in cost accounts		
➤ Material	6, 00, 000	
➤ Factory overheads	1, 20, 000	
➤ Administrative overheads	44, 000	
Income not recorded in cost accounts	1, 00, 000	
➤ Dividend	20, 000	
➤ Interest received		
➤ Total		8, 84, 000
Total		14, 49, 160
Less: Expenses not recorded in cost accounts		
➤ Legal charges	10, 000	
➤ Preliminary expenses written off	40, 000	
➤ Bad debts	80, 000	
➤ Total	1, 30, 000	
Less: Overvaluation of closing stock in cost records	29, 160	
Total	1, 59, 160	1, 59, 160
Profits as per financial accounts		12, 90, 000



7. During the year ended, 31st March 2007, the profit of a company as per financial Profit and Loss A/c was Rs.33, 248 as given below. Prepare a reconciliation statement and arrive at a profit as per cost accounts using the additional information given.

Profit and Loss Account

Debit		Credit	
Particulars	Amount- Rs.	Particulars	Amount – Rs.
To opening stock	4, 94, 358	By sales	6, 93, 000
To purchases	1, 64, 308	By sundry income	632
Less: Closing stock	1, 50, 242		
	5, 08, 424		
To direct wages	46, 266		
To factory overheads	41, 652		
To administrative overheads	19, 690		
To selling expenses	44, 352		
To net profit	33, 248		
Total	6, 93, 632	Total	6, 93, 632

The costing records show:

- A. Closing stock Rs.1, 56, 394
- B. Direct wages absorbed Rs.49, 734
- C. Factory overheads absorbed Rs.39, 428
- D. Administration expenses calculated @ 3% of sales
- E. Selling expenses absorbed @ 5% of sales

Solution:

Reconciliation Statement

Particulars	Amount – Rs.	Amount – Rs.
Profit as per financial accounts		33, 248



Question Bank – Reconciliation

A. Essay Type

1. Explain the need for reconciliation of cost and financial accounts.
2. Explain the importance of reconciliation of cost and financial accounts. Mention four items of expenses or incomes, which will appear in financial accounts but normally appear in cost accounts.
3. Why is a reconciliation of cost and financial accounts necessary? Under what circumstances a reconciliation statement can be avoided?
4. At the end of an accounting period, it is found that the profit as shown in the financial accounts falls considerably short of the profits according to the cost accounts. Indicate how the discrepancy may have arisen.
5. Indicate the reasons why it is necessary for the cost and financial accounts organization to be reconciled and explain the main sources of difference, which would enter into such a reconciliation.

B] Indicate whether the following statements are True or False

1. Under non-integral system, cost and financial accounts do not need to be reconciled.
2. Reconciliation of cost and financial accounts ensures the accuracy of the two sets of accounts.
3. Profit or loss on sale of fixed assets is included only in financial accounts but not in cost accounts.
4. Under absorption of overhead results in higher amount of profits.
5. Bad debts written off are not shown in the cost accounts.

STUDY NOTE 11

Operating Costing

Learning Objectives

After studying this chapter, you should be able to,

1. Understand the meaning and application of Operating Costing.
 2. Understand the cost unit used in service industries.
 3. Compute the cost per unit used in service industries.
-





11.1 Introduction

Cost Accounting has been traditionally associated with manufacturing companies. However in the modern competitive market, cost accounting has been increasingly applied in service industries like banks, insurance companies, transportation organizations, electricity generating companies, hospitals, passenger transport and railways, hotels, road maintenance, educational institutions, road lighting, canteens, port trusts and several other service organizations. The costing method applied in these industries is known as 'Operating Costing'. According to the Institute of Cost and Management Accountants [UK] operating costing is, 'that form of operating costing which applies where standardized services are provided either by an undertaking or by a service cost center within an undertaking'. The method of computation of cost in various service providing organizations is explained in this chapter in subsequent paragraphs.

11.2 Nature of Operating Costing

The main objective of operating costing is to compute the cost of the services offered by the organization. For doing this, it is necessary to decide the unit of cost in such cases. The cost units vary from industry to industry. For example, in goods transport industry, cost per ton kilometer is to be ascertained while in case of passenger transport, cost per passenger kilometer is to be computed. Cost units used in different service units are explained in detail later in chapter. The next step is to collect and identify various costs under different headings. The headings used are,

- ❖ Fixed or standing charges
- ❖ Semi-fixed or maintenance charges
- ❖ Variable or running charges.

One of the important features of operating costing is that mostly such costs are fixed in nature. For example, in case of passenger transport organization, most of the costs are fixed while few costs like diesel and oil are variable and dependent on the kilometers run. In the following paragraphs, method of computing costs in various service organizations is explained.

11.3 Transport Organization

Transport undertakings include goods transport organizations as well as passenger transport organizations. The cost unit is either ton kilometer or passenger kilometer. The meaning is cost of carrying one ton over a distance of one kilometer or cost of carrying one passenger for a distance of one kilometer. The costs are shown under the following heads.

- Standing Charges or Fixed Costs: These are the fixed costs, which remain constant irrespective of the distance travelled. These costs include the following costs.
 - 1) License fees and insurance
 - 2) Salaries of drivers, cleaners and conductors
 - 3) Garage costs which include garage rent and other relevant expenses
 - 4) Depreciation of the vehicle and other assets
 - 5) Taxes applicable



- 6) Any other fixed charge like administrative expenses etc.
- Variable Costs or Running Costs: These costs include,
 - 1) Petrol and diesel
 - 2) Oil
 - 3) Grease
 - 4) Any other variable costs
- Maintenance Charges: These charges include expenses like repairs and maintenance, tyre, and other charges connected with maintenance like servicing of the vehicles etc.

The cost sheet for transport organizations can be prepared in the following manner.

XYZ Transport Company Ltd.

Cost – Sheet – October 2007

Vehicle No:

Days Operated:

Registration No.

Particulars	Amount –Rs.	Amount- Rs.
A] Standing Charges/Fixed Charges <ul style="list-style-type: none"> ➤ Insurance ➤ License/Permit fees ➤ Salaries of drivers, cleaners etc ➤ Depreciation ➤ Interest ➤ Total 		
B] Running Charges/Variable Expenses <ul style="list-style-type: none"> ➤ Petrol/Diesel ➤ Oil ➤ Grease ➤ Total 		
C] Maintenance Charges <ul style="list-style-type: none"> ➤ Repairs ➤ Tyres ➤ Spares ➤ Garage charges ➤ Total 		
D] Total Cost		
E] Total ton kilometers/passenger kilometers		
F] Cost per ton kilometer/passenger kilometers		



11.4 Electricity Generation

Power houses engaged in electricity generation or steam generation use 'Power House Costing.' Operating cost statement can be prepared by identifying the costs associated with the power generation or steam generation. Cost unit is different for electricity generation and steam generation. For electricity generation, cost unit is cost per kilowatt-hour while for steam it is lb. A pro forma for these organizations is given below:

Power House Cost Sheet

XYZ Ltd. October 2007

Total Steam Produced:

Electricity Generated:

Total Steam Consumed:

Particulars	Amount – Cost per unit [lbs] – Rs.	Total Cost Rs.
A] Fixed Charges <ul style="list-style-type: none"> ➤ Rent, Rates, Taxes ➤ Insurance ➤ Depreciation ➤ Salaries ➤ Total 		
B] Fuel Charges		
C] Maintenance Charges <ul style="list-style-type: none"> ➤ Meters ➤ Furnaces ➤ Service materials ➤ Tools etc. 		
D] Water Charges		
E] Wages/Labour Charges		
F] Supervision and Other Administrative Charges		
G] Total Charges		

11.5 Hotels and Canteens

Operating costing can be used effectively in hotels and canteens. While hotels are run purely on commercial principles, canteen facilities are provided by several organizations by providing subsidies. However it is necessary to compute the cost in both the cases to find out the profit or loss at the end of a particular period. In this case, the costs associated with different products offered should be identified and cost per unit should be worked out. The cost unit may be number of meals served or any other dish offered to the customers. A typical format of the cost sheet is given below. It should be noted that this format is not a



standardized one and can be modified to suit the requirements of an organization.

Cost-Sheet

Month:

Particulars	Amount – Rs.	Amount – Rs.
A] Fixed Charges		
➤ Salaries		
➤ Insurance		
➤ Taxes		
➤ Interest		
➤ Depreciation		
➤ Any other		
➤ Total		
B] Raw Materials consumed		
C] Maintenance Charges		
➤ Crockery		
➤ Glassware		
➤ Towels		
➤ Consumable stores		
➤ Other maintenance charges		
➤ Total		
D] Supervision Charges		
E] Total Charges		
F] Number of meals served		
G] Cost Per Meal		

Problems and Solutions:

1. A lodging home is being run in a small hill station with 50 single rooms. The home offers concessional rates during six off- season months in a year. During this period, half of the full room rent is charged. The management’s profit margin is targeted at 20% of the room rent. The following are the cost estimates and other details for the year ending on 31st March 2006. [Assume a month to be of 30 days].

I] Occupancy during the season is 80% while in the off- season it is 40% only.

II] Expenses:

- o Staff salary [Excluding room attendants] Rs.2, 75, 000
- o Repairs to building Rs.1, 30, 500
- o Laundry and linen: Rs.40, 000



Operating Costing

- o Interior and tapestry: Rs.87, 500
 - o Sundry expenses: Rs.95, 400
- III] Annual depreciation is to be provided for buildings @ 5% and on furniture and equipments @ 15% on straight-line basis.
- IV] Room attendants are paid Rs.5 per room day on the basis of occupancy of the rooms in a month.
- V] Monthly lighting charges are Rs.120 per room, except in four months in winter when it is Rs.30 per room and this cost is on the basis of full occupancy for a month.
- VI] Total investment in the home is Rs.100 lakhs of which Rs.80 lakhs relate to buildings and balance for furniture and equipments.

You are required to work out the room rent chargeable per day both during the season and the off-season months on the basis of the foregoing information.

Solution: Before preparing statement of total estimated costs, some working notes will be required. They are shown on the next page.

I] Computation of Estimated Cost for the year Ending 31st March 2006

Particulars	Amount Rs.
Salary	2, 75, 000
Repairs	1, 30, 500
Laundry and linen	40, 000
Interior decoration	87, 500
Depreciation:	
5% on Rs.80 lakhs: Rs.4, 00, 000	
15% on Rs.20 lakhs: Rs.3, 00, 000	7, 00, 000
Miscellaneous expenses	95, 400
Total costs	13, 28, 400

II] Number of room days in a year:

- o Occupancy during season for 6 months @ 80% [$50 \times .80 \times 6 \times 30$] = 7200
- o Off-season occupancy for 6 months @ 40% [$50 \times .4 \times 6 \times 30$] = 3600
- o Total number of room days during a year = 10, 800

III] Attendant's salary

- ❖ For 10, 800 room days @ Rs.5 per day = Rs.54, 000

IV] Light charges for 8 months @ Rs.120 per month i.e. $\text{Rs.120}/30 = \text{Rs.4}$ per room day

Light charges for 4 months @ Rs.30 per month, i.e. $\text{Rs.30}/30 = \text{Re.1}$ per room day

- ❖ Total lighting charges:
- ❖ During season @ Rs.4 for 7200 days = Rs.28, 800



- ❖ During off season 2 months @ Rs.4 for 1200 days $[2/6 \times 3600] = \text{Rs.4, 800}$
- ❖ During 4 months of winter @ Re.1 for 2, 400 days $[4/6 \times 3600] = \text{Rs.2, 400}$
- ❖ Total lighting charges: Rs.36, 000

Note: It is given in the example that during four months of winter, the lighting is Rs.30 per room, which is $1/4^{\text{th}}$ of the lighting charges during the remaining period of the year. Hence the rate of room day which is Rs.4 will also be $1/4^{\text{th}}$ for winter period and so it is taken as Re.1 per room day.

Statement of Total Estimated Cost

Particulars	Amount Rs.
Expenses as shown in I above	13, 28, 400
Attendant's salary as shown in III above	54, 000
Lighting charges as shown in IV above	36, 000
Total cost	14, 18, 400

Computation of total Full Room Days

- ❖ During season: 7, 200
- ❖ off-season: 1, 800 [Equivalent to 50% rate of 3, 600 days]
- ❖ Total Full Room Days: 9, 000

Computation of Room Rent

- ❖ Cost per room day: $\text{Rs.}14, 18, 400 / 9, 000 = \text{Rs.}157.60$
- ❖ Add: Profit margin at 20% of rent or 25%
of cost = Rs.39.40
- ❖ Room Rent = Rs.197.00
- ❖ Thus, during season, room rent of Rs.197 is to be charged while in the off-season room rent of Rs.98.50 is to be charged.

2. A transport service company is running five buses between two towns, which are 50 kilometers apart. Seating capacity of each bus is 50 passengers. The following particulars are obtained from their books for April 2007.

Particulars	Amount Rs.
Wage of drivers, conductors and cleaners	2, 40, 000
Salaries of office staff	1, 00, 000
Diesel oil and other oil	3, 50, 000
Repairs and maintenance	80, 000
Taxation, insurance etc.	1, 60, 000
Depreciation	2, 60, 000
Interest and other expenses	2, 00, 000
Total	13, 90, 000



Operating Costing

Actually, passengers carried were 75% of seating capacity. All buses ran on all day of the month. Each bus made one round trip per day.

Find out the cost per passenger kilometer.

Solution:

Operating Cost Statement

April 2007

Particulars	Amount Rs.	Amount Rs.
A. Standing Charges		
❖ Wages of drivers, conductors and cleaners	2,40,000	
❖ Salaries of office staff	1,00,000	
❖ Taxation, insurance etc.	1,60,000	
❖ Interest and other expenses	2,00,000	
❖ Total standing charges		7,00,000
B. Running and Maintenance Charges		
❖ Repairs and maintenance	80,000	
❖ Diesel oil and other oil	3,50,000	
❖ Depreciation	2,60,000	
❖ Total running and maintenance charges		6,90,000
C. Total cost [A + B]		13,90,000
D. Cost per passenger kilometer *		2.471
Rs.13,90,000 / 5,62,500 kilometers		

* Passenger kilometers are computed as shown below.

Number of buses X Distance in one round trip X Seating capacity available X Percentage of seating capacity actually used X Number of days in a month

$$5 \text{ buses} \times 50 \text{ kilometers} \times 2 \times 50 \text{ passengers} \times 75\% \times 30 \text{ days} = 5,62,500$$

3. ABC Transport Company has given a route 40 kilometers long to run bus. The bus costs the company a sum of Rs.1,00,000. It has been insured at 3% p.a. and the annual tax will amount to Rs.2,000. Garage rent is Rs.200 per month. Annual repairs will be Rs.2,000 and the bus is likely to last for 5 years. The driver's salary will be Rs.300 per month and the conductor's salary will be Rs.200 per month in addition to 10% of takings as commission [To be shared by the driver and conductor equally].

Cost of stationery will be Rs.100 per month. Manager-cum-accountant's salary is Rs.700 per month.

Petrol and oil will be Rs.50 per 100 kilometers. The bus will make 3 up and down trips carrying on



an average 40 passengers on each trip. Assuming 15% profit on takings, calculate the bus fare to be charged from each passenger. The bus will run on an average 25 days in a month.

Solution:

Statement showing Fare to be Charged

Particulars	Amount Per Annum Rs.	Amount Per Month Rs.
A] Standing Charges		
❖ Insurance @ 3% on Rs.100000	3,000	
❖ Tax	2,000	
❖ Garage rent @ Rs.200 per month	2,400	
❖ Driver's salary @ Rs.300 per month	3,600	
❖ Conductor's salary @ Rs.200 per month	2,400	
❖ Stationery @ Rs.100 per month	1,200	
❖ Manager-cum-accountant's salary @ Rs.700 per month	8,400	
❖ Total standing charges	23,000	1,916.67
B] Running Expenses		
❖ Depreciation Rs.1,00,000/5	20,000	1,666.67
❖ Repairs	2,000	166.66
❖ Petrol and oil Re.0.50 × [40 km × 2 × 3 × 25]		3,000.00
❖ Commission *		900.00
❖ Profit		1,350.00
Total Takings		9,000.00
Fare per passenger kilometer [Rs.9,000 / 2,40,000 #]		0.0375
Fare per passenger [Rs.9,000 / 6,000]		Rs.1.50

* Computation of Commission and Profit

- ❖ Let total takings be X, commission @ 10% = X/10, profit is 15% of takings
- ❖ Hence profit = 15X/100 = 3X/20
- ❖ Total cost without commission = Rs.6,750 [Standing charges + Running charges]



Operating Costing

- ❖ Hence $X = \text{Rs.}6,750 + X/10 + 3X/20$
- ❖ Solving the equation for X , we get value of $X = \text{Rs.}9,000$ which is total takings.
- ❖ Therefore, commission will be 10% of total takings = $\text{Rs.}900$
- ❖ Profit @ 15% of total takings = $\text{Rs.}1,350$

Total passenger kilometers are computed as shown below:

$40 \text{ km} \times 2 \text{ [up and down]} \times 3 \text{ trips} \times 25 \text{ days} \times 40 \text{ passengers} = 2,40,000 \text{ passenger km per month.}$

4. A hotel has a capacity of 100 single rooms and 20 double rooms. The average occupancy of both single and double room is expected to be 80% throughout the year of 365 days. The rent for the double room has been fixed at 125% of the rent of the single room. The costs are as under:

Variable costs: Single room $\text{Rs.}220$ each per day, double room $\text{Rs.}350$ each per day

Fixed costs: Single room $\text{Rs.}120$ each per day, double room $\text{Rs.}250$ each per day

Calculate the rent chargeable for single and double rooms per day in such a way that the hotel earns a margin of safety of 20% on hire of room.

Solution:

Occupancy:

Single rooms: $100 \text{ rooms} \times 365 \text{ days} \times 80/100 = 29,200$

Double rooms: $20 \text{ rooms} \times 365 \text{ days} \times 80/100 = 5,840$

Statement Showing Total Costs

Particulars	Amount Rs.	Amount Rs.
Variable Costs:		
❖ Single rooms: 29200×220	64,24,000	
❖ Double rooms: 5840×350	20,44,000	84,68,000
Fixed Costs:		
❖ Single rooms: 29200×120	35,04,000	
❖ Double rooms: 5840×250	14,60,000	49,64,000
Total Costs		1,34,32,000

- ❖ Margin of safety 20%, so break even point 80%
- ❖ Sales at break-even-point = Total Costs = $\text{Rs.}1,34,32,000$
- ❖ Total revenue = $\text{Rs.}1,34,32,000 \times 100/80 = \text{Rs.}1,67,90,000$
- ❖ Single room = $29200 \times 1 = 29200$ days
- ❖ Double room = $5840 \times 1.25 = 7300$ days
- ❖ Total notional single room days = 36500
- ❖ Rent per day per single room = $\text{Rs.}1,67,90,000 / 36,500 = \text{Rs.}460$
- ❖ Rent per day per double room = $\text{Rs.}460 \times 1.25 = \text{Rs.}575$



5. Viveka Elementary School has a total of 150 students consisting of 5 sections with 30 students per section. The school plans for a picnic around the city during the weekend to places such as zoo, the amusement park, the planetarium etc. A private transport operator has come forward to lease out the buses for taking the students. Each bus will have a maximum capacity of 50 [excluding 2 seats reserved for the teachers accompanying the students]. The school will employ two teachers for each bus, paying them an allowance of Rs.50 per teacher. It will also lease out the required number of buses. The following are the other cost estimates:

Breakfast: Rs.5 per student

Lunch: Rs.10 per student

Tea: Rs.3 per student

Entrance fee at zoo: Rs.2 per student

Rent: Rs.650 per bus

Special permit fees Rs.50 per bus

Block entrance fees at the planetarium Rs.250

Prizes to students for games: Rs.250

No costs are incurred in respect of accompanying teachers. [Except the allowance of Rs.50 per teacher]
You are required to prepare a statement showing the total cost and also average cost per student for the levels of 30,60,90,120 and 150 students.

Solution: Please refer next page.

Statement showing Cost per Student at Various Levels

Particulars	30 Students Rs.	60 Students Rs.	90 Students Rs.	120 Students Rs.	150 Students Rs.
I] Variable Costs					
❖ Breakfast	150	300	450	600	750
❖ Lunch	300	600	900	1,200	1,500
❖ Tea	90	180	270	360	450
❖ Entrance fees	60	120	180	240	300
❖ Total [I]	600	1,200	1,800	2,400	3,000
II] Semi-variable cost					
❖ Rent of bus	650	1,300	1,300	1,950	1,950
❖ Permit fees	50	100	100	150	150
❖ Allowance to teachers	100	200	200	300	300
❖ Total [II]	800	1,600	1,600	2,400	2,400



Operating Costing

Particulars	30 Students Rs.	60 Students Rs.	90 Students Rs.	120 Students Rs.	150 Students Rs.
III] Fixed Costs					
❖ Block entrance fees at planetarium	250	250	250	250	250
❖ Prizes to students for games	250	250	250	250	250
❖ Total [III]	500	500	500	500	500
IV] Total Costs					
[I + II + III]	1900	3300	3900	5300	5900
Average cost per student	1900/30 63.33	3300/60 55	3900/90 43.33	5300/120 44.17	5900/150 39.33

Question Bank

Essay Type

1. What is 'operating costing'? Explain the important features of Operating costing.
 1. Define the concept 'operating costing'. Mention at least ten activities where operating costing is applicable.
 2. Describe the process of cost classification involved in operating costing.
 3. Draw a 'Pro-forma Cost Sheet for a Power House Company showing distinctly the production cost and generation cost.
 4. What is 'Hospital Costing'? Explain the salient features of the same.
 5. Which unit of cost you will utilize for a goods transport company? Explain with illustrations.
 6. Explain the features of 'Canteen Costing'.

STUDY NOTE 12

Marginal Costing and Break Even Analysis

Learning Objectives

After studying this topic, you should be able to,

1. To understand the basic concepts of marginal cost and marginal costing.
 2. To understand the difference between the Absorption Costing and Marginal Costing.
 3. To learn the practical applications of Marginal Costing.
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12.1 Introduction

Marginal Costing is not a method of costing like job, batch or contract costing. It is in fact a technique of costing in which only variable manufacturing costs are considered while determining the cost of goods sold and also for valuation of inventories. In fact this technique is based on the fundamental principle that the total costs can be divided into fixed and variable. While the total fixed costs remain constant at all levels of production, the variable costs go on changing with the production level. It will increase if the production increases and will decrease if the production decreases. The technique of marginal costing helps in supplying the relevant information to the management to enable them to take decisions in several areas. In this chapter, the technique of marginal costing is explained in detail.

12.2 Definitions

Marginal Cost is defined as, 'the change in aggregate costs due to change in the volume of production by one unit'. For example, if the total number of units produced are 800 and the total cost of production is Rs.12,000, if one unit is additionally produced the total cost of production may become Rs.12,010 and if the production quantity is decreased by one unit, the total cost may come down to Rs.11,990. Thus the change in the total cost is by Rs.10 and hence the marginal cost is Rs.10. The increase or decrease in the total cost is by the same amount because the variable cost always remains constant on per unit basis.

Marginal Costing has been defined as, 'Ascertainment of cost and measuring the impact on profits of the change in the volume of output or type of output. This is subject to one assumption and that is the fixed cost will remain unchanged irrespective of the change.' Thus the marginal costing involves firstly the ascertainment of the marginal cost and measuring the impact on profit of alterations made in the production volume and type. To clarify the point, let us take a simple example, suppose company X is manufacturing three products, A, B and C at present and the number of units produced are 45,000, 50,000 and 30,000 respectively p.a. If it decides to change the product mix and decides that the production of B is to be reduced by 5,000 units and that of A should be increased by 5,000 units, there will be impact on profits and it will be essential to measure the same before the final decision is taken. Marginal costing helps to prepare comparative statement and thus facilitates the decision-making. This decision is regarding the change in the volume of output. Now suppose if the company has to take a decision that product B should not be produced at all and the capacity, which will be available, should be utilized for A and C this will be change in the type of output and again the impact on profit will have to be measured. This can be done with the help of marginal costing by preparing comparative statement showing profits before the decision and after the decision. This is subject to one assumption and that is the fixed cost remains constant irrespective of the changes in the production. Thus marginal costing is a very useful technique of costing for decision-making.

12.3 Features of Marginal Costing

As mentioned above, marginal costing is not a separate method of costing but it is a technique of costing distinct from the traditional costing which is also called as 'Absorption Costing'. The distinguishing features of marginal costing are as follows:

- I. In marginal costing, costs are segregated into fixed and variable. Only variable costs are charged to the production, i.e. included in the cost of production. Fixed costs are not included in the cost of



production, which means that they are not absorbed in the production. However this does not mean that they are ignored or not taking into consideration at all. They are taken into consideration while computing the final profit or loss by debiting them to the Costing Profit and Loss Account. The logic behind omitting fixed costs from cost of production is that fixed costs do not remain fixed on per unit basis. On per unit basis, the fixed cost will increase if the production decreases while it will decrease on per unit basis if the production increases. Thus fixed cost per unit are always variable. In view of this, a question arises; on what basis they should be charged to the product? Similarly, there is a problem of under and over absorption of these overheads also. Therefore it is advocated that fixed cost should be eliminated from the cost of production but should be taken into consideration while computing the final figure of profit by charging them to the Costing Profit and Loss Account. The following illustration will clarify the point.

Illustration 1] Company X is producing 1 00 000 units. The variable cost per unit is Rs.5 and the fixed costs are Rs.5, 00,000. If we work out the total cost per unit, it will be variable cost + fixed cost per unit [at present level of production] that means, the total cost will be Rs.5 + Rs.5 = Rs.10. But as per the technique of marginal costing, the variable cost only i.e. Rs.5, will be charged to the production while the fixed cost of Rs.5, 00, 000 will not be charged to the cost of production, it will be charged to the Costing Profit and Loss Account. Thus the selling price of the product will be fixed on the basis of variable costs of Rs.5 per unit. This may result in charging the price below the total cost but producing and selling a large volume of the product will cover the fixed costs. Suppose, in the above example, selling price is Rs.9, which covers the variable cost but not the total cost, efforts of the company will be to maximize the volume of sales and through the margin between the selling price and variable cost, cover the fixed cost. The difference between the selling price of Rs.10 per unit and the variable cost of Rs.5 per units is the margin, which is called as 'Contribution'. The contribution margin in this case is Rs.5 per unit. If the company is able to produce and sell, say, 1 50 000 units it will earn a total contribution of Rs.5 × 1 50 000 units = Rs.7, 50, 000 which will cover the fixed costs and earn profits. However if the company is not able to sell sufficient number of units, it will incur a loss. The concept of break-even point which is discussed in detail later in this chapter is based on the same calculation.

- II] Another important feature of marginal costing is the valuation of inventory is done at variable cost only. This means, that variable costs only are taken into consideration while valuing the inventory. Fixed costs are eliminated from the inventory valuation because they are largely period costs and relate to a particular period or year. If they are included in the inventory valuation, they will be carried forward to the next period because the closing inventory for a particular year is the opening inventory for the next year. Thus charging current year's costs to the next year will be against the principle and hence fixed costs are not included in the inventory valuation. Secondly, as discussed in the [I] above, fixed costs are not included in the cost of production, and so including them in the inventory valuation is not justified from this angle. The following illustration will clarify the point.

Illustration 2] A Ltd. is currently producing 25 000 units of product 'P'. The variable cost per unit is Rs.7 while fixed cost is Rs.2, 00,000. The company is able to sell 20 000 units and 5000 units are unsold. While valuing this inventory, the valuation will be done at Rs.7 per unit, the value will be 5 000 units X Rs.7 per unit = Rs.35, 000. It will be seen that the total cost of production is Rs.7 [variable cost per unit] + Rs.8 [fixed cost per unit at the present level] = Rs.15 but the valuation will be at Rs.7 per unit only which is the variable cost per unit. [Principle of valuation of inventory i.e. cost price or market



Marginal Costing and Break Even Analysis

price whichever is low will be applied and in the example it is presumed that the selling price is more than the variable cost per unit].

- III] Another feature of marginal costing is the preparation of income statement. The income statement is prepared in a different manner as compared to the statement prepared under traditional costing, i.e. absorption costing. The income statement is prepared as shown below:

Income Statement Under Marginal Costing

XYZ LTD. Product P

Particulars	Amount Rs.	Amount Rs.
Sales		
Less: Variable Costs		
Contribution		
Less: Fixed Costs		
Profit		

If the company is producing more than one product, the contribution from each product is combined as a pool from which the total fixed cost is deducted. Fixed cost is not charged to each product unless it is identifiable with a product. The income statement [with imaginary figures] in such case is prepared as shown below:

XYZ Ltd.

Income Statement Under Marginal Costing

Particulars	Product X Rs.	Product Y Rs.	Product Z Rs.	Total Rs.
Sales:	20, 00,000	35, 00, 000	27, 00,000	82, 00,000
Less: Variable Cost	12, 00,000	17, 50,000	16, 00,000	45, 50,000
Contribution	8, 00,000	17, 50,000	11, 00,000	36, 50,000
Less: Fixed Cost	—	—	—	20, 00,000
Profit				16, 50,000

It can be seen from the above statement that the contribution made by each product towards the fixed cost can be measured and thus the priority for each product can be decided. If any product does not contribute anything towards the fixed cost, the management may decide to close it down.

12.4 Difference between Marginal Costing and Absorption Costing

We have discussed so far the meaning and features of marginal costing. It must be clearly understood by now, that marginal costing is a technique of costing which advocates that only variable costs should be taken into consideration while working out the total cost of production and while valuing the inventory, only variable costs should be taken into the computation. Fixed costs should not be absorbed in the cost of production but should be charged to the Costing Profit and Loss Account. On the other hand, under absorption costing all indirect costs i.e. overheads are first apportioned and then absorbed in the



production units. The difference between the absorption costing and marginal costing is discussed in the subsequent paragraphs.

Absorption Costing	Marginal Costing
1. Costs are classified as direct and indirect, direct costs are identifiable with a particular product and hence charged directly. Indirect costs i.e. overheads are first identified, apportioned to the cost centers and finally absorbed in the product units on some suitable basis.	1. Costs are classified as fixed and variable. While direct costs are mostly variable, indirect costs, i.e. overheads may be semi variable. The variable portion in the total overhead cost is identified and thus the total variable costs are computed. Only variable costs are charged to the product while the fixed costs are not absorbed in the product units. They are finally debited to the Costing Profit and Loss Account for computing the final figure of profit or loss. Thus the cost of production under marginal costing is only the variable portion of the total costs.
2. The year-end inventory of finished goods under absorption costing is valued at total cost, i.e. fixed and variable.	2. The year-end inventory is valued at variable cost only. [Refer to illustration 2] Fixed costs are not taken into consideration while valuing inventory, as they are not absorbed in the product units.
3. The fixed overhead absorption may create some problems like over/under absorption. This happens because of the overhead absorption rate which is pre determined. Suitable corrective entries are to be made to rectify the over/under absorption of overheads; otherwise the cost of production will be distorted.	3. The fixed overheads are charged directly to the Costing Profit and Loss Account and not absorbed in the product units. Therefore there is no question of under/over absorption of overheads.
4. Due to the inventory valuation, which is done at the full cost, the costs relating to the current period are carried forward to the subsequent period. This will distort the cost of production.	4. Fixed costs are not taken into consideration while valuing the inventory and hence there is no distortion of profits.
5. The total cost of production is charged to the product without distinguishing between the fixed and variable components. The selling price is thus fixed on the basis of total costs.	5. Only variable costs are charged to the cost of production and therefore the selling price is also based on only variable costs. This will result in fixation of selling price below the total costs. There is a possibility of starting a price war in such situations, which will be harmful to all the companies in the industry.

The points of difference between the absorption costing and marginal costing will clarify the difference between the two. The following illustration will further clarify the difference between absorption costing and marginal costing.



Marginal Costing and Break Even Analysis

Illustration 3] From the following data compute the profit under a] Marginal costing and b] Absorption costing and reconcile the difference in profits.

Selling price per unit: Rs.8

Variable cost per unit: Rs.4

Fixed cost per unit: Rs.2

Normal volume of production is 26 000 units per quarter.

The opening and closing stocks consisting of both finished goods and equivalent units of work in progress are as follows:

Particulars	Quarter I	Quarter II	Quarter III	Quarter IV	Total
Opening stock [Units]	—	—	6,000	2,000	—
Production [Units]	26,000	30,000	24,000	30,000	1,10,000
Sales [Units]	26,000	24,000	28,000	32,000	1,10,000
Closing stock [Units]	—	6,000	2,000	—	—

Solution: The following statements are prepared to show profits under marginal costing and absorption costing.

I] Statement Showing Profit/Loss Under Marginal Costing

Particulars	Quarter I Rs.	Quarter II Rs	Quarter III Rs	Quarter IV Rs	Total Rs.
A] Sales @ Rs.8 *	2,08,000	1,92,000	2,24,000	2,56,000	8,80,000
B] Marginal costs					
➤ Opening Stock @ Rs. 4	—	—	24,000	8,000	
➤ Production @ Rs.4	1,04,000	1,20,000	96,000	1,20,000	4,40,000
➤ Total [Opening stock + Production]	1,04,000	1,20,000	1,20,000	1,28,000	4,40,000
➤ Less: Closing Stock @ Rs.4	—	24,000	8,000		
➤ Cost of goods sold	1,04,000	96,000	1,12,000	1,28,000	4,40,000



Particulars	Quarter I Rs.	Quarter II Rs	Quarter III Rs	Quarter IV Rs	Total Rs.
C] Contribution [A – B]	1,04,000	96,000	1,12,000	1,28,000	4,40,000
D] Fixed Cost	52,000	52,000	52,000	52,000	2,08,000
E] Profit [C – D]	52,000	44,000	60,000	76,000	2,32,000

- Sales value is computed by multiplying the number of units sold in each quarter by the selling price per unit of Rs.8

II] Statement of Profit Under Absorption Costing

Particulars	Quarter I Rs.	Quarter II Rs.	Quarter III Rs.	Quarter IV Rs.	Total Rs.
A] Sales @ Rs.8	2,08,000	1,92,000	2,24,000	2,56,000	8,80,000
B] Opening Stock @ Rs.6	—	—	36,000	12,000	
C] Cost of Production @ Rs.6 *	1,56,000	1,80,000	1,44,000	1,80,000	6,60,000
D] A + C	1,56,000	1,80,000	1,80,000	1,92,000	6,60,000
E] Closing Stock @ Rs.6	—	36,000	12,000	—	—
F] Cost of Sales [Actual] D - E	1,56,000	1,44,000	1,68,000	1,92,000	6,60,000
G] Profit before adjustment of under or over absorbed fixed cost [A – F]	52,000	48,000	56,000	64,000	2,20,000
Add: Over absorbed fixed overheads **	—	8,000	—	8,000	16,000
Less: Under absorbed fixed overheads ***	—	—	4,000	—	4,000
Profit	52,000	56,000	52,000	72,000	2,32,000

* The total cost of production is Rs.6, which, consists of Rs.4 variable cost, and Rs.2 as fixed cost per unit at the normal volume of production. The opening stock cost of production and closing stock values are computed by taking these figures.

** Over absorption of fixed overheads is computed by multiplying the excess production than the normal volume by the fixed overheads per unit i.e. Rs.2

*** Under absorption of overheads is computed by multiplying the units produced below the normal volume of production by the fixed overheads per unit i.e. Rs.2.



III] Reconciliation of Profit

Particulars	Quarter I Rs.	Quarter II Rs	Quarter III Rs	Quarter IV Rs	Total Rs
Profit as per absorption costing	52, 000	56, 000	52, 000	72, 000	2, 32, 000
Less: Higher fixed cost in closing stock [6000 × Rs.2]		12, 000	—	—	12, 000
Add: Higher fixed cost in opening stock *			8, 000	4, 000	12, 000
Profit as per marginal costing	52, 000	44, 000	60, 000	76, 000	2, 32, 000

* In quarter III: $[6000 - 2000] \times \text{Rs.}2 = \text{Rs.}8,000$, Quarter IV = $2,000 \times \text{Rs.}2 = \text{Rs.}4,000$

12.5 Applications [Merits] of Marginal Costing

Marginal costing is a very useful technique of costing and has great potential for management in various managerial tasks and decision- making process. The applications of marginal costing are discussed in the following paragraphs:

- 1) **Cost Control:** One of the important challenges in front of the management is the control of cost. In the modern competitive environment, increase in the selling price for improving the profit margin can be dangerous as it may lead to loss of market share. The other way to improve the profit is cost reduction and cost control. Cost control aims at not allowing the cost to rise beyond the present level. Marginal costing technique helps in this task by segregating the costs between variable and fixed. While fixed costs remain unchanged irrespective of the production volume, variable costs vary according to the production volume. Certain items of fixed costs are not controllable at the middle management or lower management level. In such situation it will be more advisable to focus on the variable costs for cost control purpose. Since the segregation of costs between fixed and variable is done in the marginal costing, concentration can be made on variable costs rather than fixed cost and in this way unnecessary efforts to control fixed costs can be avoided.
- 2) **Profit Planning:** Another important application of marginal costing is the area of profit planning. Profit planning, generally known as budget or plan of operation may be defined as the planning of future operations to attain a defined profit goal. The marginal costing technique helps to generate data required for profit planning and decision-making. For example, computation of profit if there is a change in the product mix, impact on profit if there is a change in the selling price, change in profit if one of the product is discontinued or if there is a introduction of new product, decision regarding the change in the sales mix are some of the areas of profit planning in which necessary information can be generated by marginal costing for decision making. The segregation of costs between fixed and variable is thus extremely useful in profit planning.



- 3) **Key Factor Analysis:** The management has to prepare a plan after taking into consideration the constraints, if any, on the various resources. These constraints are also known as limiting factors or principal budget factors as discussed in the topic of 'Budgets and Budgetary Control'. These key factors may be availability of raw material, availability of skilled labour, machine hours availability, or the market demand of the product. Marginal costing helps the management to decide the best production plan by using the scarce resources in the most beneficial manner and thus optimize the profits. For example, if raw material is the key factor and its availability is limited to a particular quantity and the company is manufacturing three products, A, B and C. In such cases marginal costing technique helps to prepare a statement, which shows the amount of contribution per kg of material. The product, which yields highest contribution per kg of raw material, is given the priority and produced to the maximum possible extent. Then the other products are taken up in the order of priority. Thus the resultant product mix will yield highest amount of profit in the given situation. The following illustration will clarify the point.

Illustration 4] XYZ Ltd. is manufacturing three products, A, B and C. All the products use the same raw material which is available to the extent of 61 000 kg only. The following information is available from the books and records of the company.

Particulars	Product A	Product B	Product C
Selling price per unit	Rs.100	Rs.140	Rs.90
Variable cost per unit	Rs.75	Rs.110	Rs.65
Raw material requirement per unit [kg]	5	8	6
Market demand - units	5000	3000	4000

Advise the company about the most profitable product mix and also compute the amount of profit resulting from such product mix if the fixed costs are Rs.1, 50,000

Solution: It is given in the example that the raw material is available to the extent of 61 000 kg only. It can be understood easily that if all the products are produced to the maximum possible extent according to the market demand, the resultant profit will be highest. However it is not possible as the raw material is not available to that extent. Therefore there is a need to work out the priority of the products on the basis of contribution per kg of raw material [As it is a key factor] and then produce the products in the order of priority. The following statement is prepared to show the priority of the products on this basis.

I] Statement Showing the Contribution per Unit and per Kg of Raw Material

Particulars	Product A	Product B	Product C
Selling price per unit	Rs.100	Rs.140	Rs.90
Less: Variable cost per unit	Rs.75	Rs.110	Rs.65
Contribution per unit	Rs.25	Rs.30	Rs.25
Contribution per kg of raw material *	$25/5 = 5$	$30/8 = 3.75$	$25/6 = 4.16$
Priority	I	III	II

* Contribution per kg of raw material is computed by dividing the contribution per unit by the raw material requirement per unit.



Marginal Costing and Break Even Analysis

The next step in the example will be to prepare a statement of best production plan based on the priorities worked out in the above statement and compute the amount of profit resulting from the same. This is shown in the following statement.

II] Statement Showing the Optimum Product Mix and the Resulting Profit

Product [In order of priority]	Number of Units to be produced	Raw material requirement per unit	Total raw material consumption	Contribution per unit	Total contribution
A	5000	5kg	25,000	Rs.25	Rs.1,25,000
C	4000	6kg	24,000	Rs.25	Rs.1,00,000
B	1500 #	8 kg	12,000	Rs.30	Rs.45,000
			[Balance]		
Total			61,000		Rs.2,70,000

The amount of profit will be: Total contribution – fixed cost

$$\text{Rs.2,70,000} - \text{Rs.1,50,000} = \text{Rs.1,20,000}$$

After producing products A and C to the maximum possible extent, i.e. as per the market demand, the balance quantity of material available is 12 000 kg and in this quantity 1500 units of B can be produced as the requirement for B is 8 kg per unit. The amount of profit computed above will be the highest in the given situation.

4) **Decision Making:** Managerial decision-making is a very crucial function in any organization. Decision – making should be on the basis of the relevant information. Through the marginal costing technique, information about the cost behaviour is made available in the form of fixed and variable costs. The segregation of costs between fixed and variable helps the management in predicting the cost behaviour in various alternatives. Thus it becomes easy to take decisions. Some of the decisions are to be taken on the basis of comparative cost analysis while in some decisions the resulting income is the deciding factor. Marginal costing helps in generating both the types of information and thus the decision making becomes rational and based on facts rather than based on intuition. Some of the crucial areas of decision-making are mentioned below.

- ❖ Make or buy decisions
- ❖ Accepting or rejecting an export offer
- ❖ Variation in selling price
- ❖ Variation in product mix
- ❖ Variation in sales mix
- ❖ Key factor analysis
- ❖ Evaluation of different alternatives regarding profit improvement
- ❖ Closing down/continuation of a division
- ❖ Capital expenditure decisions.



Illustration of each of these areas is given in the ‘Solved Problems’

Break Even Point

The concept of ‘Break Even Point’ is extremely important for decision making in various areas. This concept is based on the behaviour of costs, i.e. fixed cost and variable costs. As discussed earlier, fixed costs are those costs that remain constant irrespective of the changes in the volume of production. On the other hand, variable costs are the costs that vary with the level of production. While fixed cost per unit is always variable, variable cost per units is always fixed. In addition to these two types of costs, there are semi variable costs that are partially fixed and partially variable. Semi variable costs thus have the features of both types of costs. They remain fixed up to a certain level of production and after crossing that level, they become variable.

The Break Even Point is a level of production where the total costs are equal to the total revenue, i.e. sales. Thus at the break even level, there is neither profit nor loss. Production level below the break-even-point will result into loss while production above break-even point will result in profits. This concept can be better understood with the help of the following table.

Suppose, the selling price of a product is Rs.10 per unit, variable cost Rs.6 per unit and fixed cost Rs.50, 000, the break even level can be found out with the help of the following table.

Number of Units	Sales Value [Rs.10 per unit] Rs.	Variable Cost [Rs.6 per unit] Rs.	Fixed Cost [Rs.50000] Rs.	Total Cost [Variable + Fixed] Rs.	Profit/Loss [Sales value – total cost] Rs.
2500	25, 000	15, 000	50, 000	65, 000	(-) 40, 000
5000	50, 000	30, 000	50, 000	80, 000	(-) 30, 000
7500	75, 000	45, 000	50, 000	95, 000	(-) 20,000
10000	1, 00, 000	60, 000	50, 000	1, 10, 000	(-) 10, 000
12500	1, 25, 000	75, 000	50, 000	1, 25, 000	Nil
15000	1, 50, 000	90, 000	50, 000	1, 40, 000	10, 000

The above table shows that at the production level of 12500 units, the total costs are equal to the total revenue and hence it is the break even level. Production and sales level below the break-even level results into loss as shown in the table while above the break even level will result in profits.

If the above table is analyzed, it will be seen that, when the production level was 2500, the revenue from sales was not sufficient to cover the total cost i.e. variable + fixed. When the production level starts rising, the sales level starts rising but the total cost does not rise in the proportion as the fixed cost remain the same. Consequently the amount of loss starts decreasing and the trend continues till the break even level is reached. After the break even level is crossed, the sales revenue exceeds the total costs and hence it results in profits.

Break even level can also be worked out with the help of the following formulae.

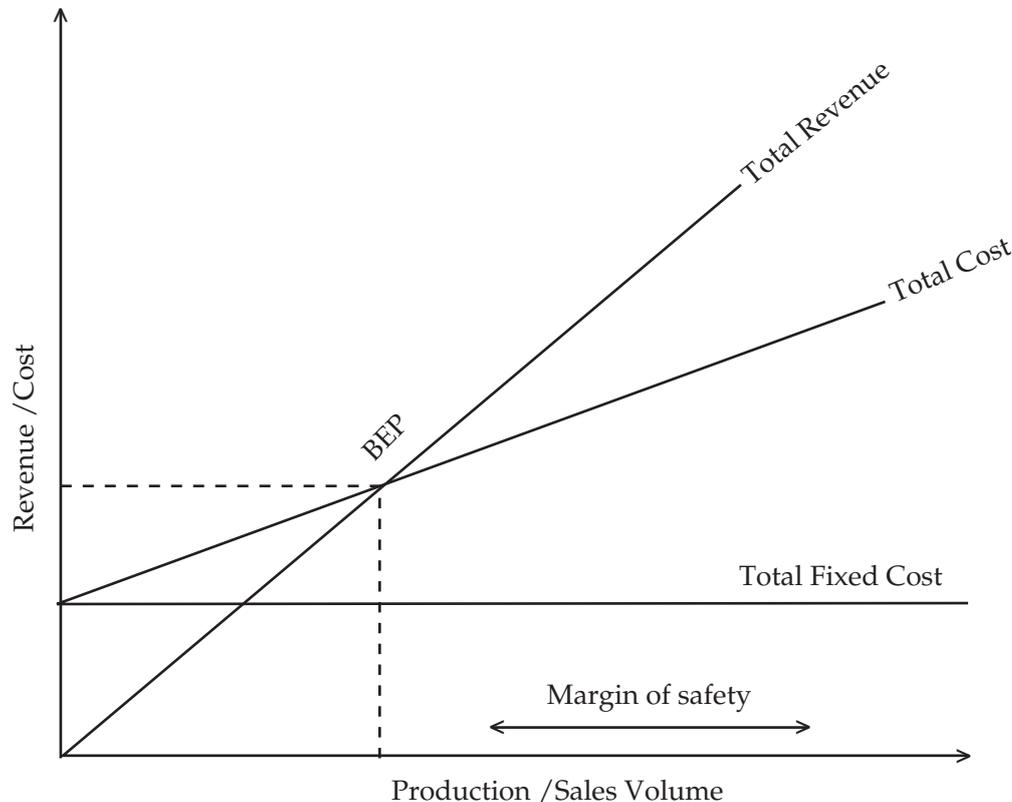
$$\text{Break even point [in units]} = \text{Fixed Cost} / \text{Contribution per Unit}$$



Marginal Costing and Break Even Analysis

Break even point [in Rs.] = Fixed Cost / Profit Volume [P/V] Ratio

Break even point can also be shown on the graph paper as follows:



Explanation: On horizontal axis, production and sales volume is shown while on the vertical axis, sales and costs in amount are shown.

Assumptions of Break Even Point: The concept of break even point is based on the following assumptions.

1. Production and sales are the same, which means that as much as is produced is sold out in the market. Thus there is no inventory remaining at the end.
2. Fixed cost remains same irrespective of the production volume.
3. Variable cost varies with the production. It changes in the same proportion that of the production. Hence it has a linear relationship with the production. In other words, variable cost per unit remains the same.
4. Selling price per unit remains same irrespective of the quantity sold.

Margin of Safety: Margin of Safety is the difference between the actual sales and the break even sales. As we have discussed, at the break even point there is neither any profit nor loss. Hence any firm will always be interested in being as much above the break even level as possible. Margin of safety explains precisely this thing and the higher the safety margin the better it is. Margin of safety is computed as follows.



Margin of Safety = Actual Sales – Break Even Sales.

Limitations of Break even Point: Break Even point is extremely useful in decision- making regarding the production level. It indicates the level of production where there is neither any profit nor loss. However this is based on the assumption that the variable cost per unit, sales price per unit and the fixed cost remains the same. If there is any change in these variables, the break even point will give misleading results.

Problems and Solutions:

1. A Company budgets for a production of 150000 units. The variable cost per unit is Rs.14 and fixed cost per unit is Rs.2 per unit. The company fixes the selling price to fetch a profit of 15% on cost. Required,

- A. What is the break-even point? B] What is the profit/volume ratio? C] If the selling price is reduced by 5%, how does the revised selling price affects the Break Even Point and the Profit/Volume Ratio? D] If profit increase of 10% is desired more than the budget, what should be the sales at the reduced price?

Solution:

A] Break Even Point = Fixed Cost /Contribution Per unit
 = Rs.2 × 1 50 000 units = Rs.3, 00, 000 /Rs.18.40 – Rs.14.00
 = Rs.3, 00, 000 / Rs.4.40 = 68, 182 units.

Note: Contribution per unit is computed as shown below.

- Selling Price per unit = Total Cost + 15% Profit on cost = Rs.16 [Rs.14 variable cost + Rs.2 fixed cost] + Rs.2.40 [15% of Rs.16] = Rs.18.40
- Contribution = Selling Price – Variable Cost = Rs.18.40 – Rs.14 = Rs.4.40

B] Profit/Volume Ratio: Contribution Per Unit/Selling Price Per Unit × 100

$$\text{Rs.4.40 /Rs.18.40} \times 100 = 23.91\%$$

C] Reduction in selling price by 5%: Reduced selling price = Rs.18.40 – 5% of Rs.18.40 = Rs.17.48, revised contribution = Rs.17.48 – Rs.14.00 = Rs.3.48

Break Even Point = Fixed Cost /Contribution Per Unit = Rs.3, 00, 000 /Rs.3.48
 = 86, 207 units

D] Desired profit = Rs.2.40 + 10% of Rs.2.40 = Rs.2.64 per unit

Total Profits = Rs.2.64 × 1 50 000 units = Rs.3, 96, 000
 + Total Fixed Costs = Rs.3, 00, 000
 Total Contribution = Rs.6, 96, 000

Quantity to be sold = Total Contribution + Revised Contribution Per Unit

$$\text{Rs.6, 96, 000 / Rs.3.48} = 2, 00, 000 \text{ units}$$

Sales Value = 2 00 000 units × Rs.17.48 = Rs.34, 96, 000



Marginal Costing and Break Even Analysis

2. From the following figures, find the Break Even Volume

Selling price per ton Rs.69.50

Variable cost per ton Rs.35.50

Fixed Cost Rs.18.02 lakhs

If this volume represents 40% capacity, what is the additional profit for an added production of 40% capacity, the selling price of which is 10% lower for 20% production and 15% lower than the existing price, for the other 20% capacity?

Solution: Existing Break Even Sales = Fixed Cost/Contribution per unit

$$\text{Rs.18.02 lakhs} / \text{Rs.69.50} - \text{Rs.35.50}$$

$$\text{Rs.18.02 lakhs} / \text{Rs.34} = 53\,000 \text{ units}$$

$$\text{Sales Value} = 53,000 \times \text{Rs.69.50} = \text{Rs.36,83,500}$$

It is given in the problem that 40% capacity represents 53,000 units

Hence 80% capacity will represent 1,06,000 units

➤ For additional 20% capacity, selling price falls by 10%

➤ Revised Selling Price = Rs.69.50 – Rs.6.95 = Rs.62.55

Less: Variable Cost = Rs.35.50

Contribution = Rs.27.05

20% capacity = 53,000 units/2 = 26,500 units

Profit if sale price is Rs.62.55 = Contribution per unit × Sales units

$$\text{Rs.27.05} \times 26,500 \text{ units} = \text{Rs.7,16,825}$$

➤ Contribution by 20% capacity for which selling price falls by 15%

➤ Revised Selling Price = Rs.69.50 – Rs.10.425 = Rs.59.075

➤ Less: Variable Cost = Rs.35.50

Contribution = Rs.23.575

Profit if sale price is Rs.59.075 = Contribution per unit × Sales units

$$\text{Rs.23.575} \times 26,500 \text{ units} = \text{Rs.6,24,737}$$

Additional profit by 40% sales = Rs.7,16,825 + Rs.6,24,737 = Rs.13,41,562

3. A retail dealer in garments is currently selling 24,000 shirts annually. He supplies the following details for the year ended 31st March 2007.

Selling price per shirt: Rs.800

Variable cost per shirt: Rs.600

Fixed Cost:

Staff salaries: Rs.24,00,000



General Office Cost: Rs.8, 00, 000

Advertising Cost: Rs.8, 00, 000

As a Cost Accountant, you are required to answer the following each part independently:

1. Calculate Break Even Point and margin of safety in sales revenue and number of shirts sold.
2. Assume that 30, 000 shirts were sold during the year, find out the net profit of the firm.
3. Assuming that in the coming year, an additional staff salary of Rs.10, 00, 000 is anticipated, and price of shirt is likely to be increased by 15%, what should be the break even point in number of shirts and sales?

Solution:

1. Break Even Point: [units] = Fixed Cost / Contribution Per Unit =

$$\text{Rs.40, 00, 000} / \text{Rs.200} = 20\ 000 \text{ number of shirts}$$
 - Note: Contribution per units is selling price – variable cost per unit
 $\text{Rs.800} - \text{Rs.600} = \text{Rs.200}$
 - Break Even Point [sales value] = 20000 units × Rs.800 = Rs.1, 60, 00, 000
 - Margin of safety = Actual Sales – Break Even Sales
 - $24, 000 \text{ shirts} \times \text{Rs.800} = \text{Rs.1, 92, 00, 000} - \text{Rs.1, 60, 00, 000} = \text{Rs.32, 00, 000}$
 - Margin of safety [units] = 24, 000 shirts – 20, 000 shirts = 4000 shirts
2. Amount of profit if 30, 000 shirts are sold:
 - Sales [units] = Fixed Cost + Profit / Contribution Per Unit
 - $30, 000 = \text{Rs.40, 00, 000} + \text{Profit} / \text{Rs.200} = \text{Profit} = \text{Rs.20, 00, 000}$
3. Revised Break Even Point if fixed cost rise by Rs.10, 00, 000 and selling price increase by 15%
 - New selling price = $\text{Rs.800} + 15\% = \text{Rs.920}$, new fixed cost = $\text{Rs.40, 00, 000} + \text{Rs.10, 00, 000} = \text{Rs.50, 00, 000}$
 - Revised Break Even Point [number of shirts] = $\text{Rs.50, 00, 000} / \text{Rs.920} - \text{Rs.600}$
 - Break Even Point = 15, 625 shirts and $15, 625 \times \text{Rs.920} = \text{Rs.1, 43, 75, 000}$
4. The following figures are available from the records of Venus Traders as on 31st March

Figures: In Lakhs of Rs.

Particulars	2006	2007
Sales	150	200
Profits	30	50

Calculate:

- a) Profit/Volume ratio and total fixed expenses
- b) Break Even Sales



Marginal Costing and Break Even Analysis

- c) Sales required to earn a profit of Rs.90 lakhs
- d) Profit/Loss that would arise if the sales were Rs.280 lakhs

Solution:

The first step in the problem is to work out the profit/volume ratio. The following formula will have to be used for the computation of this ratio.

a) Profit / Volume Ratio = Change in profit/Change in sales \times 100
$$\text{Rs.20/Rs.50} \times 100 = 40\%$$

Fixed Expenses: We can take the sales of any one year, suppose we take the sales of the year ended on 31st March 2006, the amount is Rs.150 lakhs

The profit/volume ratio is 40% which means that contribution is 40% of sales i.e. 40% of Rs.150 lakhs which comes to Rs.60 lakhs. The amount of profit is Rs.30 lakhs.

Contribution – Fixed Cost = Profit, i.e. Rs.60 lakhs – Fixed Cost = Rs.30 lakhs, therefore fixed cost is Rs.30 lakhs

- b) Break Even Sales = Fixed Cost / Profit/Volume Ratio = Rs.30 lakhs/40% = Rs.75 lakhs
 - c) Sales required to earn a profit of Rs.90 lakhs:
 - Sales = Fixed Cost + Profit /P/V Ratio = Sales = Rs.30 lakhs + Rs.90 lakhs /40%
 - Sales = Rs.120 lakhs/40% = Rs.3, 00, 00, 000 i.e. Rs.300 lakhs
 - d) Profit / loss if sales are Rs.280 lakhs, Sales = Fixed Cost + Profit /P/V Ratio
 - Rs.280 lakhs = Rs.30 lakhs + Profit /40% = Rs.82 lakhs
5. ABC Ltd. maintains a margin of safety of 37.5% with an overall contribution to sales ratio of 40%. Its fixed costs amount to Rs.5, 00,000. Calculate the following:
- 1. Break Even Sales
 - 2. Total Sales
 - 3. Total Variable Sales
 - 4. Current Profits
 - 5. New 'Margin of Safety' if the sales volume is increased by 7.5%

Solution:

1. Break Even Sales = Fixed Cost / Profit/Volume Ratio = Rs.5, 00,000/40%
$$= \text{Rs.12, 50, 000}$$

2. Total Sales = Break Even Sales + Margin of Safety
Margin of Safety = Actual Sales – Break-Even Sales

Let the actual sales be 100, Margin of Safety is 37.5%

Hence Break even sales will be Rs.62.5

Now, if the Break even sales are Rs.62.5, actual sales are Rs.100, hence if Break even sales are



Rs.12.5 lakhs, actual sales will be $100/62.5 \times 12.5 = \text{Rs.}20$ lakhs

3. Contribution = Sales – Variable Cost. As the contribution is 40% of sales, the variable cost is 60% of sales and so variable cost will be 60% of Rs.20 lakhs, i.e. Rs.12 lakhs.
4. Current Profits = Sales – [Fixed Cost + Variable Cost]
 $= \text{Rs.}20,00,000 - [\text{Rs.}12,00,000 + \text{Rs.}5,00,000]$
 $= \text{Rs.}3,00,000$
5. New Margin of Safety is the sales volume is increased by 7.5%
 New Sales Volume = $\text{Rs.}20,00,000 + 7.5\% \text{ of } \text{Rs.}20,00,000 = \text{Rs.}21,50,000$
 Hence, New Margin of Safety = $\text{Rs.}21,00,000 - \text{BEP Sales } \text{Rs.}12,50,000$
 $= \text{Rs.}9,00,000$
6. A Company has two Plants at Locations I and II, operating at 100% and 75% of their capacities respectively. The company is considering a proposal to merge the two plants at one location to optimize available capacity. The following details are available in respect of the two plants, regarding their present performance/operation.

Particulars	Location I	Location II
Sales [Rs.in lakhs]	200	75
Variable Costs [Rs. in lakhs]	140	54
Fixed Cost [Rs. in lakhs]	30	14

For decision-making purposes, you are required to work out the following information,

- I. The capacity at which the merged plan will break even.
- II. The profit of the merged plant working at 80% capacity
- III. Sales required if the merged plant is required to earn an overall profit of Rs.22,00,000

Solution:

After merging the plants, the total of sales, variable costs and fixed costs will have to be taken. However before doing that, the capacity utilization of plant at Location II will have to be made 100%. Accordingly the figures at 75% are converted into figures at 100%. Fixed cost is the exception for this, as it will remain the same at 100% capacity utilization also. The statement prepared on the next page is on the basis of 100% capacity utilization of plants at both the locations.

Solution:

Comparative Performance of Plant at 100% Capacity

Rs. in lakhs

Particulars	Plant Location I	Plant Location II	Total Merged Plant
Capacity Levels [%]	100	100	100
Sales	200	100	300
Less: Variable Cost	140	72	212



Marginal Costing and Break Even Analysis

Particulars	Plant Location I	Plant Location II	Total Merged Plant
Contribution	60	28	88
Less: Fixed Costs	30	14	44
Profit	30	14	44
Profit/Volume Ratio: Contribution/Sales	60/200 = 30%	28/100 = 28%	88/300 = 29.33%
Break Even Sales: Fixed Cost/Profit/Volume Ratio			44/29.33% 150

I] Capacity of the merged plant at break even = $150/300 \times 100 = 50\%$

II] Computation of the profitability of the merged plan at 80% capacity

Particulars	Amount [Rs. in lakhs]
Sales 80% of Rs.300	240.00
Less: Variable Cost = 70.67% of sales	169.60
Contribution	70.40
Less: Fixed Cost	44.00
Profit	26.40

III] Computation of sales required to earn desired profit of Rs.22 lakhs

$$\text{Sales} = \text{Fixed Cost} + \text{Desired Profit} / \text{Profit/Volume Ratio}$$

$$= \text{Rs.44 lakhs} + \text{Rs.22 lakhs} / 29.33\% = \text{Rs.225 lakhs}$$

7. A company sells its products at Rs.15 per unit. In a period, if it produces and sells 8000 units, it incurs a loss of Rs.5 per unit. If the volume is raised to 20 000 units, it earns a profit of Rs.4 per unit. Calculate Break Even Point both in terms of rupees as well as units.

Solution:

The basic marginal cost equation is $S - V = F + P$, where S = Sales, V = Variable Cost, F = Fixed Cost and P = Profit.

Let us assume that variable cost = x and fixed cost = y. We can form the following simultaneous equations under various situations.

$$\text{Rs.15} \times 8000 - 8000x = y - 40,000 \text{ [loss of Rs.5 per unit} \times 8000 \text{ units]} \text{ Situation I}$$

$$\text{Rs.15} \times 20,000 - 20,000x = y + 80,000 - \text{Situation II}$$

$$\text{Or, } 1,20,000 - 8000x = y - 40,000 \text{ (3)}$$

$$\text{And } 3,00,000 - 20,000x = y + 80,000 \text{ (4)}$$

By solving both the equations, we get $x = \text{Rs.5}$ i.e. variable cost per unit is Rs.5 and $y = \text{Rs.1,20,000}$ i.e. fixed cost Rs.1,20,000

$$\text{Profit Volume Ratio} = \text{Contribution/Sales} \times 100 = \text{Rs.15} - \text{Rs.5} / \text{Rs.15} \times 100 = 66.67\%$$

$$\text{Break Even Point} = \text{Fixed Cost/P/V Ratio} = \text{Rs.1,20,000} / 66.67\% = \text{Rs.1,80,000}$$

$$\text{Break Even Point [Units]} = \text{Fixed Cost/Contribution per unit} = \text{Rs.1,20,000} / \text{Rs.10} = 12000 \text{ units.}$$



8. A company wants to buy a new machine to replace one, which is having frequent breakdown. It received offers for two models, M1 and M2. Further details regarding these two models are given below

Particulars	M1	M2
Installed Capacity [Units]	10, 000	10,000
Fixed overheads per annum	Rs.2, 40,000	Rs.1, 00,000
Estimated profit at the above capacity	Rs.1, 60,000	Rs.1, 00,000

The product manufactured using this type of machine, M1 or M2, is sold at Rs.100 per unit. You are required to determine,

1. Break Even level of sales for each model.
2. The level of sales at which both the models will earn the same profit.
3. The model suitable for different levels of demand for the product.

Solution:

1. Computation of Break Even Level for both the machines
 - Machine M1: Fixed cost Rs.2, 40,000; For working out the variable cost and contribution, the following statement is prepared as working note.
 - Working Note No.1

Particulars	Amount [Rs.]
Installed capacity – 10000 units	
Fixed overheads	2, 40, 000
Estimated profits	1, 60, 000
Total contribution [Fixed overheads + Estimated profits]	4, 00, 000
Sales value: 10000 units X Rs.100	10, 00, 000
Variable cost [Sales – Contribution]	6, 00, 000
Variable cost per unit	60
Contribution per unit	40
Profit/Volume ratio: Contribution/Sales X 100	40%

$$\text{Break Even Sales} = \text{Fixed Cost} / \text{P/V Ratio} = \text{Rs.2, 40, 000} / 40\% = \text{Rs.6, 00,000}$$

$$\text{Break Even Sales} = 6000 \text{ units}$$

- Break Even Sales: M2: Similar to Working Note 1, a Working Note 2 will have to be prepared to compute, the variable cost and contribution as well as the profit volume ratio.



Marginal Costing and Break Even Analysis

➤ Working Note No.2

Particulars	Amount [Rs.]
Installed capacity – 10000 units	
Fixed overheads	1, 00,000
Estimated profits	1, 00,000
Total contribution [Fixed overheads + Estimated profits]	2, 00, 000
Sales value: 10000 units X Rs.100	10, 00, 000
Variable cost [Sales – Contribution]	8, 00, 000
Variable cost per unit	80
Contribution per unit	20
Profit/Volume ratio: Contribution/Sales X 100	20%

Break Even Sales: Fixed Cost/Profit/Volume Ratio = Rs.1, 00,000 /20% = Rs.5, 00,000

Break Even Units = 5, 000

2. The level of sales at which both the machines will earn the same profit

For computation of the above, the following formula can be used,

Level of sales at which both machines will earn the same profit = Difference in fixed cost/
difference in variable cost = Rs.2, 40,000 – Rs.1, 00,000 /Rs.80 – Rs.60

= Rs.1, 40,000 /Rs.20 = 7000 units

Thus, at 7000 units, the total costs of both the machines will be same and hence they will earn the same amount of profits.

3. Model suitable for different levels of demand of the product: If the cost structure of both the machines is observed, it can be seen that the machine M2 has lower break even point and lower fixed cost, and so this machine will be suitable in case of lower demands. On the other hand, machine M2 will be more suitable in case of higher demand because of higher profit volume ratio.
9. A factory engaged in manufacturing plastic buckets is working to 40% capacity and produces 10, 000 buckets per annum. The present cost break up for one bucket is as under,

Material Rs.10

Labour Rs.3

Overheads Rs.5 [60% fixed]

The selling price is Rs.20 per bucket.

If it is decided to work the factory at 50% capacity, the selling price falls by 3%. At 90% capacity, the selling price falls by 5% accompanied by a similar fall in the price of material.

You are required to calculate the profit at 50% and 90% capacities and also show break even points for the same capacity production.



Solution:

Statement showing Profit and Break Even Point at 50% and 90% Capacity

Particulars	50% Capacity	90% Capacity
Production - units	12, 500	22, 500
A] Sale Price per Unit	Rs.19.40	Rs.19.00
B] Variable Cost per Unit		
➤ Material	10.00	9.50
➤ Labour	3.00	3.00
➤ Variable Overheads	2.00	2.00
C] Total Variable Cost Per Unit	15.00	14.50
D] Contribution per Unit [A – C]	4.40	4.50
E] Total Contribution [Units X D]	55, 000	1, 01,250
F] Fixed Costs Rs.3 per unit at 40% capacity, i.e. 10, 000 units	30, 000	30, 000
G] Profits [E – F]	25, 000	71, 250

Break Even Sales at 50% capacity = Fixed Cost/Contribution per unit

$$= \text{Rs.}30,000 / \text{Rs.}4.40 = 6\,818 \text{ units: Rs.}1,32,270 \text{ (approx)}$$

Break Even Sales at 90% capacity = Fixed Cost/Contribution per unit

$$= \text{Rs.}30,000 / \text{Rs.}4.50 = 6\,667 \text{ units: Rs.}1,26,673$$

10. A company manufactures a single product with a capacity of 1 50 000 units per annum. The summarized profitability statement for a year is as under:

Particulars	Amount Rs.	Amount Rs.
Sales: 1 00 000 units @ Rs.15 per unit		15, 00,000
Less: Cost of Sales		
➤ Direct materials	3, 00,000	
➤ Direct labor	2, 00,000	
➤ Production overheads – variable	60,000	
➤ Production overheads – fixed	3,00,000	
➤ Administrative overheads – fixed	1, 50,000	
➤ Selling and distribution overheads – variable	90, 000	
➤ Selling and distribution overheads - fixed	1, 50,000	
Total cost of sales		12, 50,000
Profit		2, 50,000



Marginal Costing and Break Even Analysis

You are required to evaluate the following options:

- 1) What will be the amount of sales required to earn a target profit of 25% on sales, if the packing is improved at a cost of Re.1 per unit?
- 2) There is an offer from a large retailer for purchasing 30 000 units per annum subject to providing a packing with a different brand name at a cost of Rs.2 per unit. However, in this case there will be no selling and distribution expenses. Also this will not in any way affect the company's existing business. What will be the break even price for this additional offer?
- 3) If an expenditure of Rs.3, 00,000 is made on advertising, the sales would increase from the present level of 1 00 000 units to 1 20 000 units at a price of Rs.18 per unit. Will that expenditure be justified?
- 4) If the selling price is reduced by Rs.2 per unit, there will be 100% capacity utilization. Will the reduction in selling price be justified?

Solution:

The following working notes are prepared for working out the solution of various questions.

Working Note No. 1

Statement Showing Total Contribution and Contribution Per Unit

Particulars	Amount [Rs.]
Sales: 1, 00,000 units @ Rs.15 per unit	15, 00,000
Less: Variable Costs:	
➤ Direct materials: 3, 00,000	
➤ Direct Labour: 2, 00,000	
➤ Variable overheads [prod.] 60,000	
➤ Variable overheads [S & D] 90,000	
Total Variable Cost	6, 50,000
Contribution [Sales – Total Variable Cost]	8, 50,000
Variable Cost Per Unit	$6, 50,000 / 1, 00,000 = \text{Rs.}6.50$
Contribution Per Unit	$8, 50,000 / 1, 00,000 = \text{Rs.}8.50$

Working Note No. 2

Total Fixed Cost:

- Production overheads: Rs.3, 00,000
- Administration overheads: Rs.1, 50,000
- S & D Overheads: Rs.1, 50,000
- Total fixed costs: Rs.6, 00,000



1) Amount of sales required to earn a target profit of 25% on sales after improving the packing:

- Present variable cost per unit [Working Note No.1] = Rs.6.50
- Additional cost of improvement in packing = Re.1.00
- Revised variable cost per unit = Rs.7.50
- Revised contribution per unit = Rs.7.50
- Profit/volume ratio = $\text{Rs.7.50} / \text{Rs.15} \times 100 = 50\%$
- Let \times be the amount of sales to earn desired profit, the amount of sales will be computed with the help of the following formula
- $S = \text{Fixed Cost} + \text{Desired Profit} / \text{Profit/Volume Ratio}$
- Therefore, $\times = \text{Rs.6,00,000} + .25 \times / 50\% = \text{Rs.24,00,000}$
- Note: Total fixed cost is given in Working Note No.2
- Amount of sales required to earn the profit is Rs.24,00,000 and the amount of profit is Rs.6,00,00 [25% of sales]

2) Evaluation of purchase offer by a large retailer: 30 000 units, additional packing cost of Rs.2 per unit

- Present variable cost per unit: Rs.6.50
- Less: S & D Overheads: Rs..90
- Add: Packing expenses: Rs.2.00
- Revised variable cost per unit: Rs.7.60
- The current selling price is Rs.15 per unit and after considering the revised variable cost, the contribution per unit works out $\text{Rs.15} - \text{Rs.7.60} = \text{Rs.7.40}$. Since the fixed costs are not going to increase, there will be additional contribution of $30\,000 \text{ units} \times \text{Rs.7.40} = \text{Rs.2,22,000}$ which will be the additional profit and hence the offer can be accepted.
- The break even price for this offer will be Rs.7.60 per unit, which is equal to the variable cost per unit.

3) Evaluation of proposal of incurring additional advertising expenses of Rs.3,00,000

Particulars	Amount [Rs.]
Revised Selling Price per unit	18.00
Less: variable cost [working note no.1] per unit	6.50
Contribution per unit	11.50
Total contribution : $1,20,000 \times \text{Rs.11.50}$	13,80,000
Less: Fixed cost : Current Rs.6,00,000	
Add. Expenditure on	
Advertising Rs.3,00,000	9,00,000
Profit	4,80,000



Marginal Costing and Break Even Analysis

Since the amount of profit has increased from the present Rs.2, 50,000 to Rs.4, 80,000, the expenditure on advertising is justified.

4) Reduction in selling price for increasing capacity utilization to 100%

Particulars	Amount Rs.
New selling price per unit	13.00
Less: variable cost per unit	6.50
Contribution per unit	6.50
Total Contribution 1, 50,000 units × Rs.6.50	9, 75, 000
Less: Fixed cost	6, 00, 000
Profit	3, 75, 000

It can be seen that the existing profit can increase by reducing the selling price up to Rs.13 per unit and thus increasing the capacity utilization to 100% and hence the proposal is justified.

Key Factor Analysis

11] A] The following particulars are extracted from the records of a company.

Particulars	Product A	Product B
Sale price per unit	Rs.100	Rs.120
Consumption of material	2 kg	3 kg
Material cost	Rs.10	Rs.15
Direct labour cost	15	10
Direct expenses	5	6
Machine hours used	3	2
Fixed overheads per unit	Rs.5	Rs.10
Variable overheads per unit	15	20

Direct labour per hour is Rs.5. Comment on the profitability of each product [both use same raw 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 IV} production capacity [in terms of machine hours] is limited.

B] Assuming raw material as the key factor, availability of which is 10,000 kg and maximum sales potential of each product being 3500 units, find out the product mix which will yield maximum profits.



Solution: The following statement is prepared in order to answer various questions.

Particulars	Product A	Product B
Selling price per unit	Rs.100	Rs.120
Less: Variable cost per unit		
➤ Direct materials	Rs.10	Rs.15
➤ Direct labour	Rs.15	Rs.10
➤ Direct expenses	Rs.5	Rs.6
➤ Variable overheads	Rs.15	Rs.20
Total variable cost per unit	Rs.45	Rs.51
Contribution [Selling price per unit – total variable cost per unit]	Rs.55	Rs.69
Profit/volume ratio: Contribution/Sales × 100	$55/100 \times 100 = 55\%$	$69/120 \times 100 = 57.5\%$
Contribution per machine hour: Contribution/Machine hours per unit	$Rs.55/3 = 18.33$	$Rs.69/2 = Rs.34.5$
Contribution per kg of direct material = Contribution/kg of material per unit	$Rs.55/2 \text{ kg} = Rs.27.5$	$Rs.69/3 \text{ kg} = Rs.23$

Profitability of each product in each of the following situations:

- I] Total sales potential in units is limited: In this situation, the product with higher contribution per unit will be preferred as it will be more profitable to promote the same. Product B earns higher contribution per unit than product A as shown in the table and hence it will be more profitable in such situation.
- II] Total sales potential in value is limited: Product with higher profit/volume ratio will be more profitable in such situation. Product B will be more profitable as its profit volume ratio is higher than that of A.
- III] Raw material is in short supply: Product A will be more profitable in such situation as it earns higher contribution per kg of raw material.
- IV] Production capacity in machine hours is limited: In such case, product B will be more profitable as it earns higher contribution per machine hour.

B] Optimum product mix if raw material is in short supply:

Raw Material availability is 10 000 kg, in such situation, it will be necessary to decide the priority between Product A and Product B. As mentioned in III above, if raw material is in short supply, Product B will be more profitable than Product A. The following statement is prepared to show the optimum product mix.



Marginal Costing and Break Even Analysis

Product In Order Of Priority	Number of Units	Raw Material Per Unit	Total Requirement of Raw Material	Contribution Per Unit Rs.	Total Contribution Rs.
A	3,500	2 kg	7,000	55	1,92,500
B	1,000 *	3 kg	3,000 #	69	69,000
Total Contribution					2,61,500

Total Contribution: Rs.2,61,500

Less: Fixed Cost

A: Rs.17,500 **

B: Rs.35,000 ***

Total Fixed Cost: Rs.52,500

Profit: Rs.2,09,000

Total raw material availability is 10 000 kg out of which 7000 are used for A as it has the priority due to higher contribution per kg. Balance 3000 kg is available for producing product B.

* In the balance 3000 kg, 1000 units of B are possible as the requirement is 3 kg per unit.

** Fixed cost per unit is given Rs.5 for product A, hence total fixed cost for A is Rs.17,500

*** Fixed cost per units is Rs.10 for B and hence total fixed cost for B is Rs.35,000

12. P Ltd. manufactures and sells children's toys of high quality over an extensive market utilizing the services of skilled artists who are paid at an average rate of Rs.15 per hour. The total number of skilled hours available in a year is only 14000. The details of planned production for 2008-09; estimated cost and unit selling prices are given below:

Product [Toy]	Production Planned [Units]	Direct Materials Per Unit Rs.	Direct Labour Per Unit Rs.	Fixed Overheads Per Unit Rs.	Selling Price Per Unit Rs.
A	3000	20	10	15	70
B	4000	24	12	18	92
C	4000	32	12	18	95
D	3000	40	16	24	110
E	2400	60	20	30	180

Variable overheads costs amount to 50% of the direct labor cost. The company has estimated the following maximum and minimum demands for each product.

Particulars	A	B	C	D	E
Maximum – Units	5000	6000	6000	4000	4000
Minimum - Units	1000	1000	1000	500	500



You are required to work out profit as per the production plan of the company and also compute the optimum profit in the given situation.

Solution:

In the example, the direct labour hour is the key factor or constraint. The availability of the same is only 14000 labour hours and hence the priority of the products will have to be decided as all the product cannot be produced equal to the maximum quantity. The contribution per direct labour hour will be criteria for determining the priority. In the following table the contribution per unit and per direct labour hour is shown.

1] Statement showing Contribution per Direct Labour Hour and Priority of Production

Particulars	Product A Rs.	Product B Rs.	Product C Rs.	Product D Rs.	Product E Rs.
I] Selling price per unit	70	92	95	110	180
II] Variable cost per unit					
➤ Direct materials	20	24	32	40	60
➤ Direct labour	10	12	12	16	20
➤ Variable overheads [50% of direct labour]	05	06	06	08	10
III] Total variable cost	35	42	50	64	90
IV] Contribution per unit [I – III]	35	50	45	46	90
V] Direct labour hours per unit *	.67	.8	.8	1.06	1.33
VI] Contribution per direct labour hour [V / VI]	Rs.52.23	Rs.62.5	Rs.56.25	Rs.43.39	Rs.67.66
VII] Priority	IV	II	III	V	I

* Direct labour hours for each product is computed by dividing the direct labor cost per unit of each product by direct labor rate per hour, which is Rs.15

The next step in the problem is to work out the amount of profit as per the production plan prepared by the company. This computation is shown in the next statement.



2] Statement showing amount of Profits as per the Production Plan of the Company

Particulars	Product A	Product B	Product C	Product D	Product E	Total
I] Number of units to be sold	3000	4000	4000	3000	2400	
II] Contribution per unit [As per statement number 1]	Rs.35	Rs.50	Rs.45	Rs.46	Rs.90	
III] Total Rs contribution [I X II]	1, 05,000	2, 00,000	1, 80,000	1, 38,000	2, 16,000	8, 39,000
IV] Total fixed cost	45, 000	72, 000	72, 000	72, 000	72, 000	3, 33,000
V] Profit [III -IV]	60, 000	1, 28, 000	1, 08, 000	66, 000	1, 44, 000	5, 06, 000

3] Statement Showing Production Plan For Optimizing Profits

Product in order of priority	Sales Units	Number of hours required **	Contribution Per Unit	Total Contribution
E	4000 Max	5334	Rs.90	Rs.3, 60,000
B	6000 Max	4800	Rs.50	Rs.3, 00,000
C	3331 [Balance]	2665	Rs.45	Rs.1, 49,895
A	1000 Min	667	Rs.35	Rs.35, 000
D	500 Min	534	Rs.46	Rs.23, 000
Total		14, 000		Rs.8, 67, 895

Amount of maximum profit = Total Contribution – Total Fixed Cost

$$\text{Rs.8, 67,895} - \text{Rs.3, 33,000} = \text{Rs.5, 34, 895}$$

** Number of units X labour hours per unit

13. XY Ltd. is manufacturing three household products, A, B and C and selling them in a competitive market. Details of current demand, selling price and cost structure are given below.

Particulars	A	B	C
Expected Demand [units]	10, 000	12, 000	20, 000
Selling price per unit Rs.	20	16	10
Variable cost per unit			
Direct materials Rs.10 per kg	6	4	2
Direct labour Rs.1.5 per hour	3	3	1.50
Variable overheads	2	1	1.0
Fixed overheads per unit	Rs.5	Rs.4	Rs.2



The company is frequently affected by acute scarcity of raw material and high labor turnover. During the next period, it is expected to have one of the following situations:

- I] Raw material available will be only 12 100 kg
- II] Direct labour hours available will be only 5000 hrs.
- III] It may be possible to increase sales of any one product by 25% without any additional fixed costs but by spending Rs.20, 000 on advertisement. There will be no shortage of materials or labor.

Suggest the best production plan in each case and the resultant profit that the company would earn according to your suggestion.

Solution: The following statement is prepared to compute the contribution per unit and for deciding best production plan in each case. There are limiting factors like raw material and direct labour. For deciding the best production plan, priority of the products will have to be decided by computing the contribution per unit of the key factor. Accordingly the following statements are prepared.

I] Raw Material availability is 12, 100 kg

Statement Showing Contribution per kg.of Raw Material

Particulars	Product A Rs.	Product B Rs.	Product C Rs.
I] Selling price per unit	20	16	10.0
II] Variable cost per unit			
➤ Direct materials	6	4	2.0
➤ Direct labour	3	3	1.50
➤ Variable overheads	2	1	1.0
III] Total variable cost per unit	11	8	4.50
IV] Contribution per unit [I – III]	9	8	5.50
V] Raw material requirement per unit	.6	.4	.2
VI] Contribution per kg of raw material: Contribution / Raw material requirement per kg	9 / .6 = Rs.15	8 / .4 = Rs.20	Rs.5.50 / .2 Rs.27.50
Priority	III	II	I



II] Statement Showing Best Production Plan: Raw Material Availability Constraint

Products Order of Priority	Production Units	Raw Materials per unit kg	Total Raw Materials kg	Contribution Per Unit Rs.	Total Contribution Rs.
C	20 000	0.2	4000	5.50	1, 10,000
B	12 000	0.4	4800	8.00	96, 000
A	5 500	0.6	3300 *	9.00	49, 500
Total			12 100		2, 55,500
Less: Fixed Cost					1, 38,000
Profit					1, 17,500

* Total availability of raw material is 12 100 kg as given in the problem. Total 8800 kg are consumed for producing the maximum production of C and B and hence the balance quantity of 3300 kg is used to produce 5500 kg of product A.

III] Statement Showing Contribution Per Direct Labour Hour:

Particulars	Product A Rs.	Product B Rs.	Product C Rs.
Contribution per unit as per statement I	9	8	5.50
Labor hrs per unit	0.2	0.2	0.1
Contribution per labour hour [Contribution per unit/ labour hour per unit]	$9/0.2 = \text{Rs.}45$	$8/.02 = \text{Rs.}40$	$5.50/0.1 = \text{Rs.}55$
Priority	II	III	I

IV] Statement Showing Best Production Plan: Direct Labor Hour Constraint

Product as per Priority	Production Units	Labour Hours Per Unit	Total Labour Hours	Contribution Per Unit	Total Contribution
C	20,000	0.1	2000	Rs.5.50	Rs. 1,10,000
A	10,000	0.2	2000	Rs.9.00	Rs. 90,000
B	5,000	0.2	1000*	Rs.8.00	Rs. 40,000
Total			5000		Rs. 2,40,000
Less: Fixed Cost					Rs. 1,38,000
Profit					Rs. 1,02,000

* Balance labour hours after producing C and A to the maximum possible extent



V] Statement Showing Profit /Volume Ratio:

Particulars	Product A	Product B	Product C
I] Selling price per unit	Rs.20	Rs.16	Rs.10
II] Contribution per unit [As shown in earlier statements]	Rs.9	Rs.8	Rs.5.50
III] Profit/Volume Ratio: Contribution / Sales X 100	$9/20 \times 100 = 45\%$	$8/16 \times 100 = 50\%$	$5.50/10 \times 100 = 55\%$
IV] Priority	III	II	I

VI] Best Production Plan When Sales of One Product Can Be Increased By Spending Rs.20,000 on Advertising

Product	Production Units	Contribution Per Unit Rs.	Total Contribution Rs.
A	10, 000	9.00	90, 000
B	12, 000	8.00	96, 000
C	25, 000 *	5.50	1, 37, 500
Total			3, 23, 500
Less: Fixed Cost			1, 58, 000
Profit			1, 65, 500

* Sales of any one product can be increased by 25% by spending additional amount on advertising Rs.20, 000. In such situation, the product with highest profit/ volume ratio can be promoted and hence production and sales of product C should be increased by 25% as the profit/volume ratio for the same is highest. Thus the production and sale units will be 25% higher, i.e. 20 000 + 25% of 20 000 = 25 000 units.

14. A company has compiled the following data for the preparation of its budget for the year 2008-09

Particulars	Product A	Product B	Product C
Sale per month - units	8, 000	4, 000	6, 000
Selling Price	Rs.40 per unit	Rs.80 per unit	Rs.100 per unit
Direct Materials	Rs.20 per unit	Rs.48 per unit	Rs.40 per unit
Direct Labour:			
Department 1 Rs.5 per hour	5	10	20
Department 2 Rs.4 per hour	8	4	12
Variable Overheads	Rs.3 per unit	Rs.3 per unit	Rs.7 per unit
Fixed Overheads:			
Rs.1, 50, 000 per month			



Marginal Costing and Break Even Analysis

After the budget was discussed, the following action plan was approved for improving the profitability of the company.

- I] Direct labour in department 1, which is in short supply should be increased by 15, 000 hours by spending fixed overheads of Rs.8, 000 per month.
- II] To boost sales, an advertisement program should be launched at a cost of Rs.10, 000 per month.
- III] The selling price should be reduced by: A: 2.5%, B: 8.75%, C: 1%
- IV] The sales target have been increased and the sales department has confirmed that the company will be able to achieve the following quantities of sales.
A: 12, 000 units, B: 6, 000 units, C: 10, 000 units

Required:

1. Present the original budget for the year 2008-09
2. Set an optimal product mix after taking into the action plan into consideration and determine the monthly profit.
3. In case the requirement of direct labour hour of department 2 in excess of 40, 000 hours is to be met by overtime working involving double the normal rate, what will be the effect of so working overtime on the optimum profit as computed in 2 above?

Solution: The original budget for the year 2008-09 is prepared as shown below.

Original Monthly Budget for the Year 2008-09

Particulars	Product A	Product B	Product C	Total
I] Sales for the month - units	8000	4000	6000	
II] Selling price per unit	Rs.40	Rs.80	Rs.100	
III] Variable cost per unit				
➤ Direct material	Rs.20	Rs.48	Rs.40	
➤ Direct labour [Dept 1]	Rs.5	Rs.10	Rs.20	
➤ Direct labour [Dept 2]	Rs.8	Rs.4	Rs.12	
➤ Variable overheads	Rs.3	Rs.3	Rs.7	
IV] Total variable cost per unit	Rs.36	Rs.65	Rs.79	
V] Contribution per unit [II – IV]	Rs.4	Rs.15	Rs.21	
VI] Total contribution [I X V]	Rs.32, 000	Rs.60, 000	Rs.1, 26, 000	Rs.2, 18, 000
VII] Fixed cost				Rs.1, 50, 000
VIII] Profit [VI – VII]				Rs.68, 000



2] Optimum product mix after taking the action plan into consideration: For determining the optimum product mix, the following working is done.

I] Ranking of products as per revised figures

Particulars	Product A	Product B	Product C
Quantities of sales [units]	12, 000	6, 000	10, 000
Original selling price	Rs.40	Rs.80	Rs.100
Less: Discount	Rs.1 [2.5%]	Rs.7 [8.75%]	Re.1 [1%]
Revised selling price	Rs.39	Rs.73	Rs.99
Less: Variable cost per unit	Rs.36	Rs.65	Rs.79
Contribution per unit	Rs.3	Rs.8	Rs.20

Particulars	Product A	Product B	Product C
Contribution per unit [As shown in the above table]	Rs.3	Rs.8	Rs.20
Direct labour hours in Dept 1	1	2	4
Contribution per hour in Dept 1	Rs.3	Rs.4	Rs.5
Contribution per unit/labour hrs per unit in Dept 1]			
Ranking	III	II	I

II] Direct labour hour capacity of Department 1

Product	Original monthly sales in units	Direct labour hours per unit	Total hours in Dept. 1
A	8000	1	8000
B	4000	2	8000
C	6000	4	24000
Total hours			40000
Additional hours			15000
Total revised capacity hrs			55000

III] Statement of Optimal Product Mix

Product [in order of priority]	Units	Hours in Dept 1	Hours utilized
C	10000	4	40, 000
B	6000	2	12, 000
A	3000	1	3, 000 *
Total			55, 000

* After producing product C and B to the maximum possible extent as per the market demand, balance hours available for A are 3000 in which, 3000 units of A can be produced.



IV] Statement showing Optimum Monthly Profit

Product [in Order of priority]	Number of units as per statement III	Contribution per unit – Rs.	Total contribution Rs.
C	10,000	20	2,00,000
B	6,000	8	48,000
A	3,000	3	9,000
Total			2,57,000

Total Contribution: Rs.2,57,000

Less: Fixed Costs

Original: Rs.1,50,000

Additional Rs. 8,000

Advertisement Rs. 10,000

Total Rs.1,68,000

Profit: Rs. 89,000

3] Impact of Overtime Working:

I] Total hours in department 2 as per original budget

Product A: 8000 units × 2 hrs in dept. 2 = 16,000 hours

Product B: 4000 units × 1 hr in dept. 2 = 4,000 hours

Product C: 6000 units × 3 hrs in dept. 2 = 18,000 hours

Total hours available in dept. 2 = 38,000 hours as per the original budget.

If the optimal product mix is worked out as shown in Statement III in answer to question 2 above, the required hours in department 2 will be as follows:

Product C: 10,000 units × 3 hrs per unit in dept 2 = 30,000 hours

Product B: 6,000 units × 1 hr per unit in dept 2 = 6,000 hours

Product A: 3,000 units × 2 hrs per unit in dept 2 = 6,000 hours

Thus total number of hours required in dept 2 = 42,000 hours

Overtime working will be required for hours beyond 40,000 hours, i.e. for 2000 hours

The overtime premium will be 2000 hours × Rs.8 [double rate] = Rs.16,000

Thus the amount of profit will be reduced to Rs.89,000 – Rs.16,000 = Rs.73,000



Decision-Making:

15. Vinak Ltd. is operating at 75% level of activity produces and sells two products A and B. The cost sheet of the two products is given below.

Particulars	Product A	Product B
Units produced and sold	600	400
Direct materials	Rs.2.00	Rs.4.00
Direct labour	Rs.4.00	Rs.4.00
Factory overheads [40% fixed]	Rs.5.00	Rs.3.00
Selling and administration overheads 60% fixed	Rs.8.00	Rs.5.00
Total cost per unit	Rs.19.00	Rs.16.00
Selling price per unit	Rs.23.00	Rs.19.00

Factory overheads are absorbed on the basis of machine hours, which is the limiting [key] factor. The machine hour rate is Rs.2 per hour.

The company receives an offer from Canada for the purchase of product A at a price of Rs.17.50 per unit. Alternatively, the company has another offer from the Middle East for the purchase of product B at a price of Rs.15.50 per unit. In both the cases, a special packing charge of 50 p per unit has to be borne by the company.

The company can accept either of the two export orders and in either case the company can supply such quantities as may be possible to be produced by utilizing the balance of 25% of its capacity.

You are required to prepare,

- I] A statement showing the economics of the two export proposals giving your recommendations as to which proposal should be accepted.
- II] A statement showing the overall profitability of the company after incorporating the export proposal recommended by you.

Solution:

- I] In order to decide about which proposal should be accepted, the contribution per machine hour, which is a limiting factor, will have to be worked out. The product, which will yield higher contribution per machine hour, will have to be promoted for maximizing the profits. The following statement is prepared for this purpose:



Marginal Costing and Break Even Analysis

Statement showing Comparative Analysis of the two Export Proposals

Particulars	Offer from Canada For Product A Rs.	Offer from Middle East for Product B Rs.
I] Export price per unit	17.50	15.50
II] Variable cost per unit:		
➤ Materials	2.00	4.00
➤ Labour	4.00	4.00
➤ Variable factory overheads	3.00	1.80
➤ Variable selling & administration overheads	3.20	2.00
➤ Special packing charges	.50	.50
III] Total variable cost per unit	12.70	12.30
IV] Contribution per unit [I – III]	4.80	3.20
V] Machine hours per unit *	2.5 hrs	1.5 hrs
VI] Contribution per machine hour [IV/V]	4.80/2.50 = Rs.1.92	3.20/1.5 = Rs.2.13

It is clear from the above statement that product B yields higher contribution per machine hour and hence offer from Middle East should be accepted as compared to the offer from Canada.

* Machine hours per unit are computed as under.

- **Product A:** Factory overheads per unit Rs.5, machine hour rate Rs.2, factory overheads are absorbed on the basis of machine hours and hence the machine hours per unit of A are Rs. 5/2.5 = 2.5
- **Product B:** Factory overheads per unit Rs.3, machine hour rate Rs.2, hence the machine hours per unit of B are Rs. 3/2 = 1.5 hrs

II] **Overall Profitability:** For showing overall profitability units of product A sold in domestic market and units of product B sold in domestic market as well as in the export market of Middle East will have to be taken into consideration. The following statement is prepared to show the overall profitability.

Statement showing Overall Profitability

Particulars	Product A – Rs.	Product B – Rs.	Total – Rs.
I] Sales units	600	867 *	
II] Sales value	600 × Rs.23.00 = Rs.13, 800	400 units × Rs.19 = Rs.7, 600 467 units × Rs.15.50 = Rs.7, 239 ** Total Rs.14, 839	28, 639



Particulars	Product A – Rs.	Product B – Rs.	Total – Rs.
III] Variable Costs			
➤ Materials	1, 200	3, 468	4, 668
➤ Labour	2, 400	3, 468	5, 868
➤ Factory overheads- variable	1, 800	1, 561	3, 361
➤ S & A overheads	1, 920	1, 734	3, 654
➤ Special packing		234	234
IV] Total variable costs	7, 320	10, 465	17, 785
V] Contribution [II –IV]	6, 480	4, 374	10, 854
VI] Fixed overheads #	4, 080	1, 680	5, 760
VII] Profit [V – VI]	2, 400	2, 694	5, 094

* Units of product B are computed in the following manner:

- Machine hrs per unit of A = 2.5 [as shown above] × 600 units = 1500 hrs
- Machine hrs per unit of B = 1.5 [as shown above] × 400 units = 600 hrs
- Thus total machine hrs used = 1500 + 600 = 2100 hrs, these hours represent 75% capacity as given in the example and so for 100% capacity the number of machine hours used will be $2100/75 \times 100 = 2800$ hrs. Thus additional 700 hrs will be available for the export offer in which 467 units of B will be produced. [1.5 hrs for 1 unit]

** The selling price for B in the export market is Rs.15.50 per unit.

Fixed overheads for both the products consist of factory overheads and selling and administration overheads.

16. Sterling Industries Ltd. manufactures product Z by making and assembling three components, A, B and C. The components are made in a machine shop using three identical machines each of which can make any of the three components. However, the total capacity of the three machines is only 12, 000 machine hours per month and is just sufficient to meet the current demand. Labour for assembling is available according to requirements. Further details are given below.

Component	Machine Hours Per Unit	Variable Cost Per Unit	Market Price at which the Component can be purchased
A	4	Rs.48	Rs.64
B	5	Rs.60	Rs.75
C	6	Rs.80	Rs.110
Assembling [per unit of Z]	—	Rs.30	—



Marginal Costing and Break Even Analysis

Fixed cost per month amounts to Rs.50,000. Product Z is sold at Rs.300 per unit. From next month onwards the company expects the demand for Z to rise by 25%. As the machine capacity is limited, the company wants to meet the increase in demand by buying such numbers of A, B or C which is more profitable.

You are asked to find out the following:

- I] Current demand and profits made by the company.
- II] Which component and how many units of the same should be bought from the market to meet the increase in demand?
- III] Profit made by the company is suggestion in I is accepted?

Solution: The machine hours required for one unit of Z are 15 [for A, 4, B, 5 and C, 6, Total 15]. Total availability of machine hours is 12,000 and so, $12,000/15 = 800$ units of Z can be produced from these hours. The following statements are prepared.

- I] Statement Showing the Current Profit

Output and sales of Product Z = 800 units

Particulars	Amount [Rs.]
Selling price per unit	300
Less: Variable cost including assembling per unit	218
Contribution per unit	82
Total contribution 800 units X Rs.82	65,600
Less: Fixed costs	50,000
Profit	15,600

Statement of Additional Cost per Hour if Components are Purchased from Market

Particulars	Component A	Component B	Component C
Market price per unit	Rs.64	Rs.75	Rs.110
Less: Variable cost of making per unit	Rs.48	Rs.60	Rs.80
Additional cost of purchasing per unit	Rs.16	Rs.15	Rs.30
Hours saved by purchasing	4	5	6
Additional cost per hour saved	$Rs.16/4 = 4$	$Rs.15/5 = Rs.3$	$Rs.30/6 = Rs.5$

It can be seen from the above statement that additional cost per unit if the component is purchased from outside is Rs.3 for B which is the least cost. The demand is expected to be 25% more in the next month. The utilization of machine hours will be planned in such a manner that A and C can be produced to the maximum possible extent from the available machine hours and B can be partially produced and partially purchased from the open market. The following statement is prepared to show this computation.

- II] Statement showing the utilization of Machine Hours:

- Component C: Maximum units 1000: Machine hours required: 6000
- Component A: Maximum units 1000: Machine hours required: 4000
- Component B: Units to be manufactured 400: Machine hours: 2000 *
- Balance units of B i.e. 600 [1000 – 400] can be purchased from the market.



* 2000 are the balance of machine hours available to produce B, C and A are produced to the maximum possible extent as permitted by the demand as the additional cost of purchase per unit is the highest for C and followed by A.

III] Statement of Profit as per suggestion given in II

Particulars	Amount [Rs.]	Amount [Rs.]
Sales value of 1000 units @ Rs.300		3,00,000
Cost of making 1000 units of C @ Rs.80	80,000	
Cost of making 1000 units of A @ Rs.48	48,000	
Cost of making 400 units of B @ Rs.60	24,000	
Cost of buying 600 units of B @ Rs.75	45,000	
Assembling cost of Z, 1000 units @ Rs.30	30,000	
Total variable cost		2,27,000
Contribution [Sales value – total variable cost]		73,000
Less: Fixed cost		50,000
Profit		23,000

17. A company produces 30,000 units of product A and 20,000 units of product B per annum. The sales value and costs of the two products are as follows:

- Sales value Rs.7,60,000 Factory overheads: Rs.1,90,000
- Direct material: Rs.1,40,000 Administrative and selling overheads: Rs.1,20,000
- Direct labour: Rs1,90,000

50% of the factory overheads are variable and 50% of the administrative and selling overheads are fixed. The selling price of A is Rs.12 per unit and Rs.20 per unit for B.

The direct material and labour ratio for product A is 2:3 and for B is 4:5. For both the products, the selling price is 400% of direct labour. The factory overheads are charged in the ratio of direct labour and administrative and selling overheads are recovered at a flat rate of Rs.2 per unit for A and Rs.3 per unit for B.

Due to fall in demand, of the above products, the company has a plan to diversify and make product C using 40% capacity. It has been estimated that for C direct material and direct labour will be Rs.2.50 and Rs.3 per unit respectively. Other variable costs will be the same as applicable to the product A. The selling price of product C is Rs.14 per unit and production will be 30 000 units.

Assuming 60% capacity is used for manufacture of A and B, calculate,

- I] Present cost and profit
- II] Cost and profit after diversification
- III] Give your recommendations as to whether to diversify or not.



Marginal Costing and Break Even Analysis

Solution:

I] Statement showing Present Cost and Profit

Particulars		Product A	Product B	Total
I] Production and Sales [units]		30,000	20,000	50,000
II] Sales value	Rs.	3,60,000	4,00,000	7,60,000
III] Variable Costs				
❖ Direct material	Rs.	60,000	80,000	1,40,000
❖ Direct labor	Rs.	90,000	1,00,000	1,90,000
❖ Factory overheads	Rs.	45,000	50,000	95,000
❖ Administrative & selling overheads	Rs.	30,000	30,000	60,000
IV] Total variable costs	Rs.	2,25,000	2,60,000	4,85,000
V] Contribution [II – IV]	Rs.	1,35,000	1,40,000	2,75,000
VI] Fixed Costs	Rs.			1,55,000
VII] Profit [V – VI]	Rs.			1,20,000

II] Statement showing Cost and Profit after Diversification

Particulars		Product A	Product B	Product C
I] Capacity levels		60%	60%	40%
II] Production and sales [units]		18,000	12,000	30,000
III] Sales value	Rs.	2,16,000	2,40,000	4,20,000
IV] Variable costs				
❖ Direct materials	Rs.	36,000	48,000	75,000
❖ Direct labor	Rs.	54,000	60,000	90,000
❖ Factory overheads	Rs.	27,000	30,000	45,000
❖ Administrative & selling overheads		18,000	18,000	30,000
V] Total variable costs		1,35,000	1,56,000	2,40,000
VI] Contribution [III – IV]		81,000	84,000	1,80,000

Particulars	Amount Rs.
Contribution:	
❖ Product A: Rs.81,000	
❖ Product B: Rs.84,000	
❖ Product C: Rs.1,80,000	
Total contribution	3,45,000



Particulars	Amount Rs.
Less: Fixed cost:	
❖ Factory overheads: Rs.95, 000	
❖ Administration & Selling overheads Rs.60, 000	
Total fixed overheads	1, 55, 000
Profit	1, 90, 000

Recommendation: The Company should implement the proposed diversification as it has resulted into increase in the profit from Rs.1, 20, 000 to Rs.1, 90, 000

18] The annual budget of ABC Ltd. at 60% and 80% level of performance is as under. [Rs. in thousands]

Particulars	60% capacity	80% capacity
Direct material	360	480
Direct labour	480	640
Production overheads	252	276
Administrative overheads	124	132
Selling and distribution overheads	136	148
Total	1, 352	1, 676

The company is experiencing difficulties in selling its products and is presently operating at 50% capacity.

The sales revenue for the year is estimated at Rs.9,00,000. The directors are seriously considering suspending operations till the market picks up.

Market research undertaken by the company reveals that in about 12 months time, the sales will pick up and the company can comfortably operate at 75% level of performance and earn a sales income of Rs.18,00,000 in that year.

The sales personnel of the company do not want to suspend operations for fear of adverse reactions in the market but the directors want to decide the issue purely on financial considerations.

If the manufacturing and other operations of the company are suspended for a year, it is estimated that,

- 1) The present fixed cost could be reduced to Rs.2, 20, 000 per annum.
- 2) The settlement cost of personnel not required would amount to Rs.1, 50, 000.
- 3) The maintenance of plant has to go on and that would cost Rs.20, 000 per annum
- 4) On resuming operations, the expenditure connected with reopening after shut down would amount to Rs.80, 000.

Submit a report to the directors and indicate therein, based on purely financial considerations, whether it would be advisable to suspend the company's operations in the current year.



Marginal Costing and Break Even Analysis

Solution:

Statement Showing Comparative Profits

Particulars	Continuing Operations at 50% capacity Rs.	Shut-down the factory Rs.
I] Sales	9, 90, 000	—
II] Variable costs		
❖ Direct material	3, 00, 000	
❖ Direct labuor	4, 00, 000	
❖ Production overheads *	60, 000	
❖ Administration overheads *	20, 000	
❖ Selling & distribution overheads *	30, 000	
III] Total variable costs	8, 10, 000	
IV] Contribution [I – III]	1, 80, 000	
V] Fixed costs **	3, 80, 000	2, 20, 000
VI] Settlement costs	—	1, 50, 000
VII] Maintenance of plant	—	20, 000
VIII] Overhauling costs	—	80, 000
IX] Net income [loss]	[2, 00, 000] ***	[4, 70, 000]

Recommendation: It is not advisable for the company to suspend operations as shut down loss is higher than the loss associated with continued operations.

Note: Please see the working notes on the next page.



* The overheads given in the example are semi variable. It is essential to divide them fixed and variable. The working required for division of the same is shown below.

Amount in Rs.

Types of Overheads	Budgeted expenditure 60% capacity	Budgeted Expenditure 80% capacity	Difference At 20% capacity showing variable expenses	Capacity Difference At 1%	Total variable overheads 60% capacity	Fixed Overheads
Production	2, 52, 000	2, 76, 000	24, 000	1, 200	72, 000	1, 80, 000
Administration	1, 24, 000	1, 32, 000	8, 000	400	24, 000	1, 00, 000
Selling and Distribution	1, 36, 000	1, 48, 000	12, 000	600	36, 000	1, 00, 000

Note:

The variable overheads shown in the table are at 60% capacity. In the example it is given that the company is operating at 50% capacity and hence it is necessary to compute the variable overheads at 50% capacity. This computation is shown below.

- Production overheads: $50/60 \times 72, 000 = \text{Rs.}60, 000$
- Administration: $50/60 \times 24, 000 = \text{Rs.}20, 000$
- Selling and distribution overheads: $50/60 \times 36, 000 = \text{Rs.}30, 000$
- Total variable overheads = Rs.1, 10, 000

** Fixed overheads: Rs.3, 80, 000 as shown in the last column of the above table.

*** Net income = Contribution – Fixed cost

Question Bank on Marginal Costing

A. Essay Type Questions:

1. Define 'Marginal Cost' and 'Marginal Costing'. How variable and fixed costs are treated in marginal costing? Give a journal entry for overhead accounts under marginal costing.
2. State the utility of marginal costing in price fixation during trade depression and for export purposes.
3. Discuss the differences between the marginal costing and absorption costing.
4. State how the ascertainment of behaviour of overhead expenses under varying conditions of production and sales facilitates both, cost control and decision making.
5. Discuss the importance of the following terms in relation to marginal costing.
A] Key factor B] Break even point C] Margin of safety



Marginal Costing and Break Even Analysis

6. The effect of price reduction is always to reduce the profit/volume ratio, to raise the break even point and to shorten the margin of safety. Explain and illustrate by numerical example.
7. What is a break even chart? What is a profit graph? State the purpose of constructing such charts.
8. State the assumptions and limitations of break even point analysis.
9. Construct a profit graph with suitable data and obtain an equation of the profit line. Use this equation in profit planning.
10. What are the different methods available for segregation of semi variable expenses? Explain with examples.
11. Discuss fully the applications of marginal costing.
12. Discuss the reasons for difference between profits under marginal costing and absorption costing.
13. Discuss the limitations of marginal costing.
14. What do you understand by profit/volume ratio? Discuss the importance of the profit/volume ratio and state how it can be improved?
15. Discuss the importance of break even point.

B] State whether the following statements are True or False:

1. Marginal cost includes prime cost plus fixed overheads.
2. Contribution is the difference between the selling price and the total costs.
3. An increase in the volume of the production will result in reduction in unit variable cost.
4. The amount of profit under absorption costing and marginal costing is one and the same.
5. All variable costs are included in the marginal cost.
6. Margin of safety is the difference between actual sales and the sales and the break even point.
7. The difference between the budgeted output and the actual output is known as margin of safety.
8. The break even point will be lower if the selling price is increased but the amount of cost does not change.
9. At break even point margin of safety is nil.
10. When fixed cost is deducted from total cost, we get marginal cost.

C. Fill in the Blanks:

1. In cost accounting, marginal cost does not include _____.
2. In absorption costing, _____ cost is added to inventory.
3. Sales minus variable cost = fixed costs plus _____.
4. Profit volume ratio is contribution / _____ X 100



5. At break even point total revenue is equal to _____ costs.
6. In marginal costing, fixed costs are charged to _____.
7. Margin of safety is the difference between _____ and _____.
8. In marginal costing, stock is valued at _____.
9. When the production volume is nil, the loss will be equal to _____.
10. Constraint on various resources is also known as _____.

D] Select the correct answer in each of the following:

1. The break even point is the point at which,
 - a) There is no profit, no loss
 - b) Contribution margin is equal to total fixed cost
 - c) Total fixed cost is equal to total revenue
 - d) All of the above.
2. A large margin of safety indicates
 - a) Over capitalization
 - b) The soundness of business
 - c) Overproduction
 - d) None of these
3. The selling price is Rs.20 per unit, variable cost Rs.12 per unit, and fixed cost Rs.16, 000, the break-even-point in units will be,
 - a) 800 units
 - b) 2000 units
 - c) 3000 units
 - d) None of these
4. The P/V ratio of a product is 0.4 and the selling price is Rs.40 per unit. The marginal cost of the product would be,
 - a) Rs.8
 - b) Rs.24
 - c) Rs.20
 - d) Rs.25
5. Fixed cost per unit decreases when,
 - a) Production volume increases
 - b) Production volume decreases



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- c) Variable cost per unit decreases
 - d) Variable cost per unit increases.
6. Each of the following would affect the break even point except a change in the,
- a) Number of units sold.
 - b) Variable cost per unit
 - c) Total fixed cost
 - d) Sales price per unit.
7. A decrease in sales price,
- a) Does not affect the break-even-sales.
 - b) Lowers the net profit
 - c) Increases the break-even-point.
 - d) Lowers the break-even-point
8. Under the marginal costing system, the contribution margin discloses the excess of,
- a) Revenue over fixed cost
 - b) Projected revenue over the break-even-point
 - c) Revenues over variable costs
 - d) Variable costs over fixed costs.
9. Cost volume-profit analysis allows management to determine the relative profitability of a product by,
- a) Highlighting potential bottlenecks in the production process
 - b) Keeping fixed costs to an obsolete minimum
 - c) Determine contribution margin per unit and projected profits at various levels of production
 - d) Assigning costs to a product in a manner that maximizes the contribution margin.
10. Contribution margin is known as,
- a) Marginal income
 - b) Gross profit
 - c) Net income
 - d) Net profit.

STUDY NOTE 13

Budgets and Budgetary Control

Learning Objectives

After studying this topic, you should be able,

1. To understand the basic concepts of Budgets and Budgetary Control.
 2. To understand the preparation of various types of budgets.
 3. To understand the utility and limitations of budgets and budgetary control
-





13.1 Introduction

The first important task in front of the management is to have clearly defined objectives. Objectives are short term as well as long term and they should be defined in clear terms. It is necessary to prepare a comprehensive plan to transform these objectives into reality and planning without controlling will not be effective and hence there is a need of effective control system. While planning helps an organization to work systematically towards achieving the objectives, controlling helps to review the progress made and to monitor whether the work is progressing as per the plan or not. Budgeting is one such technique that helps in planning as well as controlling. It is a technique of cost accounting with the twin objectives of facilitating planning and ensuring controlling. Various aspects of budgets and budgetary control, the types of budgets and the preparation of the same are discussed in detail in this chapter.

13.2 Definitions

To begin with, let us try to understand the definitions of budget and budgetary control. Budget has been defined by CIMA U.K. as, ' A financial and/or quantitative statement prepared prior to a defined period of time, of the policy to be pursued during that period for the purpose of achieving a given objective.' If we analyze the definition, the following features of budget emerge.

- I. A budget is a statement that is always prepared prior to a defined period of time. This means that budget is always prepared for future period and not for the past. For example, a budget for the year 2008-09 regarding the sales will be prepared in the year 2007-08. Another important point is that the time for which it is prepared is certain. Thus a budget may be prepared for next 3 years/1 year/ 6 months/1 month or even for a week, but the point is that the time frame for which it is prepared is certain. It cannot be prepared for indefinite period of time.
- II. Budget is prepared either in quantitative details or monetary details or both. This means that budget will show the planning in terms of rupees or in quantity or both. For example, a production budget will show the production target in number of units and when the target units are multiplied by the anticipated production cost, it will be a production cost budget that is expressed in terms of money. Similarly purchase budget is prepared in quantity to show the anticipated purchases in the next year and when the quantity is multiplied by the expected price per unit, it will become a purchase cost budget that is expressed in monetary terms. Some budgets are prepared only in monetary terms, for example, cash budget, capital expenditure budget etc.
- III. Every organization has well defined objectives, which are to be achieved in a particular span of time. It is of paramount importance that there should be systematic efforts to bring them into reality. As a part of these efforts, it is necessary to formulate a policy and it is reflected in the budget. Thus if a firm has to launch a massive drive for recruitment of people, this policy will be reflected in the manpower planning budget as well as other relevant budgets. Thus the policy to be pursued in future for the purpose of achieving well-defined objectives is reflected in the budget.

Budgetary Control is actually a means of control in which the actual results are compared with the budgeted results so that appropriate action may be taken with regard to any deviations between the two. Budgetary control has the following stages.



- **Developing Budgets:** The first stage in budgetary control is developing various budgets. It will be necessary to identify the budget centers in the organization and budgets will have to develop for each one of them. Thus budgets are developed for functions like purchase, sale, production, manpower planning as well as for cash, capital expenditure, machine hours, labor hours and so on. Utmost care should be taken while developing the budgets. The factors affecting the planning should be studied carefully and budgets should be developed after a thorough study of the same.
- **Recording Actual Performance:** There should be a proper system of recording the actual performance achieved. This will facilitate the comparison between the budget and the actual. An efficient accounting and cost accounting system will help to record the actual performance effectively.
- **Comparison of Budgeted and Actual Performance:** One of the most important aspects of budgetary control is the comparison between the budgeted and the actual performance. The objective of such comparison is to find out the deviation between the two and provide the base for taking corrective action.
- **Corrective Action:** Taking appropriate corrective action on the basis of the comparison between the budgeted and actual results is the essence of budgeting. A budget is always prepared for future and hence there may be a variation between the budgeted results and actual results. There is a need for investigation of the same and take appropriate action so that the deviations will not repeat in the future. Responsibilities can be fixed on proper persons so that they can be held responsible for any such deviations.

13.3 Objectives of Budgeting

An effective budgeting system plays a crucial role in the success of a business organization. The budgeting system has the following objectives, which are of paramount importance in the overall efficiency and effectiveness of the business organization. These objectives are discussed below.

- **Planning:** Planning is necessary for doing any work in a systematic manner. A well-prepared plan helps the organization to use the scarce resources in an efficient manner and thus achieving the pre-determined targets becomes easy. A budget is always prepared for future period and it lays down targets regarding various aspects like purchase, production, sales, manpower planning etc. This automatically facilitates planning.
- **Co-ordination:** For achieving the predetermined objectives, apart from planning, coordinated efforts are required. Budgeting facilitates coordination in the sense that budgets cannot be developed in isolation. For example, while developing the production budget, the production manager will have to consult the sales manager for sales forecast and purchase manager for the availability of the raw material. Production budget cannot be developed in isolation. Similarly the purchase and sales budget as well as other functional budgets like cash, capital expenditure, manpower planning etc cannot be developed without considering other functions. Hence the coordination is automatically facilitated.
- **Control:** Planning is looking ahead while controlling is looking back. Preparation of budgets involves detailed planning about various activities like purchase, sales, production, and other functions like marketing, sales promotion, manpower planning. But planning alone is not sufficient. There should be a proper system of controlling which will ensure that the work is progressing as per the plan. Budgets provide the basis for such controlling in the sense that the actual performance can be compared with the budgeted performance. Any deviation between the two can be found out and analyzed to ascertain



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the reasons behind the deviation so that necessary corrective action can be taken to rectify the same. Thus budgeting helps immensely in controlling function.

13.4 Benefits of Budgeting

Budgeting plays an important role in planning and controlling. It helps in directing the scarce resources to the most productive use and thus ensures overall efficiency in the organization. The benefits derived by an organization from an effective system of budgeting can be summarized as given below.

- I. Budgeting facilitates planning of various activities and ensures that the working of the organization is systematic and smooth.
- II. Budgeting is a coordinated exercise and hence combines the ideas of different levels of management in preparation of the same.
- III. Any budget cannot be prepared in isolation and therefore coordination among various departments is facilitated automatically.
- IV. Budgeting helps planning and controlling income and expenditure so as to achieve higher profitability and also act as a guide for various management decisions.
- V. Budgeting is an effective means for planning and thus ensures sufficient availability of working capital and other resources.
- VI. It is extremely necessary to evaluate the actual performance with predetermined parameters. Budgeting ensures that there are well-defined parameters and thus the performance is evaluated against these parameters.
- VII. As the resources are directed to the most productive use, budgeting helps in reducing the wastages and losses.

13.5 Preparation for Budgetary Control

A budgetary control is extremely useful for planning and controlling as described above. However, for getting these benefits, sufficient preparation should be made. For complete success, a solid foundation should be laid down and in view of this the following aspects are of crucial importance.

- I. **Budget Committee:** For successful implementation of budgetary control system, there is a need of a budget committee. In small or medium size organizations, the budget related work may be carried out by the Chief Accountant himself. Due to the size of the organization, there may not be too many problems in implementation of the budgetary control system. However, in large size organization, there is a need of a budget committee consisting of the chief executive, budget officer and heads of main departments in the organization. The main functions of the budget committee are to get the budgets prepared and then scrutinize the same, to lay down broad policies regarding the preparation of budgets, to approve the budgets, to suggest for revision, to monitor the implementation and to recommend the action to be taken in a given situation.
- II. **Budget Centers:** Establishment of budget centers is another important pre-requisite of a sound budgetary control system. A budget center is a group of activities or a section of the organization for which budget can be developed. For example, manpower planning budget, research and development



cost budget, production and production cost budget, labor hour budget and so on. Budget centers should be defined clearly so that preparation becomes easy.

- III. **Budget Period:** A budget is always prepared prior to a defined period of time. This means that the period for which a budget is prepared is decided in advance. Thus a budget may be prepared for three years, one year, six months, one month or even for one week. The point is that the period for which the budget is prepared should be certain and decided in advance. Generally it can be said that the functional budgets like sales, purchase, production etc. are prepared for one year and then broken down on monthly basis. Budgets like capital expenditure are generally prepared for a period from 1 year to 3 years. Thus depending upon the type of budget, the period of the same is decided and it is important that it is decided well in advance.
- IV. **Preparation of an Organization Chart:** There should be an organization chart that shows clearly defined authorities and responsibilities of various executives. The organization chart will define clearly the functions to be performed by each executive relating to the budget preparation and his relationship with other executives. The organization chart may have to be adjusted to ensure that each budget center is controlled by an appropriate member of the staff.
- V. **Budget Manual:** A budget manual is defined by ICMA as 'a document which sets out the responsibilities of the person engaged in, the routine of and the forms and records required for budgetary control'. The budget manual thus is a schedule, document or booklet, which contains different forms to be used, procedures to be followed, budgeting organization details, and set of instructions to be followed in the budgeting system. It also lists out details of the responsibilities of different persons and the managers involved in the process. A typical budget manual contains the following.
- Objectives and managerial policies of the business concern.
 - Internal lines of authorities and responsibilities.
 - Functions of the budget committee including the role of budget officer.
 - Budget period
 - Principal budget factor
 - Detailed program of budget preparation
 - Accounting codes and numbering
 - Follow up procedures.
- VI. **Principal Budget Factor or Key Factor:** A key factor or a principal budget factor [also called as constraint] is that factor the extent of whose influence must first be assessed in order to prepare the functional budgets. Normally sales is the key factor or principal budget factor but other factors like production, purchase, skilled labor may also be the key factors. For example, a company has production capacity to produce 30,000 tones per annum but if the sales forecast tells that the market can absorb only 20,000 units, there is no point in producing 30,000 units. Thus the sale is the key factor in this case. On the other hand, if the company has capacity to produce 30,000 units and the market has the capacity to absorb the entire production which means that sales is not the key factor but if raw material is available in limited quantity so that only 25,000 units can be produced, the raw material will become the key factor. The key factor puts restrictions on the other functions and



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hence it must be considered carefully in advance. So continuous assessment of the business situation becomes necessary. In all conditions the key factor is the starting point in the process of preparation of budgets. A typical list of some of the key factors is given below.

- **Sales:** Consumer demand, shortage of sales staff, inadequate advertising
- **Material:** Availability of supply, restrictions on import
- **Labor:** Shortage of labor
- **Plant:** Availability of capacity, bottlenecks in key processes
- **Management:** Lack of capital, pricing policy, shortage of efficient executives, lack of know-how, faulty design of the product etc.

VII. **Establishment of Adequate Accounting Records:** It is essential that the accounting system should be able to record and analyze the transactions involved. A chart of accounts or accounts code should be maintained which may correspond with the budget centers for establishment of budgets and finally control through budgets.

13.6 Types of Budgets

Budgets can be classified as per the following basis.

- On the basis of Area of Operation
 - A. Functional Budgets
 - B. Master Budget
- On the basis of Capacity Utilization
 - A. Fixed Budget
 - B. Flexible Budgets
- On the basis of Time
 - A. Short Term
 - B. Medium Term
 - C. Long Term
- On the basis of Conditions
 - A. Basic Budget
 - B. Current Budget

These budgets are discussed in detail in the following paragraphs.

- Classification according to Area of Operation



A. **Functional Budgets:** The functional budgets are prepared for each function of the organization. These budgets are normally prepared for a period of one year and then broken down to each month. The following budgets are included in this category.

- ❖ **Sales Budget:** A Sales Budget shows forecast of expected sales in the future period [the period is well-defined] and expressed in quantity of the product to be sold as well as the monetary value of the same. A Sales Budget may be prepared product wise, territories/area/country wise, customer group wise, salesmen wise as well as time wise like quarter wise, month wise, weekly etc. The following factors are taken into consideration while preparing a sales budget.
 - **Analysis of past sales:** Analysis of sales for the last 5-10 years will provide valuable information like the long term trend, seasonal trends, cyclical fluctuations and other relevant information like customer preference analysis, shift in demand, competition and other environmental factors. This information can be used to predict the likely future demand of the product.
 - **Estimates given by the sales staff:** Sales staff of the business organization works in the field and hence they know the market situation very well. They have very close interaction with the market and are in a better position to know the demand pattern and other such trends. However, care is to be taken that the subjective element in the sales estimates given by the sales staff should be eliminated to arrive at a realistic sales forecast.
 - **Market Potential Analysis:** Marketing Research helps any business organization to collect the data regarding markets, demand pattern, customer preferences, market potential and other factors like economic factors and environmental factors. From this analysis, market potential can be worked out which will be used in the sales budget.
 - **Dependent Factor:** Demand of a product is dependent upon certain factors. For example, the demand for petrol and diesel is dependent on the number of vehicles plying though the roads. Analysis of such dependent factor will help to prepare the sales forecast which can be used in the sales budget.

A business firm can use any of the above methods or a combination of the above methods to prepare sales forecast and incorporate the same in the sales budget.

Illustration I: A company manufactures two products, A and B. Its sales department has three area divisions, North, East and South. Preliminary sales budgets for the year ending 31st March 2007, based on the assessment of the divisional managers were as follows.

Product A: North 2,00,000 units, South 5,50,000 units and East 1,00,000 units

Product B: North 3,00,000 units, South 4,00,000 units and East Nil

Sale price: A Rs.4 and B Rs.3 in all areas.

Arrangements are made for the extensive advertising of Products A and B and it is estimated that the North division sales will increase by 1,00,000 units. Arrangements are also made to advertise and distribute product in Eastern area in the second half of the year 2006-07 when sales are expected to be 5,00,000 units.

Prepare a revised sales budget for the year ended 31st March after taking into consideration the above mentioned adjustments.



Budgets and Budgetary Control

Solution:

Product A				Product B			
Division	Quantity	Price. Rs.	Value Rs.	Division	Quantity	Price.	Value
North	3,00,000	4	12,00,000	North	4,00,000	3	12,00,000
South	5,50,000	4	22,00,000	South	4,40,000	3	13,20,000
East	1,00,000	4	4,00,000	East	5,00,000	3	15,00,000
Total	9,50,000		38,00,000	Total	13,40,000		40,20,000

Illustration II: AB Ltd. manufactures two products, A and B and sells them through two divisions, north and south. For the purpose of submission of Sales Budget to the budget committee the following information is available.

Budgeted Sales for the current year were,

Product A: north 4,000 units @ Rs.9 each, south 6,000 units @ Rs.9 each

Product B: north 3,000 units @ Rs.21 each, south 5,000 @ Rs.21 each

Actual sales for the current year were,

Particulars	North	South
Product A	5,000 units @ Rs.9 each	7,000 units @ Rs.9 each
Product B	2,000 units @ Rs.21 each	4,000 units @ Rs.21 each

Adequate market studies reveal that Product A is popular but under priced. It is observed that if the price of A is increased by Re.1 it will still find a ready market. On the other hand, B is overpriced to customers and the market could absorb more if sales price of B is reduced by Re.1. The management has agreed to give effect to the above price changes.

From the information based on these price changes and reports from salesmen, the following estimates have been prepared by divisional managers.

Percentage increase in sales over current budget is,

Particulars	North	South
Product A	+ 10%	+ 5%
Product B	+ 20%	+ 10%

With the help of an intensive advertisement campaign, the following additional sales over the estimated sales of divisional managers are possible.

Additional sales above the estimated sales of divisional managers

Particulars	North	South
Product A	600	700
Product B	400	500



You are required to prepare a budget for sales incorporating the above estimates and also show the budgeted sales and actual sales for the current year.

Solution:

Sales Budget

AB Co Ltd

Division	Product	Budgeted For Future Period	Budgeted For Current Period	Actual Sales For Current Period
North	Product A	5,000 units @ Rs.10 = Rs.50000	4000 units @ Rs.9 = Rs.36000	5000 units @ Rs.9 = Rs.45000
	Product B	4,000 units @ Rs.20 = Rs.80000	3000 units @ Rs.21 = Rs.63000	2000 units @ Rs.21 = Rs.42000
Total	Quantity	9000 units	7,000 units	7000 units Rs.87000
	Amount	Rs.1,30,000	Rs.99000	
South	Product A	7000 units @ Rs.10 = Rs.70000	6,000 units @ Rs.9 = Rs.54000	7000 units @ Rs.9 = Rs63000
	Product B	6,000 units @Rs.20 = Rs.1, 20,000	5000 units @ Rs.21 =Rs.1, 05,000	4,000 units @ Rs.21 = Rs.84000
Total	Quantity	13,000 units Rs.1, 90,000	11000 units Rs.1, 59,000	11000 units Rs.1, 47,000
	Product A	12000 units@Rs.10 Rs.1, 20,000	10000 units @ Rs.9 = Rs.90000	12000 units @Rs.9 = Rs.1, 08,000
Total	Product B	10000 units @Rs.20 = Rs.2, 00,000	8000 units @ Rs.21 = Rs.1, 68,000	6000 units @Rs.21 = Rs.1, 26,000
	Product A	22000 units Rs.3, 20,000	18000 units Rs.2, 58,000	18000 units Rs.2, 34,000

❖ **Production Budget:** This budget shows the production target to be achieved in the next year or the future period. The production budget is prepared in quantity as well as in monetary terms. Before preparation of this budget it is necessary to study the principal budget factor or the key factor. The principal budget factor can be sales demand or the production capacity or availability of raw material. The policy of the management regarding the inventory is also taken into consideration. The production budget is normally prepared for a period of one year and then broken down on monthly basis. Production targets are decided by adding the budgeted closing inventory in the sales forecast and subtracting the opening inventory from the total of the same. Production Cost Budget is prepared by multiplying the production targets by the budgeted production cost per unit. The following illustration will clarify the concept.



Budgets and Budgetary Control

Illustration III

Prepare Production Budget from the following details for XYZ Ltd.

Product	Estimated Inventory 1st April 2008	Estimated Inventory 31st March 2009	Sales Forecast as per Sales Budget
X	2,500 units	3,000 units	15000 units
Y	3,500 units	4,000 units	20000 units

Solution

Production Budget XYZ Ltd. Year 2008-09

Particulars	Product A - Units	Product B - Units
Sales Forecast	15000	20000
Add: Estimated Closing Stock	3000	4000
Total Requirements	18000	24000
Less: Opening Stock	2500	3500
Net Requirement	15500	20500

- ❖ **Material Purchase Budget:** This budget shows the quantity of materials to be purchased during the coming year. For the preparation of this budget, production budget is the starting point if it is the key factor. If the raw material availability is the key factor, it becomes the starting point. The desired closing inventory of the raw materials is added to the requirement as per the production budget and the opening inventory is subtracted from the gross requirements. This budget is prepared in quantity as well as in the monetary terms and helps immensely in planning of the purchases of raw materials. Availability of storage space, financial resources, various levels of materials like maximum, minimum, re-order and economic order quantity are taken into consideration while preparing this budget. A separate material utilization budget may also be prepared as a preparation of material purchase budget.

Illustration IV: [Sales, Production, Material Utilization and Material Purchase Budget]

R Ltd. manufactures three products, A, B and C. You are required to prepare for the month of January 2008, the following budgets from the information given below.

- i. Sales Budget in quantity and value
- ii. Production Budget
- iii. Material Utilization Budget
- iv. Purchase Budget in quantity and value

Sales Forecast

Product	Quantity	Price Per Unit
A	1000	Rs.100
B	2000	Rs.120
C	1500	Rs.140



Materials Used in Company's Products Are,

Material M1 Rs.4 per unit

Material M2 Rs.6 per unit

Material M3 Rs.9 per unit

Quantities used in Product

Product	M1	M2	M3
A	4	2	–
B	3	3	2
C	2	1	1

Finished Stocks:

Product	A	B	C
Opening Inventory- units	1000	1500	500
Closing Inventory- units	1100	1650	550

Material Stocks:

Particulars	M1	M2	M3
Opening Stock [Units]	26000	20000	12000
Closing Stock [Units]	31200	24000	14400

Solution:

Sales Budget

Particulars	Product A	Product B	Product C	Total
Units	1000	2000	1500	
Selling Price Per Unit [Rs.]	100	120	140	
Sales Value [Rs]	1, 00,000	2, 40,000	2, 10,000	5, 50,000

Production Budget- in Units

Particulars	Product A	Product B	Product C
Sales Forecast	1000	2000	1500
Add: Expected Closing Stock	1100	1650	550
Gross Requirement	2100	3650	2050
Less: Opening Stock	1000	1500	500
Net Production Requirement	1100	2150	1550



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Material Utilization Budget

Budgeted Production	M1 Units	M2 Units	M3 Units
A: 1100 units	$1100 \times 4 = 4400$	$1100 \times 2 = 2200$	—
B: 2150 units	$2150 \times 3 = 6450$	$2150 \times 3 = 6450$	$2150 \times 2 = 4300$
C: 1550 units	$1550 \times 2 = 3100$	$1550 \times 1 = 1550$	$1550 \times 1 = 1550$

Material Purchase Budget

Particulars	M1	M2	M3	Total
Requirement as per Material Utilization Budget [units]	13950	10200	5850	
Add: Closing Stock [units]	31200	24000	14400	
Total Requirements	45150	34200	20250	
Less: Opening Stock [units]	26000	20000	12000	
Required Purchases [units]	19150	14200	8250	
Unit Cost [Rs]	4	6	9	
Purchase Cost [Rs]	76,600	85,200	74,250	2, 36,050

- ❖ **Cash Budget:** A cash budget is an estimate of cash receipts and cash payments prepared for each month. In this budget all expected payments, revenue as well as capital and all receipts, revenue and capital are taken into consideration. The main purpose of cash budget is to predict the receipts and payments in cash so that the firm will be able to find out the cash balance at the end of the budget period. This will help the firm to know whether there will be surplus cash or deficit at the end of the budget period. It will help them to plan for either investing the surplus or raise necessary amount to finance the deficit. Cash Budget is prepared in various ways, but the most popular form of the same is by the method of Receipt and Payment method. This method is illustrated in the following illustration.

Illustration VI: [Cash Budget]

ABC Co. wished to arrange overdraft facilities with its bankers during the period April 2008 to June 2008 when it will be manufacturing mostly for the stock. Prepare a Cash Budget for the above period from the following data, indicating the extent of the bank facilities the company will require at the end of each month.

Particulars	Sales	Purchases	Wages
February 2008	Rs.1, 80,000	Rs.1, 24,800	Rs.12, 000
March	1, 92,000	1, 44,000	14, 000
April	1, 08,000	2, 43,000	11, 000
May	1, 74,000	2, 46,000	10, 000
June	1, 26,000	2, 68,000	15, 000



Additional Information:

1. 50% of the credit sales are realized in the month following the sales and remaining 50% in the second month following. Creditors are paid in the month following the month of purchases. There are no cash sales or cash purchases
2. Cash at bank [overdraft] estimated on 1st April 2008 is Rs.25, 000

Solution:

Working Notes:

Collection from debtors:

- ❖ April:
 - ❖ 50% of sales of February Rs.90, 000} Total Rs.1, 86,000
 - ❖ 50% of sales of March Rs.96, 000}
- ❖ May
 - ❖ 50% of sales of March Rs.96, 000} Total Rs.1, 50,000
 - ❖ 50% of sales of April Rs.54, 000}
- ❖ June
 - ❖ 50% of sales of April Rs.54, 000} Total Rs.1, 41,000
 - ❖ 50% of sales of May Rs.87, 000}

Solution:

Cash Budget April – June 2008

Particulars	April Rs.	May Rs.	June Rs.
A] Opening Balance [Overdraft]	25, 000	56, 000	[47, 000]
B] Expected Receipts Collections from debtors	1, 86,000	1, 50,000	1, 41,000
C] Total Cash Available [A + B]	2, 11,000	2, 06,000	94,000
D] Expected Payments			
i. Payment to creditors	1, 44,000	2, 43,000	2, 46,000
ii. Wages	11,000	10,000	15,000
E] Total Payments	1, 55,000	2, 53,000	2, 61,000
F] Closing Balance [C – E]	56,000	[47,000]	[1, 67,000]

- ❖ **Other Functional Budgets:** In addition to the budgets discussed above, the following are other functional budgets.



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- ❖ **Direct Labor Budget:** The labor budget estimates the labor required for smooth and uninterrupted production. The labor budget shows the number of each type or grade of workers required in each period to achieve the budgeted output, budgeted cost of such labor, period wise and period of training necessary for different types of labor.
 - ❖ **Factory Overhead Budget:** This budget is prepared for planning of the factory overheads to be incurred during the budget period. In this budget the overheads should be shown department wise so that responsibility can be fixed on proper persons. Classification of factory overheads into fixed and variable components should also be shown in this budget.
 - ❖ **Administrative Overhead Budget:** This budget covers the administrative costs for non-manufacturing business activities. The administrative overheads include expenses like office expenses, office salaries, directors' remuneration, legal expenses, audit fees, rent, interest, property taxes, postage, telephone, telegraph etc. These expenses should be classified properly under different headings to determine the responsibilities regarding cost control and reduction.
 - ❖ **Capital Expenditure Budget:** Capital expenditure is incurred with a long - term perspective and with the objective of augmenting the earning capacity of the firm in the long run. Capital expenditure results in either acquisition of fixed asset or permanent improvement in the existing fixed assets. Another important feature of capital expenditure is that the amount involved is very heavy and the decision to incur capital expenditure is not reversible. Hence a careful planning is required before decision to incur capital expenditure is taken. In the budget of capital expenditure, apart from the planning of incurring the expenditure, evaluation of the same is also shown. This budget therefore becomes extremely crucial as it not only plans the expenditure but also evaluates the same and helps in arriving at a decision.
 - ❖ **Manpower Planning Budget:** This budget shows the requirement of manpower in the budget period. The categories in which manpower is required are also shown in this budget. The requirement of manpower depends on the expansion plans of the organization and also on the expected separations during the budget period.
 - ❖ **Research and Development Cost Budget:** This budget is one of the important tools for planning and controlling research and development costs. It helps management in planning the research and development activities well in advance and also about the fairness of the expenditure. Research and development is one of the important activities of any firm and hence proper planning and coordination is required for effectiveness of the same. This budget also helps to plan the requirement of necessary staff for carrying out research and development.
- B. **Master Budget:** All the budgets described above are called as 'Functional Budgets' that are prepared for planning of the individual function of the organization. For example, budgets are prepared for Purchase, Sales, Production, Manpower Planning, and so on. A Master Budget which is also called as 'Comprehensive Budget' is a consolidation of all the functional budgets. It shows the projected Profit and Loss Account and Balance Sheet of the business organization. For preparation of this budget, all functional budgets are combined together and the relevant figures are incorporated in preparation of the projected Profit and Loss Account and Balance Sheet. Thus Master Budget is prepared for the entire organization and not for individual functions.



- **Fixed and Flexible Budgets:** The fixed and flexible budgets are discussed in detail in the following paragraphs.
- **Fixed Budgets:** When a budget is prepared by assuming a fixed percentage of capacity utilization, it is called as a fixed budget. For example, a firm may decide to operate at 90% of its total capacity and prepare a budget showing the projected profit or loss at that capacity. This budget is defined by The Institute of Cost and Management Accountants [U.K.] as ' the budget which is designed to remain unchanged irrespective of the level of activity actually attained. It is based on a single level of activity.' For preparation of this budget, sales forecast will have to be prepared along with the cost estimates. Cost estimates can be prepared by segregating the costs according to their behavior i.e. fixed and variable. Cost predictions should be made element wise and the projected profit or loss can be worked out by deducting the costs from the sales revenue. Actually in practice, fixed budgets are prepared very rarely. The main reason is that the actual output differs from the budgeted output significantly. Thus if the budget is prepared on the assumption of producing 50, 000 units and actually the number of units produced are 40, 000, the comparison of actual results with the budgeted ones will be unfair and misleading. The budget may reveal the difference between the budgeted costs and actual costs but the reasons for the deviations may not be pointed out. A fixed budget may be prepared when the budgeted output and actual output are quite close and not much deviation exists between the two. In such cases, maximum control can be exercised between the budgeted performance and actual performance.
- **Flexible Budgets:** A flexible budget is a budget that is prepared for different levels of capacity utilization. It can be called as a series of fixed budgets prepared for different levels of activity. For example, a budget can be prepared for capacity utilization levels of 50%, 60%, 70%, 80%, 90% and 100%. The basic principle of flexible budget is that if a budget is prepared for showing the results at say, 15, 000 units and the actual production is only 12, 000 units, the comparison between the expenditures, budgeted and actual will not be fair as the budget was prepared for 15, 000 units. Therefore a flexible budget is developed for a relevant range of production from 12, 000 units to 15, 000 units. Thus even if the actual production is 12, 000 units, the results will be comparable with the budgeted performance of 12, 000 units. Even if the production slips to 8, 000 units, the manager has a tool that can be used to determine budgeted cost at 9, 000 units of output. The flexible budget thus, provides a reliable basis for comparisons because it is automatically geared to changes in production activity. Thus a flexible budget covers a range of activity, it is flexible i.e. easy to change with variation in production levels and it facilitates performance measurement and evaluation.
- While preparing flexible budget, it is necessary to study the behavior of costs and divide them in fixed, variable and semi variable. After doing this, the costs can be estimated for a given level of activity.
- It is also necessary to plan the range of activity. A firm may decide to develop flexible budget for activity level starting from 50% to 100% with an interval of 10% in between. It is necessary to estimate the costs and associate them with the chosen level of activity.
- Finally the profit or loss at different levels of activity will be computed by comparing the costs with the revenues.



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Illustration VI: [Flexible Budget]

A factory engaged in manufacturing plastic toys is working at 40% capacity and produces 10, 000 toys per month. The present cost break up for one toy is as under.

Material: Rs.10

Labor: Rs.3

Overheads: Rs.5 [60% fixed]

The selling price is Rs.20 per toy. If it is decided to work the factory at 50% capacity, the selling price falls by 3%. At 90% capacity, the selling price falls by 5% accompanied by a similar fall in the price of material. You are required to prepare a statement showing the profits/losses at 40%, 50% and 90% capacity utilizations.

Solution:

Flexible Budget **At 40%, 50% and 90% Capacity Utilization**

Particulars	40% Capacity Utilization	50% Capacity Utilization	90% Capacity Utilization
Production - Units	10, 000	12, 500	22, 500
Selling Price Per Unit	Rs.20	Rs.19.40	Rs.19
Sales Value [units X selling price per unit]	Rs.2, 00,000	Rs.2, 42, 500	Rs.4, 27, 500
Variable Costs:			
Material Rs.10 per unit	Rs.1, 00,000	Rs.1, 21, 500 *	Rs.2, 13, 750 **
Labor Rs.3 per unit	Rs.30, 000	Rs.37, 500	Rs.67, 500
Overheads Rs.2 per unit	Rs.20, 000	Rs.25, 000	Rs.45, 000
Total Variable Costs	Rs.1, 50, 000	Rs.1, 84, 000	Rs.3, 26, 250
Fixed Costs	Rs.30, 000	Rs.30, 000	Rs.30, 000
Total Costs [Variable Cost + Fixed Cost]	Rs.1, 80, 000	Rs.2, 14, 000	Rs.3, 56, 250
Profit/Loss [Sales – Total Costs]	Rs.20, 000	Rs.27, 500	Rs.71, 250

* 12, 500 units X Rs.9.70 per unit = Rs.1, 21, 500

** 22, 500 units X Rs.9.50 per unit = Rs.2, 13, 750



- **Classification of Budgets According to Time:** According to this classification, budgets are divided in the following categories.
 - **Short Term Budget:** Any budget that is prepared for a period up to one year is known as Short Term Budget. Functional budgets are normally prepared for a period of one year and then it is broken down month wise.
 - **Medium Term Budget:** Budget prepared for a period 1-3 years is Medium Term Budget. Budgets like Capital Expenditure, Manpower Planning are prepared for medium term.
 - **Long Term Budgets:** Any budget exceeding 3 years is known as Long Term Budgets. Master Budget is normally prepared for long term. In the modern days due to uncertainty, very few budgets are prepared for long term.

- ❖ **Zero Base Budgeting:** Zero Base Budgeting is method of budgeting whereby all activities are reevaluated each time budget is formulated and every item of expenditure in the budget is fully justified. Thus the Zero Base Budgeting involves from scratch or zero.

Zero based budgeting [also known as priority based budgeting] actually emerged in the late 1960s as an attempt to overcome the limitations of incremental budgeting. This approach requires that all activities are justified and prioritized before decisions are taken relating to the amount of resources allocated to each activity. In incremental budgeting or traditional budgeting, previous year's figures are taken as base and based on the same the budgeted figures for the next year are worked out. Thus the previous year is taken as the base for preparation of the budget. However the main limitation of this system of budgeting is that an activity is continued in the future only because it is being continued in the past. Hence in Zero Based Budgeting, the beginning is made from scratch and each activity and function is reviewed thoroughly before sanctioning the same and all expenditures are analyzed and sanctioned only if they are justified.

Besides adopting a 'Zero Based' approach, the Zero Based Budgeting also focuses on programs or activities instead of functional departments based on line items, which is a feature of traditional budgeting. It is an extension of program budgeting. In program budgeting, programs are identified and goals are developed for the organization for the particular program. By inserting decision packages in the system and ranking the packages, the analysis is strengthened and priorities are determined.

- ❖ **Applications of Zero Based Budgeting:** The following stages/steps are involved in the application of Zero Based Budgeting.
 - Each separate activity of the organization is identified and is called as a decision package. Decision package is actually nothing but a document that identifies and describes an activity in such a manner that it can be evaluated by the management and rank against other activities competing for limited resources and decide whether to sanction the same or not.
 - It should be ensured that each decision package is justified in the sense it should be ascertained whether the package is consistent with the goal of the organization or not.
 - If the package is consistent with the overall objectives of the organization, the cost of minimum efforts required to sustain the decision should be determined.
 - Alternatives for each decision package are considered in order to select better and cheaper options.



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- Based on the cost and benefit analysis a particular decision package/s should be selected and resources are allocated to the selected package.
- ❖ **Benefits from Zero Based Budgeting:** ZBB was first introduced by Peter A. Pyhrr, a staff control manager at Texas Instruments Corporation, U.S.A. He developed this technique and implemented it for the first time during the year 1969-70 in Texas in the private sector and popularized its wider use. He wrote an article on ZBB in Harvard Business Review and later wrote a book on the same. The ZBB concept was first applied in the State of Georgia, U.S.A. when Mr. Jimmy Carter was the Governor of the State. Later after becoming the President of U.S.A. Mr. Carter introduced and implemented the ZBB in the country in the year 1987. ZBB has a wide application not only in the Government Departments but also in the private sector in a variety of business. In India, the ZBB was applied in the State of Maharashtra in 80s and early 90s. Benefits from ZBB can be summarized in the following manner.
 - ZBB facilitates review of various activities right from the scratch and a detailed cost benefit study is conducted for each activity. Thus an activity is continued only if the cost benefit study is favorable. This ensures that an activity will not be continued merely because it was conducted in the previous year.
 - A detailed cost benefit analysis results in efficient allocation of resources and consequently wastages and obsolescence is eliminated.
 - A lot of brainstorming is required for evaluating cost and benefits arising from an activity and this results into generation of new ideas and also a sense of involvement of the staff.
 - ZBB facilitates improvement in communication and co-ordination amongst the staff.
 - Awareness amongst the managers about the input costs is created which helps the organization to become cost conscious.
 - An exhaustive documentation is necessary for the implementation of this system and it automatically leads to record building.
- ❖ **Limitations of Zero Based Budgeting:** The following are the limitations of Zero Based Budgeting.
 - It is a very detailed procedure and naturally if time consuming and lot of paper work is involved in the same.
 - Cost involved in preparation and implementation of this system is very high.
 - Morale of staff may be very low as they might feel threatened if a particular activity is discontinued.
 - Ranking of activities and decision-making may become subjective at times.
 - It may not advisable to apply this method when there are non financial considerations, such as ethical and social responsibility because this will dictate rejecting a budget claim on low ranking projects.
- ❖ **Performance Budgeting:** It is budgetary system where the input costs are related to the performance i.e. the end results. This budgeting is used extensively in the Government and Public Sector Undertakings. It is essentially a projection of the Government activities and expenditure thereon for the budget period. This budgeting starts with the broad classification of expenditure according to functions such as education, health, irrigation, social welfare etc. Each of the functions is then classified into programs sub classified into activities or projects. The main features of performance budgeting are as follows.



- Classification into functions, programs or activities
- Specification of objectives for each program
- Establishing suitable methods for measurement of work as far as possible.
- Fixation of work targets for each program.

Objectives of each program are ascertained clearly and then the resources are applied after specifying them clearly. The results expected from such activities are also laid down. Annual, quarterly and monthly targets are determined for the entire organization. These targets are broken down for each activity center. The next step is to set up various productivity or performance ratios and finally target for each program activity is fixed. The targets are compared with the actual results achieved. Thus the procedure for the performance budgets include allocation of resources, execution of the budget and periodic reporting at regular intervals.

The budgets are initially compiled by the various agencies such as Government Department, public undertakings etc. Thereafter these budgets move on to the authorities responsible for reviewing the performance budgets. Once the higher authorities decide about the funds, the amount sanctioned are communicated and the work is started. It is the duty of these agencies to start the work in time, to ensure the regular flow of expenditure, against the physical targets, prevent over runs under spending and furnish report to the higher authorities regarding the physical progress achieved.

In the final phase of performance budgetary process, progress reports are to be submitted periodically to higher authorities to indicate broadly, the physical performance to be achieved, the expenditure incurred and the variances together with explanations for the variances.

Problems and Solutions:

1. A company manufactures two products, X and Y. A forecast of units to be sold in the first four months of the year is given below.

Particulars	Product X [units]	Product Y [units]
January	1, 000	2, 800
February	1, 200	2, 800
March	1, 600	2, 400
April	2, 000	2, 000
May	2, 400	1, 600

Other information is given below.

Particulars	Product X – Rs. Per Unit	Product Y- Rs. Per Unit
Direct material	12.50	19.00
Direct labor	4.50	7.00
Factory overheads per unit	3.00	4.00

There will be no opening and closing work in progress [WIP] at the end of any month and finished product [in units] equal to half of the budgeted sale of the next month should be in stock at the end of each



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month. [including previous year December]

You are required to prepare,

- A] Production budget for January to April and
- B] Summarized production cost budget

[ICWAI- Inter December 2006, Management Accounting – Performance Management]

Solution:

Production Budget – [Units]

Product X

January – April

Particulars	January	February	March	April	Total
A] Sales Forecast	1,000	1,200	1,600	2,000	
B] Expected Closing Stock [50% of budgeted sales of next month]	600	800	1,000	1,200	
C] Total Requirements [A + B]	1,600	2,000	2,600	3,200	
D] Opening Stock	500	600	800	1,000	
E] Net Requirements [C – D]	1,100	1,400	1,800	2,200	6,500

Production Budget – [Units]

Product Y

January - April

Particulars	January	February	March	April	Total
A] Sales Forecast	2,800	2,800	2,400	2,000	
B] Expected Closing Stock [50% of budgeted sales of next month]	1,400	1,200	1,000	800	
C] Total Requirements [A + B]	4,200	4,000	3,400	2,800	
D] Opening Stock	1,400	1,400	1,200	1,000	
E] Net Requirements [C – D]	2,800	2,600	2,200	1,800	9,400



Production Cost Budget

January – April

Particulars	Product X – 6,500 units		Product Y- 9400 units	
	Per Unit [Rs.]	Total Amt [Rs.]	Per Unit [Rs.]	Total Amt. [Rs.]
Direct Material	12.50	81, 250	19.00	1,78,600
Direct Labor	4.50	29,250	7.00	65,800
Factory Overheads	3.00	19,500	4.00	37,600
Total	20.00	1, 30, 000	30.00	2,82,000

2. Zenith Ltd. has prepared the following Sales Budget for the first five months of 2008

Month	Sales Budget [units]
January	10,800
February	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 January 2008, there were 2,700 units of product on hand. There is no work in progress at the end of any month.

Every unit of product requires two types of materials in the following quantities.

Material A: 4 kg

Material B: 5 kg

Materials equal to one half of the requirements of the next month’s production are to be in hand at the end of every month. This requirement was met on 1st January 2008.

Prepare the following budgets for the quarter ending on 31st March 2008

- I] Production Budget – Quantity Wise
- II] Materials Purchase Budget – Quantity Wise.



Solution:

Zenith Ltd.

Production Budget [In Units] January – March 2008

Particulars	January	February	March
I] Sales	10,800	15,600	12,200
II] Estimated Closing Stock	3,900	3,050	2,600
III] Gross Requirements [I + II]	14,700	18,650	14,800
IV] Opening Stock	2,700	3,900	3,050
V] Net Requirements [III-IV]	12,000	14,750	11,750

Materials Requirement Budget [Quantitative]

Material A – January – March 2008

Particulars	January	February	March
Production [As per Production Budget – units]	12,000	14,750	11,750
Requirements for Production: 4 kg per unit	48,000	59,000	47,000
Add: Desired Closing Stock	29,500	23,500	20,500
Gross Requirements	77,500	82,500	67,500
Less: Opening Stock	24,000	29,500	23,500
Net Requirements	53,500	53,000	44,000

Materials Requirement Budget [Quantitative]

Material B – January – March 2008

Particulars	January	February	March
Production [As per Production Budget – units]	12,000	14,750	11,750
Requirements for Production: 5 kg per unit	60,000	73,750	58,750
Add: Desired Closing Stock	36,875	29,375	25,625
Gross Requirements	96,875	1,03,125	84,375
Less: Opening Stock	30,000	36,875	29,375
Net Requirements	66,875	66,250	55,000



Budgets and Budgetary Control

Direct Labor Budget

Particulars	Number of Hours
Total Standard Hours Required: 1,600 units × 3	4,800
Productivity Ratio: 80%	
Actual Hours Required: 4,800/ .80	6,000
Budgeted Hours Available 36 men × 144 hours	5,184
Shortfall	816

Comments: From the Direct Labor Budget it can be seen that the direct labor hours available are not sufficient and hence there is a shortage of 816 hours. Therefore it will be necessary to work overtime, as well as improvement in the efficiency.

4. From the following data, prepare a Production Budget for XYZ Ltd for a period of 6 months ending 30th June.

Product	Opening Stock 1st January 2008 - units	Closing Stock 30th June 2008 Units	Sales Forecast Units	Normal Loss in Production [%]
A	8,000	10,000	60,000	4
B	9,000	50,000	50,000	2
C	12,000	14,000	80,000	6

Solution:

Particulars	A Units	B Units	C Units	Total Units
I] Sales Forecast	60,000	50,000	80,000	1,90,000
II] Estimated Closing Stock	10,000	8,000	14,000	32,000
III] Gross Requirements [I + II]	70,000	58,000	94,000	2,22,000
IV] Opening Stock	8,000	9,000	12,000	29,000
V] Required Good Units [III – IV]	62,000	49,000	82,000	1,93,000
VI] Loss in Production	2,583	1,000	5,234	8,817
VII] Units to be Produced	64,583	50,000	87,234	2,01,817



5. A newly started company wishes to prepare Cash Budget from January 2008. Prepare a Cash Budget for the first six months from the following estimated receipts and expenditures.

Month	Total Sales Rs.	Materials Rs.	Wages Rs.	Production Overheads Rs.	Selling & Distribution Overheads Rs.
January	20,000	20,000	4,000	3,200	800
February	22,000	14,000	4,400	3,300	900
March	24,000	14,000	4,600	3,300	800
April	26,000	12,000	4,600	3,400	900
May	28,000	12,000	4,800	3,500	900
June	30,000	16,000	4,800	3,600	1,000

Cash balance on 1st January was Rs.10, 000. A new machine is to be installed at Rs.30, 000 on credit to be repaid by two equal installments in March and April. Sales commission @ 5% on total sales is to be paid within the month following actual sales. Rs.10, 000 being the amount of 2nd call on shares may be received in March. Share premium amounting to Rs.2, 000 is also receivable with 2nd call.

Credit allowed by suppliers is 2 months, credit allowed to customers is 1 month, delay in payment of overheads is 1 month, and delay in payment in wages is ½ month.

Assume cash sales to be 50% of total sales.

Cash Budget

January – June 2008

Rs.

Particulars	Jan.	Feb	March	April	May	June
A] Opening Balance	10,000	18,000	29,800	20,000	6,100	8,800
B] Expected Receipts						
I] Cash Sales [50% of total sales]	10,000	11,000	12,000	13,000	14,000	15,000
II] Collections from Debtors [1 month credit]		10,000	11,000	12,000	13,000	14,000
III] Share 2nd Call			10,000			
IV] Share Premium			2,000			



Budgets and Budgetary Control

C] Total Expected Receipts [I+II+III+IV]	10,000	21,000	35,000	25,000	27,000	29,000
D] Total Cash Available [A + C]	20,000	39,000	64,800	45,000	33,100	37,800
E] Expected Payments						
I] Payment for Purchases [2 months credit]			20,000	14,000	14,000	12,000
II] Production overheads [1 month delay]		3,200	3,300	3,300	3,400	3,500
IV] S & D overheads [1 month delay]		800	900	800	900	900
V] Wages *	2,000	4,200	4,500	4,600	4,700	4,800
VI] Sales Commission		1,000	1,100	1,200	1,300	1,400
VII] Machine Purchase			15,000	15,000		
F] Total Payments	2,000	9,200	44,800	38,900	24,300	22,600
G] Cl. Balance [D - F]	18,000	29,800	20,000	6,100	8,800	15,200

* There is a delay in payment of wages by $\frac{1}{2}$ month; hence 50% of current month and 50% of previous month is paid in the current month. The payment made in each month is show below.

Particulars	January	February	March	April	May	June
Wages	2,000	2,000 Jan 2,200 Feb	2,200 Feb 2,300 Mar	2,300 M 2,300 A	2,300 A 2,400 M	2,400 M 2,400 J
		4,200 (Total)	4,500 (Total)	4,600 (Total)	4,700 (Total)	4,800 (Total)

6. Summarized below are the Income and Expenditure forecasts for the month March to August 2008

Month	Credit Sales Rs.	Credit Purchases Rs.	Wages Rs.	Mfg. Expenses Rs.	Office Expenses Rs.	Selling Expenses Rs.
March	60,000	36,000	9,000	4,000	2,000	4,000
April	62,000	38,000	8,000	3,000	1,500	5,000
May	64,000	33,000	10,000	4,500	2,500	4,500
June	58,000	35,000	8,500	3,500	2,000	3,500
July	56,000	39,000	9,000	4,000	1,000	4,500
August	60,000	34,000	8,000	3,000	1,500	4,500



You are given the following further information

- ❖ Plant costing Rs.16,000 due for delivery in June. 10% on delivery and balance after three months.
- ❖ Advance tax Rs.8,000 is payable in March and June
- ❖ Period of credit allowed, Suppliers 2 months and customers 1 month
- ❖ Lag in payment of manufacturing expenses half month
- ❖ Lag in payment of all other expenses one month
- ❖ Cash balance on 1st May 2008 is Rs.8,000
- ❖ Prepare Cash Budget for three months starting from 1st May 2008

Solution:

Cash Budget
May – August 2008 **Rs.**

Particulars	May	June	July
I] Opening Cash Balance	8,000	15,750	12,750
II] Expected Cash Receipts:			
A] Collections from Debtors [Credit 1 month]	62,000	64,000	58,000
III] Total Expected Receipts	62,000	64,000	58,000
IV] Total Cash Available [I + III]	70,000	79,750	70,750
V] Expected Payments			
A] Purchases [2 months credit]	36,000	38,000	33,000
B] Manufacturing Expenses [Half month credit] *	3,750	4,000	3,750
C] Wages [Half month credit] *	8,000	10,000	8,500
D] Office Expenses [one month credit]	1,500	2,500	2,000
E] Selling Expenses [one month credit]	5,000	4,500	3,500
F] Purchase of Machine			1,600
G] Advance Tax		8,000	
VI] Total Payments [A + B + C + D + E + F + G]	54,250	67,000	52,350
VII] Closing Balance [IV – VI]	15,750	12,750	18,400



Budgets and Budgetary Control

* There is a delay of half a month for payment of Manufacturing Expenses and wages and hence current month's 50% and previous month's 50% are paid in the current month.

7. Prepare a Cash Budget in respect of six months from July to December from the following information.

Month	Sales Rs.000	Mat. Rs.000	Wages Rs.000	Production O/H Rs.000	Admn O/H Rs.	Selling O/H Rs	Dist. O/H Rs	R & D O/H Rs
April	100	40	10.0	4.4	3,000	1,600	800	1,000
May	120	60	11.2	4.8	2,900	1,700	900	1,000
June	80	40	8.0	5.0	3,040	1,500	700	1,200
July	100	60	8.4	4.6	2,960	1,700	900	1,200
Aug.	120	70	9.2	5.2	3,020	1,900	1,100	1,400
Sept	140	80	10.0	5.4	3,080	2,000	1,200	1,400
Oct	160	90	10.4	5.8	3,120	2,050	1,250	1,600
Nov	180	100	10.8	6.0	3,140	2,150	1,350	1,600
Dec	200	110	11.6	6.4	3,200	2,300	1,500	1,600

The cash balance as on 1st July was expected Rs.1, 50, 000

Expected Capital Expenditure:

Plant and Machinery to be installed in August to a cost of Rs.40, 000 will be payable on September 1st. The extension to the Research and Development Department amounting to Rs.10, 000 will be completed on August 1st, payable Rs.2, 000 per month from the date of completion. Under a hire purchase agreement Rs.4, 000 is to be paid each month.

The Cash Sales of Rs.2, 000 per month are expected. No commission is payable. However a commission of 5% on credit sales is to be paid within the month following the sale.

Period of credit allowed by suppliers 3 months, credit allowed to customers 2 months, delay in payment of overheads 1 month, delay in payment of wages 1st week of the following month.

An income tax of Rs.1, 00, 000 is due to be paid on October 1st. A preference share dividend of 10% on Rs.2, 00, 000 is payable on November 1st. 10% calls on the ordinary share capital of Rs.4, 00, 000 is due on July 1st and September 1st. The dividend from investments amounting to Rs.30, 000 is expected on November 1st.



Solution:

Cash Budget

July – December

Amount in Thousands of Rs.

Particulars	July Rs.	August Rs.	September Rs.	October Rs.	November Rs.	December Rs.
A] Opening Balance	150					
B] Expected Receipts:						
I] Cash Sales	2	2	2	2	2	2
II] Collections from Debtors	98	118	78	98	118	138
III] Calls on Ordinary Shares	40		40			
IV] Dividend on Investments					30	
C] Total Expected Receipts [I + II + III + IV]	140	120	120	100	150	140
D] Total Cash Available [A + C]	290					
E] Expected Payments						
I] Purchase of Materials						

The problem is purposely left incomplete so that students can attempt the solution.

8. Prepare a Cash Budget from the following information for ABC Ltd.

Particulars	1st Quarter [Rs.]	IIInd Quarter [Rs.]	III rd Quarter [Rs.]	IVth Quarter [Rs.]
Opening Cash	10, 000			
Collections from customers	1,25, 000	1,50, 000	1,60, 000	2,21, 000
Payments:				
Purchase of Materials	20, 000	35, 000	35, 000	54, 200
Other expenses	25, 000	20, 000	20, 000	17, 000
Salaries and wages	90, 000	95, 000	95, 000	1,09, 200



Budgets and Budgetary Control

Particulars	1st Quarter [Rs.]	IIInd Quarter [Rs.]	III rd Quarter [Rs.]	IVth Quarter [Rs.]
Income tax	5,000			
Machinery Purchase				20,000

The company desires to maintain a cash balance of Rs.15,000 at the end of each quarter. Cash can be borrowed or repaid in multiples of Rs.500 at an interest rate of 10% p.a. Management does not want to borrow cash more than what is necessary and wants to repay as early as possible. In any event, loans cannot be extended beyond a quarter. Interest is computed and paid when principal is repaid. Assume that borrowing takes place at the beginning and repayments are made at the end of the quarter.

[ICWAI Intermediate]

Solution:

ABC Ltd.

Cash Budget Period I – IV Quarter

Particulars	Quarter I [Rs.]	Quarter II [Rs.]	Quarter III [Rs.]	Quarter IV [Rs.]
A] Opening Cash Balance	10,000	15,000	15,000	15,325
B] Cash Receipts				
• From Debtors	1,25,000	1,50,000	1,60,000	2,21,000
C] Total Cash Available [A + B]	1,35,000	1,65,000	1,75,000	2,36,325
D] Expected Payments				
• Materials	20,000	35,000	35,000	54,200
• Other Expenses	25,000	20,000	20,000	17,000
• Salaries and Wages	90,000	95,000	95,000	1,09,200
• Income Tax	5,000	–	–	–
• Machinery Purchase	–	–	–	20,000
E] Total Payments	1,40,000	1,50,000	1,50,000	2,00,400
F] Minimum Cash Balance Required	15,000	15,000	15,000	15,000
G] Total Cash Required [E + F]	1,55,000	1,65,000	1,65,000	2,15,400
H] Excess/Deficit [C – G]	20,000	–	10,000	20,925



Particulars	Quarter I [Rs.]	Quarter II [Rs.]	Quarter III [Rs.]	Quarter IV [Rs.]
I] Borrowing	20,000	–	–	–
J] Repayment			9,000	11,000
K] Interest			675 *	1,100
L] Total Effect of Financing	20,000	–	9,675	12,100
M] Closing Cash Balance [C + L – E]	15,000	15,000	15,325	23,825

* Interest is calculated as follows.

10% p.a. on Rs.9,000 = Rs.900. Since the amount is repaid in the third quarter, interest is calculated for 9 months, i.e. for 12 months Rs.900, for 9 months = Rs.675.

Similarly, in the last quarter interest is calculated @ 10% on Rs.11,000 = Rs.1,100

9. A manufacturing company is currently working at 50% capacity and produces 10,000 units at a cost of Rs.180 per unit as per the following details.

Materials: Rs.100

Labor: Rs.30

Factory Overheads: Rs.30 [40% fixed]

Administrative Overheads: Rs.20 [50% fixed]

Total Cost Per Unit: Rs.180

The selling price per unit at present is Rs.200. At 60% working, material cost per unit increases by 2% and selling price per unit falls by 2%. At 80% working, material cost per unit increases by 5% and selling price per unit falls by 5%.

Prepare a Flexible Budget to show the profits/losses at 50%, 60% and 80% capacity utilization.



Budgets and Budgetary Control

Solution:

Flexible Budget

Particulars	Capacity Utilization 50%	Capacity Utilization 60%	Capacity Utilization 80%
A] Number of Units	10,000	12,000	16,000
B] Selling Price Per Unit	Rs.200	Rs.196	Rs.190
C] Variable Cost Per Unit			
• Direct Material	Rs.100	Rs.102	Rs.105
• Direct Labor	Rs. 30	Rs. 30	Rs. 30
• Factory Overheads [60%]	Rs. 18	Rs. 18	Rs. 18
• Administrative Overheads [50%]	Rs. 10	Rs. 10	Rs. 10
D] Total Variable Cost Per Unit	Rs.158	Rs.160	Rs.163
E] Total Variable Cost [A X D]	Rs.15,80,000	Rs.19,20,000	Rs.26,08,000
F] Fixed Costs [Rs.12 + Rs.10 = Rs.22 per unit at existing level of 10,000 units.]	Rs. 2,20,000	Rs. 2,20,000	Rs. 2,20,000
G] Total Cost [E + F]	Rs.18,00,000	Rs.21,40,000	Rs.28,28,000
H] Sales Revenue [A X B]	Rs.20,00,000	Rs.23,52,000	Rs.30,40,000
I] Profits/Losses [H – G]	Rs.2,00,000	Rs.2,12,000	Rs.2,12,000

10. The following data are available for a manufacturing company for a yearly period.

Particulars	Rs. in Lakhs
FIXED EXPENSES	
Wages and Salaries	9.5
Rent, Rates and Taxes	6.6
Depreciation	7.4
Sundry Administrative Expenses	6.5
SEMI-VARIABLE EXPENSES	
Maintenance and Repairs	3.5
Indirect Labor	7.9
Sales Department's Salaries	3.8



Particulars	Rs. in Lakhs
Sundry Administrative Expenses	2.8
VARIABLE EXPENSES [AT 50% CAPACITY]	
Materials	21.7
Labor	20.4
Other Expenses	7.9
Total	98.0

Assume that the fixed expenses remain constant at all levels of production. Semi variable expenses remain constant between 45% and 65% capacity, increasing by 10% between 65% and 80% capacity and by 20% between 80% and 100% capacity.

Sales at various levels are,

At 50% Rs.100 lakhs

At 60% Rs.120 lakhs

At 75% Rs.150 lakhs

At 90% Rs.180 lakhs

At 100% Rs.200 lakhs

Prepare a flexible budget for the year at 60% and 90% capacity utilizations and calculate the profits/losses at those levels

Solution:

Flexible Budget

Rs. in Lakhs

Particulars	Capacity Utilization 50%	Capacity Utilization 60%	Capacity Utilization 90%
A] Sales	100.00	120.00	180.00
B] Variable Costs			
➤ Materials	21.7	26.04	39.06
➤ Labor	20.4	24.48	36.72
➤ Other Expenses	7.9	9.48	14.22
C] Total Variable Costs	50.00	60.00	90.00



Budgets and Budgetary Control

Particulars	Capacity Utilization 50%	Capacity Utilization 60%	Capacity Utilization 90%
D] Semi-variable Costs			
➤ Maintenance and Repairs	3.5	3.5	4.20
➤ Indirect Labor	7.9	7.9	9.48
➤ Sales Dept Salaries	3.8	3.8	4.56
➤ Sundry Admn Expenses	2.8	2.8	3.36
E] Total Semi variable Costs	18.0	18.0	21.60
F] Fixed Costs			
➤ Wages and Salaries	9.5	9.5	9.5
➤ Rent, Rates and Taxes	6.6	6.6	6.6
➤ Depreciation	7.4	7.4	7.4
➤ Sundry Administrative Expenses	6.5	6.5	6.5
G] Total Fixed Costs	30.0	30.0	30.0
H] Total Costs [C + E + F]	98.00	108.00	141.60
I] Profit/Loss [A – H]	2.00	12.0	38.40

11. The monthly budget for manufacturing overheads of a manufacturing company is given below.

Particulars	Capacity 60%	Capacity 100%
Budgeted Production	600 units	800 units
Wages	Rs.1200	Rs.2000
Consumable Stores	900	1500
Maintenance	1100	1500
Power and Fuel	1600	2000
Depreciation	4000	4000
Insurance	1000	1000
Total	9800	12,000

You are required to,

- Indicate which of the items are fixed, variable and semi variable
- Prepare a budget for 80% capacity
- Show the total cost, both fixed and variable per unit of output at 60%, 80% and 100% capacity levels.



Solutions:

Flexible Budget Different Levels of Capacity

Particulars	Capacity Utilization 60%	Capacity Utilization 80%	Capacity Utilization 100%
A] Budgeted Production - Units	600	800	1000
B] Variable Costs:	Rs.	Rs.	Rs.
➤ Wages	1, 200	1, 600	2, 000
➤ Consumable Stores	900	1, 200	1, 500
C] Total Variable Costs	2, 100	2,800	3, 500
D] Semi Variable Costs			
➤ Maintenance [W.N.1]	1, 100	1, 300	1, 500
➤ Power and Fuel [W.N.2]	1, 600	1, 800	2, 000
E] Total Semi Variable Costs	2, 700	3, 100	3, 500
F] Fixed Costs			
➤ Depreciation	4, 000	4, 000	4, 000
➤ Insurance	1, 000	1, 000	1, 000
G] Total Fixed Costs	5, 000	5, 000	5, 000
H] Total Costs [C + E + F]	9, 800	10, 900	12, 000
I] Variable Cost Per Unit [C/A]	3.5	3.5	3.5
J] Fixed Cost Per Unit	8.33	6.25	5

Notes:

- From the data given in the example, it is clear that depreciation and insurance are fixed expenses, as they have remained constant at all levels of capacity utilization.
- Wages and Consumable Stores are variable, as they have increased in the same proportion of production.
- Maintenance and Power and Fuel are semi variable expenses, as they have not increased in the same proportion of the production. Their calculations are shown below.

- Working Note No. 1- Maintenance

60% level = Rs.1, 100

100% level = Rs.1, 500

Difference = Rs.400 for a difference of 400 units

Variable element is thus: Rs.400/400 units = Re.1



Budgets and Budgetary Control

Thus, the amount at different levels of capacity is computed as shown below

Particulars	60% Capacity 600 units	80% Capacity 800 units	100% Capacity 1000 units
Variable Element [Re 1 per unit]	Rs.600	Rs.800	Rs.1000
Fixed Element	Rs.500	Rs.500	Rs. 500
Total Amount as given in the problem	Rs.1, 100	Rs.1, 300 *	Rs.1, 500

- Working Note No. 2: Power and Fuel

60% level = Rs.1, 600

100% level = Rs.2, 000

Difference = Rs.400 for a difference of 400 units

Variable element is thus Rs.400/400 units = Re.1

Thus the amount at different levels of capacity utilization is computed as shown below.

Particulars	60% Capacity 600 units	80% Capacity 800 units	100% Capacity 1000 units
Variable Element [Re.1 per unit]	Rs.600	Rs.800	Rs.1000
Fixed Element	Rs.1000	Rs.1000	Rs.1000
Total Amount as given in the problem	Rs.1600	Rs.1800 *	Rs.2000

* These amounts are worked out by computing variable element at Re.1 per unit and the balance as fixed element.

12. ABC Ltd. manufactures a single product for which market demand exists for additional quantity. Present sales of Rs.60, 000 per month utilize only 60% capacity of the plant. Sales Manager assures that with a reduction of 10% in the price, he would be in a position to increase the sales by about 25% to 30%. The following data are available.

Selling price: Rs.10 per unit

Variable cost: Rs.3 per unit

Semi variable cost: Rs.6, 000 fixed plus Rs.0.50 per unit

Fixed cost: Rs.20, 000 at present level estimated to be Rs.24, 000 at 80% output

You are required to,

- Prepare a statement showing the operating profit at 60%, 70% and 80% levels of capacity utilization at current selling price and at proposed selling price
- The percentage increase in the present output which will be required to maintain the present profit margin at the proposed selling price.



Solution:

A] Comparative Statement of Operating Profit at Current Selling Price

Particulars	60% Capacity	70% Capacity	80% Capacity
I] Output - Units	6,000	7,000	8,000
II] Selling Price Per Unit Rs.	10	10	10
III] Sales Value [I × II] Rs.	60,000	70,000	80,000
IV] Variable Cost Rs.3 per unit X Number of units	18,000	21,000	24,000
V] Semi Variable Cost Rs.6,000 fixed + Rs.0.50 per unit	9,000	9,500	10,000
VI] Fixed Cost	20,000	20,000	24,000
VII] Total Cost [IV + V + VI]	47,000	50,500	58,000
VIII] Profits/Losses [III – VII]	13,000	19,500	22,000

B] Comparative Statement of Operating Profit at Proposed Selling Price

Particulars	60% Capacity	70% Capacity	80% Capacity
I] Output – Units	6,000	7,000	8,000
II] Selling Price Per Unit Rs	9	9	9
III] Sales Value [I X II]	54,000	63,000	72,000
IV] Total Cost [Same as shown in Statement A]	47,000	50,500	58,000
V] Profit/Loss III - IV	7,000	12,500	14,000

C] Percentage Increase in the Present Output Required to maintain the Present Profit Margin At The Proposed Selling Price:

Proposed Selling Price: Rs.9.00
 Variable Cost : Rs.3.50
 Contribution: Rs.5.50
 Present Profit: Rs.13,000
 Fixed Cost Rs.26,000 [Rs.20,000 + Rs.6,000]
 Required Contribution: Rs.39,000 [Profit + Fixed Cost]

Required output: Required Contribution/Contribution Per Unit = 39,000/5.5 = 7091 units % Increase in output required = $1091/6000 \times 100 = 18.18\%$



Budgets and Budgetary Control

13. The following budget of PQ Ltd, a manufacturing organization, has been prepared for the year 2007-08.

Particulars	% of Sales Value
Raw Materials	40
Direct Wages	25
Factory Overheads - Variable	10
Factory Overheads - Fixed	5
Administration and Selling and Distribution Overheads - Variable	6
Administration and Selling and Distribution Overheads - Fixed	12
Profit	2
Sales Value	100

After considering the quarterly performance, it is felt that the budgeted volume of sales would not be achieved. But the company expects to achieve 80% of the budgeted sales [equivalent to sales value of Rs.160, 00, 000] At this stage; the company has received an export order for its usual line of products. The estimated prime cost and special export expenses for fulfilling the export order are Rs.13, 00, 000 and Rs.40, 000 respectively. You are required to,

- 1) Present the original budget and the revised budget based on 80% achievement of the target sales, showing the quantum of profit/loss
- 2) Prepare a statement of budgeted costs for working out the overhead recovery rates in percentages
- 3) Work out the lowest quotation for the export order.

[ICWAI Intermediate]

Solution:

- 1) Statement showing the original Budget and the Revised Budget and Profit/Loss

Particulars	% of Sales Value	Original Budget Rs.in 00, 000	% of Sales Value	Revised Budget Rs.in 00, 000
A] Sales	100	200.00*	80	160.00
B] Variable Costs				
• Raw Materials	40	80.00		64.00
• Direct Wages	25	50.00		40.00
• Factory Overheads [V]	10	20.00		16.00
• Adm and S. & D. Overheads	6	12.00		9.60
C] Total Variable Costs	81	162.00		129.60



Particulars	% of Sales Value	Original Budget Rs.in 00, 000	% of Sales Value	Revised Budget Rs.in 00, 000
D] Fixed Costs				
• Factory Overheads	5	10.00		10.00
• Adm and S. & D. Overheads	12	24.00		24.00
E] Total Fixed Costs	17	34.00		34.00
F] Total Costs [C + E]	98	196.00		163.60
G] Profit/Loss [A – F]	2	4		3.60

* Sales at 80% level are Rs.160, hence sales at 100% level= $160/80 \times 100 = \text{Rs.}200$

2. Statement Showing Overhead Recovery Rates Based On Original Budget

- Variable Factory Overheads = $20,00,000 / 50,00,000 \times 100 = 40\%$ of D.W.
- Fixed Factory Overheads = $10,00,000 / 50,00,000 \times 100 = 20\%$ of D.W.
- Variable Administrative and Selling & Distribution Overheads
 $12,00,000 / 160,00,000 \times 100 = 7.5\%$ of Works Cost *
- Fixed Administrative and Selling & Distribution Overheads
 $24,00,000 / 160,00,000 \times 100 = 15\%$ of Works Cost *
- Note: Factory overheads, fixed and variable are based on direct wages while administrative and selling and distribution overheads are based on works cost.

3. Quotation for Export Offer is shown on the next page.

Statement showing Quotation for Export Order

Particulars	Amount Rs.
Raw Materials Rs.13, 00, 000 × 40/65 **	8.000
Direct Wages Rs.13, 00, 000 × 25/65 ***	5.000
Prime Cost [Raw Materials + Direct Wages]	13.000
Variable Factory Overheads [40% of Direct Wages]	2.000
Works Cost [Prime Cost + Variable Factory Overheads]	15.000
Variable Administration and Selling and Distribution Overheads [7.5% of Works Cost]	1.125
Special Export Expenses	0.400
Total Cost of Export Order	16.525



Budgets and Budgetary Control

Note: Export order can be priced at any price above Rs.16, 52, 500

- * Works Cost = Total Variable Cost – Variable Administration and Selling & Distribution Overheads + Fixed Factory Overheads
 - ** Prime Cost is given as Rs.13, 00,000 [Export Order]. Prime Cost is 65% of total sales and material content is 40%. Accordingly amount of material is computed
 - *** Similarly the amount of direct wages is computed.
14. The following information relates to the production activities of Goodwish Ltd for 3 months ending on 31st December, 2006.

Particulars	Amount in Rupees
Fixed Expenses:	
Management Salaries	2,10, 000
Rent and Taxes	1,40, 000
Depreciation of Machinery	1,75, 000
Sundry Office Expenses	2,22, 000
Total Fixed Expenses	7,47, 000
Semi – Variable Expenses at 50% capacity	
Plant Maintenance	62, 500
Labor	2,47, 000
Salesmen’s salaries	72, 500
Sundry Expenses	65, 000
Total Semi-Variable Expenses	4,47, 000
Variable Expenses	
Materials	6,00, 000
Labour	6,40, 000
Salesmen’s commission	95, 000
Total Variable Expenses	13,35, 000

It is further noted that semi-variable expenses remain constant between 40% and 70% capacity, increase by 10% of the above figures between 70% and 85% capacity and increase by 15% of the above figures between 85% and 100% capacity. Fixed expenses remain constant whatever the level of activity may be. Sales at 60% capacity are Rs.25,50, 000, at 80% capacity Rs.34, 00, 000 and at 100% capacity Rs.42, 50, 000. Assuming that all items of produced are sold, prepare a Flexible Budget at 60%, 80% and 100% productive capacity.



Flexible Budget for Three Months Ending 31st December 2006

Particulars	60% Capacity Level Amount Rupees	80% Capacity Level Amount Rupees	100% Capacity Level Amount Rupees
Sales	25,50,000	34,00,000	42,50,000
A] Variable Expenses			
Material	7,20,000	9,60,000	12,00,000
Labor	7,68,000	10,24,000	12,80,000
Salesmen's Commission	1,14,000	1,52,000	1,90,000
Total [A]	16,02,000	21,36,000	26,70,000
B] Semi-variable Expenses			
Plant Maintenance	62,500	68,750	71,875
Indirect Labor	2,47,500	2,72,250	2,84,625
Salesmen's salaries	72,500	79,750	83,375
Sundry Expenses	65,000	71,500	74,750
Total [B]	20,49,500	26,28,250	31,84,625
C] Fixed Expenses			
Management Salaries	2,10,000	2,10,000	2,10,000
Rent and Taxes	1,40,000	1,40,000	1,40,000
Depreciation on Machinery	1,75,000	1,75,000	1,75,000
Sundry Office Expenses	2,22,500	2,22,500	2,22,500
Total [C]	7,47,500	7,47,500	7,47,500
Total Costs [A+B+C]	27,97,000	33,75,750	39,32,125
Profit/Loss	[-] 2,47,000	24,250	3,17,875

15. S.M. Ltd. produces two products, A and B. The budget for these products [at 60% level of activity] for the year 2008-09 gives the following information.

Particulars	Product A	Product B
Raw Material Per Unit	Rs.7.50	Rs.3.50
Direct Labor Per Unit	Rs.4.00	Rs.3.00
Variable Overheads Per Unit	Rs.2.00	Rs.1.50
Fixed Overheads Per Unit	Rs.6.00	Rs.4.50
Selling Price Per Unit	Rs.20.00	Rs.15.00
Production and Sales [Units]	4,000	6,000



Budgets and Budgetary Control

The Managing Director, not being satisfied, with the projected results presented above, referred the budget to the Marketing Director for his observations regarding performance improvement. The Marketing Director suggested that the sales [in quantity] of both the products A and B could be increased by 50% provided the selling price were reduced by 5% and 10% for the products A and B respectively. The price reduction should be made applicable to the entire sales [in quantity] of both the products A and B.

You are required to prepare a statement of overall profitability on the basis of original budget and the revised budget.

Solution:

I] Statement showing the Overall Profitability – Original Budget

Particulars	Product A 4000 Units Rs.	Product B 6000 Units Rs.	Total Rs.
A] Selling Price Per Unit	20.00	15.00	
B] Sales Value [A X Number of Units]	80,000	90,000	
C] Variable Costs			
• Raw Materials *	30,000	21,000	
• Direct Labor **	16,000	18,000	
• Variable Overheads ***	8,000	9,000	
D] Total Variable Costs	54,000	48,000	
E] Fixed Overheads ****	24,000	27,000	
F] Total Costs [D + E]	78,000	75,000	
G] Profit [B- F]	2,000	15,000	17,000

II] Statement showing the Overall Profitability – Revised Budget

Particulars	Product A 6000 Units Rs.	Product B 9000 Units Rs.	Total Rs.
A] Selling Price Per Unit	19.00	13.50	
B] Sales Value [A X Number of Units]	1,14,000	1,21,500	
C] Variable Costs			
• Raw Materials *	45,000	31,500	
• Direct Labor **	24,000	27,000	
• Variable Overheads ***	12,000	13,500	
D] Total Variable Costs	81,000	72,000	
E] Fixed Overheads ****	24,000	27,000	
F] Total Costs [D + E]	1,05,000	99,000	
G] Profit [B- F]	9,000	22,500	31,500

* Raw Material per unit for Product A is Rs.7.50 and for Product B Rs.3.50

** Direct Labor per unit for Product A Rs.4.00 and for B Rs.3.00



*** Variable Overheads for Product A Rs.2.00 and for B Rs.1.50 per unit

**** Fixed Overheads at present level for A and B Rs.6.00 and Rs.4.50 per unit

Question Bank

A] Answer the following

1. Define 'Budget' and 'Budgetary Control'. Give a description of two important budgets.
2. Define 'budgetary Control' and explain its objectives. Discuss how the functional budgets are built up taking any one specific example.
3. Discuss the objectives and limitations of budgetary control
4. List the important functional budgets prepared by a business.
5. Example the concept of flexible budget. How is it prepared?
6. What is a 'sales budget'? How is it prepared?
7. Give an organization chart for budgetary control and discuss its importance.
8. What is a 'budget manual'? Mention the contents and advantages of the same.
9. What factors generally determine a budget period? Give examples.
10. What is 'Principal Budget Factor'? Give a list of such factors and state the effect of existence of two or more budget factors in an organization.
11. Distinguish between 'fixed budget' and 'flexible budget'. What is the starting point for the preparation of budgets?
12. Budgetary control of repairs and maintenance is extremely difficult – Discuss
13. What do you understand by 'Zero Base Budgeting' as distinct from conventional budgeting? Briefly state its process, its advantages and limitations. Discuss its applications in Indian conditions.
14. What do you understand by 'Performance Budgeting'? Explain its main features.
15. You are the budget controller of a large organization and are primarily concerned with budgetary control of large-scale administrative expenses.

B] State whether the following statements are TRUE or FALSE.

1. Budgets are action plans.
2. The principal budget factor in budgeting does not remain the same every year.
3. Cash budget is a part of financial budget.
4. Budgetary control and standard costing do not go together.
5. Fixed budgets are concerned with acquisition of fixed assets.
6. Functional budgets are subsidiary to master budget.
7. Flexible budgets are in fact a series of fixed budget.



Budgets and Budgetary Control

8. All functional budgets are combined to prepare master budget.
9. Budgeting is useful for planning and controlling.
10. Production budget shows the quantity of a product to be sold during the budget period.
11. Zero base budgeting and performance budgeting is one and the same.
12. A budget is prepared for different segments of a business.
13. Principal Budget Factor is a factor controllable by the Manager of the Budget Center.
14. Budgeting and forecasting is one and the same.
15. Once prepared, a budget should never be revised.
16. Capital expenditure budget is prepared generally for short term.
17. A budget variance is the difference between the budgeted performance and actual performance.
18. A budget is prepared only in quantitative details.
19. Budgetary control is a technique of costing.
20. Principal budget factor is a constraint on the resources.

C] Select the correct answer from the choices given, in each of the following.

- 1) A budget is A] an aid to management B] a postmortem analysis C] a substitute of management.
- 2) The principal budget factor for consumer goods manufacturer is normally A] sales demand B] labor supply C] both sales and labor
- 3) The budgeted standard hours of a factory is 12, 000. The capacity utilization ratio for April 2007 stood at 90% while the efficiency ratio for the month came to 120%. The actual production in standard hours for April 2007 was A] 10, 800 B] 12, 960 C] 14, 400 D] 12, 800
- 4) A budget is a projected plan of action in A] physical units B] monetary terms C] physical units and monetary units.
- 5) The document which describes the budgeting organizations, procedures etc is known as A] Budget center B] Principal Budget Factor C] Budget Manual
- 6) Flexible budgets are useful for A] Planning purpose only B] Planning, performance evaluation and feedback control C] Control of performance only D] Nothing at all.
- 7) The scarce factor of production is known as, A] Key factor B] Linking factor C] Critical factor D] Production factor.
- 8) Information to prepare a flexible budget includes, A] Total fixed costs, total variable costs B] Total fixed costs, total variable costs and capacity base C] Unit fixed costs and unit variable costs D] Total fixed costs, variable costs per unit, several level of activity.

STUDY NOTE 14

Standard Costing

Learning Objectives

After studying this topic, you should be able to,

1. Understand the concept of Standard Cost and Standard Costing
 2. Understand the objectives and utility of Standard Costing.
 3. Compute and analyse various variances.
-





14.1 Introduction

Two vital functions of management of any organization are planning and controlling. While planning helps the management to make systematic efforts to achieve the well-defined objectives, control enables them to review the actual performance and locate the difference between the planned performance and actual performance. Thus for evaluating performance, it is necessary to compare the actual performance with some pre-determined or pre planned targets. One of the important parameters of performance is the cost of production. According to M. Porter, for achieving sustainable competitive advantage it is necessary to establish cost leadership. For achieving this, it is of paramount importance that the various costs are monitored closely and there is a constant comparison of the actual costs with some pre-determined targets. Standard Costing is an important tool in the hands of management for improving the management control by providing parameters for comparison of actual with these parameters. The concept of standard cost, standard costing, variance analysis and other relevant aspects of the same are discussed in this chapter in detail in the subsequent paragraphs.

14.2 Definitions

Standard Cost is defined as, 'a pre-determined cost which is calculated from management's standard of efficient operation and the relevant necessary expenditure. It may be used as a basis for price fixation and for cost control through variance analysis.' [CIMA – UK] Standard Costing is defined as, 'preparation and use of standard costs, their comparison with actual costs and analysis of variances into their causes and points of incidences.' [CIMA – UK] From the definitions given above, the following features of standard cost and standard costing emerge. Meaning of both the terms will be clearer by going through carefully these features.

14.3 Features of Standard Cost and Standard Costing

The following are the features of standard cost:

- Standard cost is a pre planned or pre-determined cost. This means that the standard cost is determined even before the commencement of production. For example, if a firm is planning to launch a product in the year 2009, the standard cost of the same will be determined in the year 2008.
- Standard cost is not an estimated cost. There is a difference between saying what would be the cost and what should be the cost. Standard cost is a planned cost and it is a cost that should be the actual cost of production.
- It is calculated after taking into consideration the management's standard of efficient operation. Thus standard cost fixed on the assumption of 80% efficiency will be different from what it will be if the assumption is of 90% efficiency.
- Standard cost can be used as a basis for price fixation as well as for exercising control over the cost.

Standard Costing is a technique of costing rather than a method and has the following features:

- Standard costing involves setting of standards for various elements of cost. Thus standards are set for material costs, labour costs and overhead costs. Setting of standard is the heart of standard costing



and so this work is done very carefully. Setting of wrong standards will defeat the very purpose of standard costing. Standards are not only set for costs, but also for sales and profits. The objective behind setting of standards is to have a basis for comparison between the standard performance and the actual performance.

- Another feature of standard costing is to continuously record the actual performance against the standards so that comparison between the two can be done easily.
- Standard costing ensures that there is a constant comparison between the standards and actual and the difference between the two is worked out. The difference is known as 'variance' and it is to be analysed further to find out the reasons behind the same.
- After the ascertaining of the variances, analyzing them to find out the reasons for the variances and taking corrective action in order to ensure that the variances are not repeated, are the two important actions of management. Thus standard costing helps immensely in evaluation of performance of the organization.
- Estimated costs should not be confused with standard costs. Though both of them are future costs, there is a fundamental difference between the two. Estimated cost is more or less a reasonable assessment of what the cost will be in future while on the other hand, standard cost is a pre planned cost in the sense it denotes what the cost ought to be. Estimated costs are developed on the basis of projections based on past performance as well as expected future trends. Standard costs are pre determined in a scientific manner through technical analysis regarding the material consumption and time and motion study for determining labour requirements. Estimated costs may not help management in decision making as they are not scientifically pre determined costs but standard costs are decided after a comprehensive study and analysis of all relevant factors and hence provide reliable measures for product costing, product pricing, planning, co-ordination and cost control as well as reduction purposes. Under estimated costing, the cost is estimated in advance and is based on the assumption that costs are more or less free to move and that what is made is the best estimate of the cost. Under standard costing, a cost is established which is based on the assumption that cost will not be allowed to move freely but will be controlled as far as possible so that the actual cost will be close to the standard cost as far as possible and any variation between the standard and actual cost will be capable of reasonable explanation.

14.4 Setting of Standards

The heart of the standard costing is setting of standards. Standard setting should be done extremely carefully to ensure that the standards are realistic and neither too high nor too low. If very high standards are set, it will be impossible to attain the same and there will be always an adverse variance. This will result in lowering the morale of the employees. On the other hand, if standards are set too low, they will be attained very easily and the favourable variances will create complacency amongst the employees. In view of this, the standards should be set very carefully. The following aspects should be taken into consideration before setting the standards.

- **Type of Standard:** The important aspect is that what should be the level of standard from the point of attainment? Whether it should be very difficult to achieve or too easy to achieve? In other words whether the standards set should be too high or too low? Thus from the standard of attainment, there can be the following types of standards.



Standard Costing

- I. **Ideal Standard:** An ideal standard is a standard, which can be attained under the most favourable conditions. The expected performance can be achieved only if all factors, such as material and labour prices, level of performance of employees, highest output with best possible equipment and machinery, highest level of efficiency and so on. In practice, it is very difficult to achieve this, as the combination of all favourable factors is almost impossible. Hence the utility of this standard is that it can be used for relatively long period of time without alteration. However, as the achievement is nearly impossible, the employee may be frustrated due to the constant adverse variances.
 - II. **Normal Standard:** This standard is the average standard, which is attainable during the future period of time, which may be long enough to cover one business cycle. This standard will be revised only after one business cycle is over and thus frequent revision is not required. Normal standard may be useful for management in long term planning.
 - III. **Basic Standard:** Basic Standard is the standard, which is established for an unaltered use for an indefinite period, which may be a very long period of time. Basic standards are revised very rarely, and hence the fluctuations in the costs and prices are not reflected in this standard.
 - IV. **Expected Standard:** An Expected Standard is a standard, which, it is anticipated, can be attained during a future specified standard period. This standard is quite attainable, it is consistent and hence fulfils all the purposes of a good standard. It provides incentive to improve performance and get the better of the adverse conditions. These standards are formulated after making allowance for the cost of normal spoilage, cost of idle time due to machine breakdowns, and the cost of other events, which are unavoidable in normal efficient operations. Thus all the normal losses are taken into consideration. These standards are most accurate and very useful to the management in product costing, inventory valuations, estimates, analyses, performance evaluation, planning, and employee motivation for managerial decision-making.
 - V. **Historical Standard:** This is the average standard, which has been achieved in the past. This standard tends to be a loose standard because there is a possibility that the average past performance may include inefficiencies, which will be passed on the new standards. However the utility of these standards is that past performance can be used as a basis for setting of standard in future.
- **Length of the period of use:** The management has to take another crucial decision about the length of the period for which the standard will remain valid. In other words, it will have to be decided whether the standards should be revised too frequently or after a long time. In the types of standards, we have seen that there are basic standards, which remain unaltered for a long period of time while the current standards, and expected standards are revised more frequently. Thus it will have to be decided as to what should be the frequency of revision.
 - **Attainment Level:** Before setting of standards, the management has to ascertain the level of attainment as regards to the output. While fixing the level, due considerations should be given to the constraints if any, on the production, level of efficiency, availability of skilled manpower, sales potential and so on.



14.5 Setting of Standard Costs

In the previous paragraphs, we have seen the establishment of standards and the care to be taken for the same. Now we have to see the setting of standard costs for various elements of cost like material, labour and overheads and subsequently the computation and analysis of variances. It should be remembered that setting of standard costs is not the job of cost accounting department only, it is a task which is to be completed with the co-operation of departments like production, sales, manpower planning, personnel, works study engineer and the cost accounting department. Without the co-operation and active participation of all the departments, setting of standard cost will be impossible and hence it is rightly said that techniques like standard costing and budgeting promotes co-ordination and team work in an organization. The setting of standard costs is discussed in the following paragraphs.

- **Direct Material Cost Standard:** Direct material is an important element of cost and in several industries; the direct material cost is 50% - 55% of the total cost. In case of industry like sugar, the material cost is nearly 65 -70 % of the total cost. In view of this, there is a need to monitor the cost of material closely and take steps to control and reduce the same. Standard for direct material cost is set with this particular objective. The standard direct material cost indicates as to how much the material cost should have been and then it is compared with the actual cost to find out the difference between the two. The establishment of standard cost for direct materials involves the determination of, a] standard quantity of standard raw materials and b] standard price of raw material consumed. The standard quantity of materials is determined with the help of production department and while fixing the same; normal or inevitable losses are taken into consideration. The cost accounting department in co-operation with the purchase department determines standard price of material consumed. Recent prices, past prices and the likely trend of prices in the future are taken into consideration while fixing the standard prices. Similarly stock on hand, purchase orders already placed and likely fluctuations in the price should also be taken into consideration while fixing the material price standards.
- **Direct Labour:** Labour is also an important element of cost and the standard labour cost indicates the labour cost that should be incurred. Two factors need to be taken into consideration while fixing the standard labour cost. The first one is the standard time and the second one is the standard rate. For setting the standard time, it is necessary to conduct time and motion study with the help of Work Study Engineer. Firstly motion study is conducted to identify unnecessary motions and then to eliminate them. After elimination of unnecessary motions, standard time is allotted to the motions that are required to be performed for producing the product. While determining the standard time, allowance is made for normal idle time to cover mental and physical fatigue. The standard wage rate is fixed after considering the level of rates in the market, the degree of skill required for performing the job, the availability of manpower and the wage structure in the concerned industry. Concept of 'Standard Hour' is extremely important in setting the standards for labour. It is a hypothetical hour, which represents the amount of work, which should be performed in one hour under standard conditions.
- **Factory Overhead Standards:** Setting of standard for overhead costs, there is a need to determine, a] standard capacity and b] standard overhead cost for that capacity. The standard overhead cost can be computed using normal capacity. Normal capacity is not the total installed capacity but it is the practical capacity, which is based on the resources available and efficient utilization of the same. After this the standard overheads are fixed. In case of variable overheads, since they remain constant per



Standard Costing

unit of the production, it is necessary to calculate only standard variable overhead rate per unit or per hour. In case of fixed overheads, budgeted fixed overheads and budgeted production are to be taken into consideration. A standard rate of fixed overhead per unit is then computed by dividing the budgeted fixed overheads by the budgeted production.

- **Direct Expenses:** If at all there are some items of standard expenses, rate per unit of the same may be determined on the basis of budgeted output and budgeted direct expenses.

14.6 Computation of Variances

After setting the standards and standard costs for various elements of cost, the next important step is to compute variances for each element of cost. Variance is the difference between the standard cost and the actual cost. In other words it is the difference between what the cost should have been and what is the actual cost. Element wise computation of variances is given in the following paragraphs.

A] **Material Variances:** In the material variances, the main objective is to find out the difference between the standard cost of material used for actual production and actual cost of material used. Thus the main variance in this category is the cost variance, which is thereafter broken down into other variances. These variances are given below.

I] **Material Cost Variance:** As mentioned above, this variance shows the difference between the standard cost of material consumed for actual production and the actual cost. The following formula is used for computation of this variance.

- **Material Cost Variance:**

Standard Cost of Material Consumed for Actual Production – Actual Cost

If the actual cost of material consumed is less than the standard cost of material consumed, the variance is 'favourable', otherwise it is adverse.

- **Material Price Variance:** One of the reasons for difference between the standard material cost and actual material cost is the difference between the standard price and actual price. Material Price Variance measures the difference between the standard price and actual price with reference to the actual quantity consumed. The computation is as shown below:

- **Material Price Variance:** Actual Quantity [Standard Price – Actual Price]

- **Material Quantity [Usage] Variance:** This variance measures the difference between the standard quantity of material consumed for actual production and the actual quantity consumed and the same is multiplied by standard price. The computation is as shown below.

- **Material Quantity [Usage] Variance:**

Standard Price [Standard Quantity – Actual Quantity]

The total of Price Variance and Quantity Variance is equal to Cost Variance

Material Cost Variance = Material Price Variance + Material Quantity Variance

Illustration No.1] Calculate Material Variances from the following details.

Standard quantity of materials for producing 1 unit of finished product 'P' is 5 kg. The



standard price is Rs.6 per kg. During a particular period, 500 units of 'P' were produced. Actual material consumed was 2700 kg at a cost of Rs.16, 200.

Solution:

I] Material Cost Variance = Standard Cost of Materials – Actual Cost

$$500 \text{ units} \times 5 \text{ kg} \times \text{Rs.6} - \text{Rs.16, 200}$$

$$\text{Rs.15, 000} - \text{Rs.16, 200} = \text{Rs.1, 200 [A]}$$

II] Material Price Variance = Actual Quantity [Standard Price – Actual Price]

$$2, 700 [\text{Rs.6} - \text{Rs.6}] = \text{Nil}$$

III] Material Quantity Variance = Standard Price [Std. Qty – Actual Qty]

$$\text{Rs.6} [2500 - 2700] = \text{Rs.1, 200 [A]}$$

Reconciliation

Material Cost Variance = Material Price Variance + Material Quantity Variance.

$$\text{Rs.1200 [A]} = \text{Rs. Nil} + \text{Rs.1, 200 [A]}$$

➤ **Material Mix Variance:** In case of several products, two or more types of raw materials are mixed to produce the final product. In such cases, standard proportion of mixture is decided in advance. For example, in manufacturing one unit of product 'P', material A and B may have to be mixed in a standard proportion of 3:2. This is called as a standard mix. However, when the actual production begins, the actual proportion of mix may have to be changed due to several reasons like non-availability of a particular material etc. In such cases material mix variance arises. The mix variance is computed in the following manner.

- Material Mix Variance = Standard Cost of Standard Mix – Standard Cost of Actual Mix

➤ **Material Yield Variance:** In any manufacturing process, some unavoidable loss always takes place. Thus if the input is 100, output may be 95, 5 units being normal or unavoidable loss. The normal loss is always anticipated and taken into consideration while determining the standard quantity. Yield variance arises when the actual loss is more or less than the normal loss. The computation of yield variance is as given below.

- Material Yield Variance = SYR [Actual Yield – Standard Yield]

SYR = Standard Yield Rate, i.e. standard cost per unit of standard output.

Reconciliation: Quantity Variance = Mix Variance + Yield Variance.



Standard Costing

The following chart will explain the relationships between various material variances in a better manner.

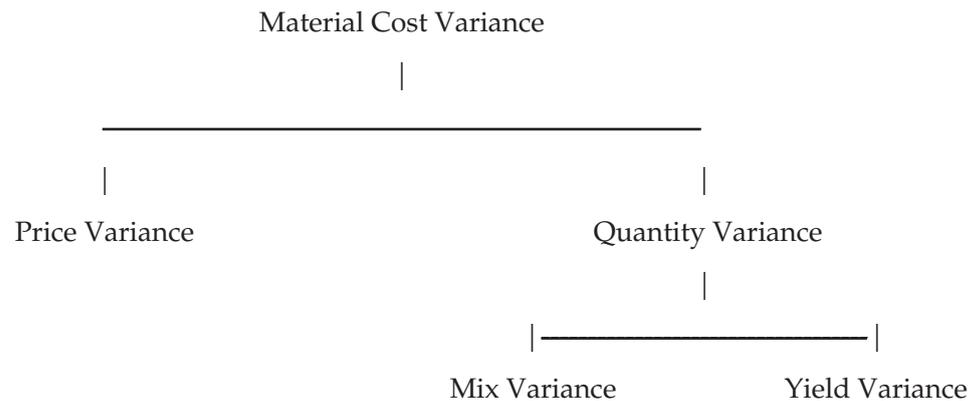


Illustration 2] The standard material cost to produce a ton of chemical X is given below:

300 kg of material A @ Rs.10 per kg

400 kg of material B @ Rs.5 per kg

500 kg of material C @ Rs.6 per kg

During a particular period, 100 tons of mixture X was produced from the usage of

35 tons of material A @ Rs.9, 000 per ton

42 tons of material B @ Rs.6, 000 per ton

53 tons of material C @ Rs.7, 000 per ton

Calculate material cost, price, and usage and mix variances.

Solution: The following table is prepared for computation of the variances.

Material	Standard Quantity Kg	Standard Rate Rs.	Standard Cost Rs.	Actual Quantity Kg	Actual Rate Rs.	Actual Amount Rs.
A	300 kg	10	3000	35, 000	9	3, 15, 000
B	400	5	2000	42, 000	6	2, 52, 000
C	500	6	3000	53, 000	7	3, 71, 000
Total	1200		8000	1, 30, 000		9, 38, 000

I] **Material Cost Variance:** Standard Cost [for actual production] – Actual Cost

$$\text{Rs.8, 00, 000} - \text{Rs.9, 38, 000} = \text{Rs.1, 38, 000 [A]}$$

Note: Standard cost of materials for actual production: For 1 ton of production, the standard cost is Rs.8, 000, so for 100 tons, the standard cost is Rs.8, 00, 000

II] **Material Price Variance:** Actual Quantity [STD Price – Actual Price]

- Material A = 35, 000 [Rs.10 – Rs.9] = Rs.35, 000 [F]
- Material B = 42, 000 [Rs.5 – Rs.6] = Rs.42, 000 [A]



- Material C = 53, 000 [Rs.6 – Rs.7] = Rs.53, 000 [A]
- Total Material Price Variance = Rs.60, 000 [A]

III] **Material Quantity Variance** = Standard Price [STD Quantity – Actual Quantity]

- Material A = Rs.10 [30, 000 – 35, 000] = Rs.50, 000 [A]
- Material B = Rs.5 [40, 000 – 42, 000] = Rs.10, 000 [A]
- Material C = Rs.6 [50, 000 – 53, 000] = Rs.18, 000 [A]
- Total Material Quantity Variance = Rs.78, 000 [A]

IV] **Material Mix Variance** = Std Cost of Std Mix – Std Cost of Actual Mix

$$\text{Rs.8, 66, 667} - \text{Rs.8, 78, 000} = \text{Rs.11, 333}$$

- Note: Standard Cost of Standard Mix is computed as under
- If Actual mix would have been in the standard proportion, the quantities of material A, B and C would have been,
- A: $300/1200 \times 1, 30, 000 = 32, 500 \times \text{Rs.10} = \text{Rs.3, 25, 000}$
- B: $400/1200 \times 1, 30, 000 = 43, 333.33 \times \text{Rs.5} = \text{Rs.2, 16, 667}$
- C: $500/1200 \times 1, 30, 000 = 54, 166.67 \times \text{Rs.6} = \text{Rs.3, 25, 000}$
- Total standard cost of standard mix = Rs.8, 66, 667
- Standard cost of actual mix has been computed by multiplying the actual quantity by the standard cost.

Illustration 3] S.V. Ltd. manufactures a single product, the standard mix of which are as follows:

Material A 60% at Rs.20 per kg

Material B 40% at Rs.10 per kg

Normal loss in the production is 20% of input. Due to shortage of material A, the standard mix was changed and the actual mix was as follows:

Material A 105 kg at Rs.20 per kg

Material B 95 kg at Rs.9 per kg

Actual loss was 35 kg, while the actual output was 165 kg

Calculate all material variances.



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Solution: The following table is prepared for computation of variances in this example.

Material	Standard Quantity kg	Standard Price Rs.	Standard Cost Rs.	Actual Quantity kg	Actual Price Rs.	Actual Cost Rs.
A	60	20	1200	105	20	2100
B	40	10	400	95	9	855
Total	100		1600	200		2955
Normal Loss	20			35 [A.L.]		
Standard Output	80		1600	165 Actual Output		2955

I] **Material Cost Variance:** Standard Cost for Actual Production – Actual Cost

$$\text{Rs.3,300} - \text{Rs.2955} = \text{Rs.345 [F]}$$

Note: Standard cost for actual production is computed as shown below:

For 80 kg, the standard cost is Rs.1,600, so for actual production of 165 kg, the standard cost is $165/80 \times 1600 = \text{Rs.3,300}$

II] **Material Price Variance:** Actual Quantity [Standard Price – Actual Price]

- Material A = $105 [\text{Rs.20} - \text{Rs.20}] = \text{Nil}$
- Material B = $95 [\text{Rs.10} - \text{Rs.9}] = \text{Rs.95 [F]}$
- Total Material Price Variance = Rs.95 [F]

III] **Material Quantity Variance:** Standard Price [Std. Quantity – Actual Quantity]

- Material A = $\text{Rs.20} [124 - 105] = \text{Rs.380 [F]}$
- Material B = $\text{Rs.10} [83 - 95] = \text{Rs.120 [A]}$
- Total Material Quantity Variance = Rs.260 [F]

Note: Standard quantity for actual production is computed as shown below

- Material A = $165/80 \times 60 = 123.75$ or 124
- Material B = $165/80 \times 40 = 82.5$ or 83

IV] **Material Mix Variance:** Standard Cost of Standard Mix – Std. Cost of Actual Mix

$$\text{Rs.3,200} - \text{Rs.3,050} = \text{Rs.150 [F]}$$

Note: Standard cost of standard mix is computed as under,

Material A: 60% of 200 [Actual Input] = $120 \times \text{Rs.20} = \text{Rs.2400}$

Material B: 40% of 200 [Actual Input] = $80 \times \text{Rs.10} = \text{Rs.800}$

$$\text{Total Cost} = \text{Rs.3200}$$



Standard cost of actual mix is computed by multiplying the actual quantity by the standard price

V] **Material Yield Variance:** Standard Yield Rate [Actual Yield – Standard Yield]

$$1600/80 [165 - 160] = \text{Rs.}20 [165 -160] = \text{Rs.}100 \text{ [F]}$$

Note: Standard yield is in relation to the actual input of 200 kg and hence the standard yield is 200 less 20% normal loss i.e.40 kg and the standard yield is 160 kg.

B] **Labour Variances:** Like the material variances, labour variances arise due to the difference between the standard labour cost for actual production and the actual labour cost. The following variances are computed in case of direct labour.

I] **Labour Cost Variance:** This variance is the main variance in case of labour and arises due to the difference between the standard labour cost for actual production and the actual labour cost. The following formula is used for computation of this variance.

$$\text{Labour Cost Variance} = \text{Standard Labour Cost for Actual Production} - \text{Actual Labour Cost}$$

This variance will be favourable is the actual labour cost is less than the standard labour cost and adverse if the actual labour cost is more than the standard labour cost.

II] **Labour Rate Variance:** One of the reasons for labour cost variance is the difference between the standard rate of wages and actual wages rate. The labour rate variance indicates the difference between the standard labour rate and the actual labour rate paid. The formula for computation is as under.

$$\text{Labour Rate Variance: Actual Hours Paid [Standard Rate – Actual Rate]}$$

This variance will be favourable if the actual rate paid is less than the standard rate. The labour rate variance is that portion of direct labour cost variance, which is due to the difference between the labour rates.

III] **Labour Efficiency Variance:** It is of paramount importance that efficiency of labour is measured. For doing this, the actual time taken by the workers should be compared with the standard time allowed for the job. The standard time allowed for a particular job is decided with the help of time and motion study. The efficiency variance is computed with the help of the following formula.

$$\text{Labour Efficiency Variance} = \text{Standard Rate [Standard Hours for Actual Output – Actual Hours worked]}$$

This variance will be favourable is the actual time taken is less than the standard time.

IV] **Labour Mix Variance or Gang Composition Variance:** This variance is similar to the material mix variance and is computed in the same manner. In doing a particular job, there may be a particular combination of labour force, which may consist of skilled, semi skilled and unskilled workers. However due to some practical difficulties, this composition may have to be changed. How much is the loss caused due to this change or how much is the gain due to this change is indicated by this variance. The computation is done with the help of the following formula.

$$\text{Labour Mix Variance} = \text{Standard Cost of Standard Mix} - \text{Standard Cost of Actual Mix.}$$

V] **Labour Yield Variance:** This variance indicates the difference between the actual output and the standard output based on actual hours. In other words, a comparison is made between the actual



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production achieved and the production that should have been achieved in actual number of working hours. The variance will be favourable if the actual output achieved is more than the standard output. The computation is done in the following manner.

Labour Yield Variance = Average Standard Wage Rate Per Unit [Actual Output – Standard Output]

VI] **Idle Time Variance:** This variance indicates the loss caused due to abnormal idle time. While fixing the standard time, normal idle time is taken into consideration. However if the actual idle time is more than the standard/normal idle time, it is called as abnormal idle time. This variance will be always adverse and will be computed as shown below.

Idle Time Variance = Abnormal Idle Time X Standard Rate.

The following chart will show the relationships between various labour variances.

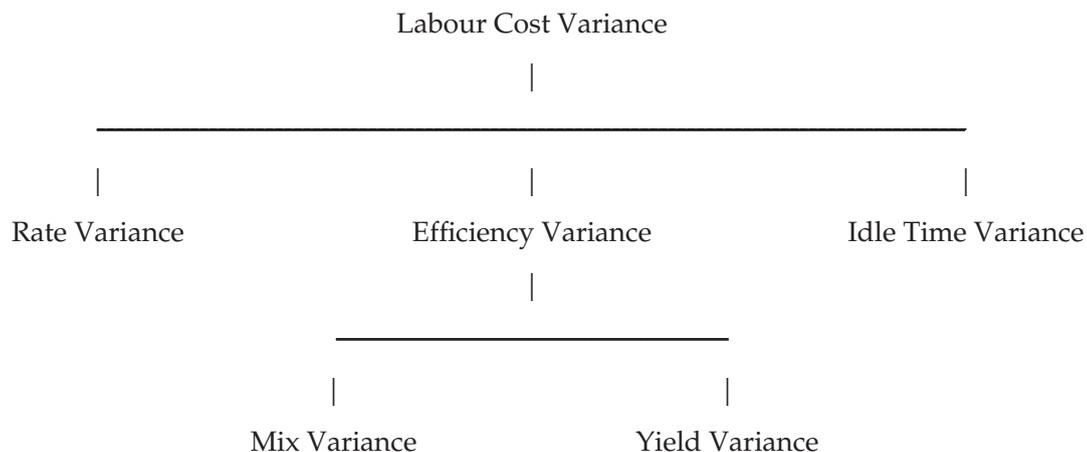


Illustration 4]

Standard hours for manufacturing two products, M and N are 15 hours per unit and 20 hours per unit respectively. Both products require identical kind of labour and the standard wage rate per hour is Rs.5. In a particular year, 10, 000 units of M and 15, 000 units of N were produced. The total labour hours worked were 4, 50, 000 and the actual wage bill came to Rs.23, 00,000. This includes 12, 000 hours paid for @ Rs.7 per hour and 9400 hours paid for @ Rs.7.50 per hour, the balance having been paid at Rs.5 per hour. You are required to calculate labour variances.

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Solution:

I] **Labour Cost Variance:** Standard Labour Cost for Actual Production – Actual Labour Cost

$$\text{Rs.22, 50, 000} - \text{Rs.23, 00, 000} = \text{Rs.50, 000 [A]}$$

Note: Standard Labour Cost for Actual Production is computed as under,

Product M: 10, 000 units × 15 hrs per unit × Rs.5 per hour = Rs.7, 50, 000

Product N: 15, 000 units × 20 hrs per unit × Rs.5 per hour = Rs.15, 00, 000

Total standard labour cost for actual production = Rs.22, 50, 000



II] **Labour Rate Variance:** Actual Hours [Standard Rate – Actual Rate]

$$12,000 \text{ [Rs.5 – Rs.7]} = \text{Rs.24,000 [A]}$$

$$9,400 \text{ [Rs.5 – Rs.7.50]} = \text{Rs.23,500 [A]}$$

$$4,29,100 \text{ [Rs.5 – Rs.5]} = \text{Nil}$$

$$\text{Total Labour Rate Variance} = \text{Rs.47,500 [A]}$$

III] **Labour Efficiency Variance** = Standard Rate [Standard Time – Actual Time]

$$\text{Rs.5 [4,50,000 – 4,50,500]} = \text{Rs.2500 [A]}$$

Reconciliation:

$$\text{Labour Cost Variance} = \text{Labour Rate Variance} + \text{Labour Efficiency Variance}$$

$$\text{Rs.50,000 [A]} = \text{Rs.47,500 [A]} + \text{Rs.2500 [A]}$$

Illustration Number 5]

The standard output of production EXE is 25 units per hour in a manufacturing department of a company employing 100 workers. The standard wage rate per labour hour is Rs.6.

In a 42 hours week, the department produced 1040 units of the product despite 5% of the time paid were lost due to an abnormal reason. The hourly wage rate actually paid were Rs.6.20, Rs.6 and Rs.5.70 respectively to 10, 30 and 60 of the workers.

Compute various relevant labour variances.

Solution: The following table is prepared for computation of various relevant labour variances.

Standard	Actual Hours	Actual Rate Rs.	Amount Rs.
Standard output 25 units per hour for 100 employees	42 hrs X 10 workers = 420 hrs	Rs.6.20	2,604
Hence standard man hours per unit = 100 workers/25 units per hr = 4	42 hrs X 30 workers = 1260 hrs	Rs.6.00	7,560
	42 hrs X 60 workers = 2520 hrs	Rs.5.70	14,364
Actual output = 1040 units	Total: 4200 hrs		24,528
Standard hrs for 1040 units = 1040 X 4 = 4160	Idle Time 5% of 4200 = 210 hrs		
Standard cost for actual output = 4160 hrs X Rs.6 per hr = Rs.24,960	Actual Hrs Worked 4200 – 210 = 3990		

I] **Labour Cost Variance:** Standard Cost for Actual Production – Actual Cost

$$\text{Rs.24,960}^* - \text{Rs.24,528}^{**} = \text{Rs.432 [F]}$$



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II] **Labour Rate Variance:** Actual Hours [Standard Rate – Actual Rate]

- 420 [Rs.6 – Rs.6.20] = Rs.84 [A]
- 1260 [Rs.6 – Rs.6] = Nil
- 2520 [Rs.6 – Rs.5.70] = Rs.756 [F]
- Total Labour Rate Variance = Rs.672 [F]

III] **Labour Efficiency Variance:** Standard Rate [Standard Time – Actual Time Worked]

$$\text{Rs.6 [4160 \# – 3990]} = \text{Rs.1020 [F]}$$

IV] **Labour Idle Time Variance:** Abnormal Idle Time X Standard Rate

$$210 \text{ hrs X Rs.6} = \text{Rs.1260 [A]}$$

- * As shown in the table
- ** As shown in the table
- # Standard time for actual output = 4160 hrs as shown in the table.

Illustration Number 6]

The following was the composition of a gang of workers in a factory during a particular month, in one of the production departments. The standard composition of workers and wage rates per hour were as follows.

Skilled: Two workers at a standard rate of Rs.20 per hour each

Semi-Skilled: Four workers at a standard rate of Rs.12 per hour each

Unskilled: Four workers at a standard rate of Rs.8 per hour each.

The standard output of the gang was four units per hour of the product. During the month in question, however the actual composition of the gang and hourly rates paid were as under

Skilled: 2 workers @ Rs.20 per hour

Semi-Skilled: 3 workers @ Rs.14 per hour

Un-skilled: 5 workers @ Rs.10 per hour

The gang was engaged for 200 hours during the month, which included 12 hours when no production was possible due to the machine breakdown. 810 units of the product was recorded as output of the gang during the month.

Calculate various labour variances.



Solution:

The following table is prepared to compute the variances.

Category of Workers	Standard Composition of Gang	Standard Rate Rs.	Standard Cost Rs.	Actual Composition of Gang and number of hrs	Actual Rate Rs.	Actual Cost Rs.
Skilled	2	20	40	2 X 200 = 400	20	8,000
Semi-skilled	4	12	48	3 X 200 = 600	14	8,400
Un-skilled	4	8	32	5 X 200 = 1000	10	10,000
Total		40	120	10 X 200 = 2000		26,400

I] **Labour Cost Variance:** Standard Cost for Actual Production – Actual Cost

$$Rs.24,300 - Rs.26,400 = Rs.2,100 [A]$$

Note: Standard labour cost for actual production: For 1 man-hour the standard cost is Rs.120 as shown in the table. In one hour 4 units are produced and so the standard labour cost per unit is Rs.120/4 units = Rs.30 per unit. Thus standard labour cost for actual production will be 810 units X Rs.30 = Rs.24,300. Actual labour cost is shown in the table.

II] **Labour Rate Variance:** Actual Hours [Standard Rate – Actual Rate]

- Skilled: 400 [Rs.20 – Rs.20] = Nil
- Semi-skilled: 600 [Rs.12 – Rs.14] = Rs.1200 [A]
- Un-skilled: 1000 [Rs.8 – Rs.10] = Rs.2000 [A]
- Total Labour Rate Variance = Rs.3200 [A]

III] **Labour Efficiency Variance:** Standard Rate [Standard Time – Actual Time]

C] **Overhead Variances:** The overhead variances show the difference between the standard overhead cost and the actual overhead cost. In case of direct material and direct labour variances, there is no question of dividing them into fixed and variable as the direct material and direct labour costs are variable. However, in case of overheads, it is necessary to divide them into fixed and variable for computation of variances. We will take up the fixed overhead variances first and then the variable overhead variances. The fixed overhead variances are discussed in the following paragraphs.

I] **Fixed Overhead Variances:** The following variances are computed in case of fixed overheads.

- A. **Fixed Overhead Cost Variance:** This variance indicates the difference between the standard fixed overheads for actual production and the actual fixed overheads incurred. Actually this variance indicates the under/over absorbed fixed overheads. If the actual overheads incurred are more than the standard fixed overheads, it indicates the under absorption of fixed overheads and the variance is favourable. On the other hand, if the actual overheads incurred are more than the standard fixed overheads, it indicates the over absorption of fixed overheads and the variance is adverse. The following formula is used for computation of this variance.



Fixed Overhead Cost Variance: Standard Fixed Overheads for Actual Production – Actual Fixed Overheads.

- B. **Fixed Overhead Expenditure/Budget Variance:** This variance indicates the difference between the budgeted fixed overheads and the actual fixed overhead expenses. If the actual fixed overheads are more than the budgeted fixed overheads, it is an adverse variance as it means overspending as compared to the budgeted amount. On the other hand, if the actual fixed overheads are less than the budgeted fixed overheads, it is a favourable variance. This variance is computed with the help of the following formula.

Fixed Overhead Expenditure Variance: Budgeted Fixed Overheads – Actual Fixed Overheads

- C] **Fixed Overheads Volume Variance:** This variance indicates the under/over absorption of fixed overheads due to the difference in the budgeted quantity of production and actual quantity of production. If the actual quantity produced is more than the budgeted one, this variance will be favourable but it will indicate over absorption of fixed overheads. On the other hand, if the actual quantity produced is less than the budgeted one, it indicates adverse variance and there will be under absorption of overheads. The formula for computation of this variance is as shown below:

Fixed Overhead Volume Variance: Standard Rate [Budgeted Quantity – Actual Quantity]

Reconciliation I = Fixed Overhead Cost Variance = Expenditure Variance + Volume Variance

- D] **Fixed Overhead Efficiency Variance:** It is that portion of volume variance which arises due to the difference between the output actually achieved and the output which should have been achieved in the actual hours worked. This variance will be favourable if the actual production is more than the standard production in actual hours. The formula for computation of this variance is as follows:

Fixed Overhead Efficiency Variance: Standard Rate [Standard Production – Actual Production]

- E] **Fixed Overhead Capacity Variance:** This variance is also that portion of volume variance, which arises due to the difference between the capacity utilization, i.e. the capacity actually utilized and the budgeted capacity. If the capacity utilization is more than the budgeted capacity, the variance is favourable, otherwise it will be adverse. The formula is as follows:

Fixed Overheads Capacity Variance: Standard Rate [Standard Quantity – Budgeted Quantity]

Reconciliation II = Volume Variance = Efficiency Variance + Capacity Variance

- F] **Fixed Overhead Revised Capacity Variance:** This variance indicates the difference in capacity utilization due to working for more or less number of days than the budgeted one. The computation of this variance is done by using the following formula.

Fixed Overhead Revised Capacity Variance = Standard Rate [Standard Quantity – Revised Budgeted Quantity]

- G] **Fixed Overheads Calendar Variance:** This variance indicates the difference between the budgeted quantity of production and actual quantity of production achieved arising due to the difference in the number of days worked and budgeted. The formula for computation of this variance is as follows.



Fixed Overheads Calendar Variance = Standard Rate [Budgeted Quantity – Revised Budgeted Quantity]

II] **Variable Overhead Variances:** The following variances are computed in case of variable overheads.

A] **Variable Overhead Cost Variance:** This variance indicates the difference between the standard variable overheads for actual overheads and the actual overheads. The difference between the two arises due to the variation between the budgeted and actual quantity. The formula for the computation of this variance is as follows:

Variable Overhead Cost Variance = Standard Variable Overheads for Actual Production – Actual Variable Overheads.

B] **Variable Overheads Expenditure Variance:** This variance indicates the difference between the standard variable overheads to be charged to the standard production and the actual variable overheads. If the actual overheads are less than the standard variable overheads, the variance is favourable, otherwise it is adverse. The formula for the computation is as follows:

Variable Overhead Expenditure Variance = Standard Variable Overheads for Standard Production – Actual Variable Overheads.

C] **Variable Overheads Efficiency Variance:** It indicates the efficiency by comparing between the output actually achieved and the output that should have been achieved in the actual hours worked. [Standard Production] This variance will be favourable if the actual output achieved is more than the standard output. The formula for computation is given below:

Variable Overheads Efficiency Variance: Standard Rate [Standard Quantity – Actual Quantity]

Important note: All the formulae mentioned above are with reference to the quantity. All overhead variances can also be computed with relation to number of hours. In one of the illustrations, this is demonstrated.

Illustration Number 7]

From the following information extracted from the books of a manufacturing company, calculate Fixed and Variable Overhead Variances.

Particulars	Budgeted	Actual
Production – Units	22, 000	24, 000
Fixed Overheads	Rs.44, 000	Rs.49, 000
Variable Overheads	Rs.33, 000	Rs.39, 000
Number of Days	25	26
Number of man hours	25, 000	27, 000



Solution:

A) Fixed Overhead Variances:

- I] **Fixed Overhead Cost Variance:** Standard Fixed Overheads for Actual Production – Actual Fixed Overheads = Rs.48,000 – Rs.49,000 = Rs.1,000 [A]

Note: Standard fixed overheads for actual production = Actual Production 24,000 X standard rate Rs.2 [Rs.44,000 budgeted fixed overheads / 22,000 budgeted production = Rs.2]

- II] **Fixed Overhead Expenditure Variance:** Budgeted Fixed Overheads – Actual Fixed Overheads = Rs.44,000 – Rs.49,000 = Rs.5,000 [A]

- III] **Fixed Overhead Volume Variance:** Standard Rate [Budgeted Quantity – Actual Quantity] = Rs.2 [22,000 – 24,000] = Rs.4,000 [F]

The variance is favourable as the actual quantity produced is more than the budgeted quantity.

Reconciliation I = Cost Variance = Expenditure Variance + Volume Variance

$$\text{Rs.1,000 [A]} = \text{Rs.5,000 [A]} + \text{Rs.4,000 [F]}$$

- IV] **Fixed Overhead Efficiency Variance:** Standard Rate [Standard Quantity – Actual Quantity] = Rs.2 [23,760 – 24,000] = Rs.480 [F]

Note: Standard quantity of production is in reference to actual number of hours. If 22,000 units are produced in 25,000 hrs [standard hours], in actual 27,000 hours, 23,760 units should have been produced. When number of days and number of hours, both are given, the standard quantity is always to be computed in relation to the actual hours. However, if only number of days is given, the standard quantity will have to be computed in relation to number of days.

- V] **Fixed Overhead Capacity Variance:** Standard Rate [Standard Quantity – Budgeted Quantity] = Rs.2 [23,760 – 22,000] = Rs.3,520 [F]

Reconciliation II = Volume Variance = Efficiency Variance + Capacity Variance

$$\text{Rs.4,000 [F]} = \text{Rs.480 [F]} + \text{3,520 [F]}$$

- VI] **Fixed Overhead Revised Capacity Variance** = Standard Rate [Standard Quantity – Revised Budgeted Quantity] = Rs.2 [23,760 – 22,880] = Rs.2 X 880 = Rs.1760 [F]

Note: Standard quantity is computed as shown in the Efficiency Variance. Revised Budget Quantity is computed as: in 25 days, the production is 22,000 so in 26 days the revised quantity is 22,880 units.

- VII] **Fixed Overhead Calendar Variance:** Standard Rate [Revised Budgeted Quantity – Budgeted Quantity] = Rs.2 [22,880 – 22,000] = Rs.2 X 880 = Rs.1,760 [F]

Reconciliation III = Capacity Variance = Revised Capacity Variance + Calendar Variance = Rs.3,520 [F] = Rs.1760 [F] + Rs.1760 [F]



B] Variable Overheads Variance:

I] **Cost Variance:** Standard Variable Overheads for Actual Production – Actual Variable Overheads:
 Rs.36, 000 – Rs.39, 000 = Rs.3, 000 [A]

Note: Standard Variable Overheads for Actual Production = Standard Rate Per Unit X Actual Production Units = Rs.1.5 [Budgeted variable overheads Rs.33, 000 /Budgeted production units 22, 000 = Rs.1.5] X 24, 000 units = Rs.36, 000

II] **Expenditure Variance:** Standard Variable Overheads for Standard Production – Actual Variable Overheads: Rs.1.5 X 23, 760 – Rs.39, 000 = Rs.3360 [A]

III] **Efficiency Variance:** Standard Rate [Standard Quantity – Actual Quantity]
 Rs.1.5 [23, 760 – 24, 000] = Rs.360 [F]

Solved Problems

1. Calculate Material Cost Variances from the following:

Standards	Actual
Material A – 20% @ Rs.2 per kg	Material A – 8 kg @ Rs.3 per kg
Material B – 80% @ Rs.8 per kg	Material B – 4 kg @ Rs.7 per kg

There is no process loss.

Solution – The following statement will have to be prepared for computation of variances.

Standards	Actual
Material A – 2 kg @ Rs.2 per kg = Rs.4	Material A – 8 kg @ Rs.3 per kg = Rs.24
Material B – 8 kg @ Rs.8 per kg = Rs.64	Material B – 4 kg @ Rs.7 per kg = Rs.28

Material Cost Variance = Standard Cost – Actual Cost = Rs.68 – Rs.52 = Rs.16[F]

2. The standard cost of a certain chemical mixture is as follows:

40% of Material A @ Rs.200 per ton

60% of Material B @ Rs.300 per ton

A standard loss of 10% is expected in the production. During a particular period materials used are,

90 tons Material A @ Rs.180 per ton

110 tons Material B @ Rs.340 per ton

Actual production produced was 182 tons of the finished goods.

Calculate Material Price Variance, Material Usage Variance, Material Mix Variance and Material Yield Variance.

Solution : The following statement will have to be prepared for calculation of the material variances.



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Standards	Actuals
Material A 40 tons @ Rs.200 = Rs.8,000	90 tons @ Rs.180 per ton = Rs.16,200
Material B 60 tons @ Rs.300 = Rs.18,000	110 tons @ Rs.340 per ton = Rs.37,400
Total 100 tons = Rs.26,000	200 tons = Rs.53,600
Less: 10% Std. Loss 10 tons	Less: Actual loss 18 tons
Standard Production 90 tons = Rs.26,000	182 tons = Rs.53,600

I] Material Price Variance - AQ [SP – AP] = Material A = 90[200-180]= Rs.1,8 00 [F]

Material B =110[300-340]= Rs.4,4 00[A]

Total Price Variance = Rs.2,6 00 [A]

II] Material Usage Variance SP [SQ – AQ]- Material A = 200[81-90]= Rs.1,8 00[A]

Material B = 300[121-110]= Rs.3,3 00[F]

Total Usage Variance = 1,500 [F]

III] Material Mix Variance – Std. Cost of Std. Mix – Std. Cost of Actual Mix

Rs.52, 000 – Rs.51,000 = Rs.1,000 [F]

IV] Material Yield Variance – Std. Yield Rate[Actual Yield – Standard yield]

26, 000/90[182-180] = Rs.577.77[F]

Standard Yield Rate = Standard cost per unit of standard production

3. Calculate Material Price and Mix variance from the following

Standard	Actual
Material A – 20 kg @ Rs.5	20 kg @ Rs.6
Material B – 30 kg @ Rs.4	20 kg @ Rs.3
Material C – 50 kg @ Rs.6	60 kg @ Rs.5
Total – 100 kg	Total – 100 kg

Solution:

Material Price Variance – AQ [SP – AP] – Material A = 20[Rs.5-Rs.6] = Rs.20[A]

Material B = 20[Rs.4- Rs.3] = Rs.20[F]

Material C = 60[Rs.6-Rs.5] = Rs.60[F]

Total Material Price Variance =Rs.60[F]

Material Mix Variance – Standard Cost of Standard Mix – Standard Cost of Actual Mix

Rs.520 – Rs.540 = Rs.20[A]



4. Mixers Ltd. is engaged in producing a standard mix using 60 kg of chemical X and 40 kg of chemical Y. The standard loss of production is 30%. The standard price of X is Rs.5 per kg and of Y is Rs.10 per kg. The actual mixture and yield were as follows:

X – 80 kg @ Rs.4.50 per kg

Y – 70 kg @ Rs.8.00 per kg

Actual yield 115 kg.

Calculate all Material Variances

Solution: The following statement will have to be prepared for calculation of variances.

Standard	Actual
Material X – 60 kg @ Rs.5 = Rs.300	80 kg @ Rs.4.50 = Rs.360
Material Y – 40 kg @ Rs.10= Rs.400	70 kg @ Rs.8 = Rs.560
Std. Loss – 30%	Actual Loss = 35 kg
Std. Production – 70 kg = Rs.700	Actual Production – 115 kg

I] Material Cost Variance – Std. Cost – Actual Cost – Rs.1,150 – Rs.920 = Rs.230[F]

II] Material Price Variance – AQ [SP – AP] : X = 80 [Rs.5 - Rs.4.50] = Rs.40[F]

Y = 70 [Rs.10 - Rs.8] = Rs.140[F]

Total Price Variance = Rs.180[F]

III] Material Quantity Variance – SP [SQ – AQ] : X = Rs.5[98.57 – 80]=Rs.92.85[F]

Y = Rs.10 [65.71 - 70] = Rs.42.9[A]

Total Quantity Variance = Rs.49.95 [F]

IV] Material Mix Variance – Std Cost of Std Mix – Std Cost of Actual Mix

Rs.1,050 – Rs.1,100 = Rs.50 [A]

V] Material Yield Variance – Std Yield Rate [Actual Yield – Standard Yield]

Rs.10 [115 - 105] = Rs.100 [F]

5. Standard hours for manufacturing two products, M and N are 15 hours per unit and 20 hours per unit respectively. Both products require identical kind of labour and the standard wages rate per hour is Rs.5. In the year 2006, 10,000 units of M and 15,000 units of N were manufactured. The total labour hours actually worked were 4,50,000 and the actual wages bill came to Rs.23,00,000. This includes 12,000 hours paid for @ Rs.7 per hour and 9,400 hours paid for @ Rs.7.50 per hour, the balance having been paid @ Rs.5 per hour. Calculate labour variances.

Solution:

Labour Cost Variance = Standard labour cost for actual production – Actual labour cost

Product M = 10,000 units × 15 hrs. × Rs.5 = Rs.7,50,000

Product N = 15,000 units × 20 hrs × Rs.5 = Rs.15,00,000



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Total standard cost = Rs.22, 50, 000

Total actual labour cost = Rs.23, 00, 000

Labour Cost Variance = Rs.22, 50, 000 – Rs.23, 00, 000 = Rs.50, 000[A]

Labour Rate Variance = Actual Hours [Standard rate – Actual rate]

$$12, 000 [\text{Rs.}5 - \text{Rs.}7] = \text{Rs.}24, 000 [\text{A}]$$

$$9, 400 [\text{Rs.}5 - \text{Rs.}7.50] = \text{Rs.}23, 500 [\text{A}]$$

$$4, 29, 100[\text{Rs.}5 - \text{Rs.}5] = \text{Nil}$$

Total Labour Rate Variance = Rs.47, 500 [A]

Labour Efficiency Variance = Standard Rate [Standard Time – Actual Time]

$$= \text{Rs.}5 [4,50,000 - 4,50,500] = \text{Rs.}2, 500[\text{A}]$$

6. The standard cost card for a product shows,

Material cost 2 kg @ Rs.2.50 each = Rs.5.00 per unit

Labour 2 hours @ Rs.10 each = Rs.20 per unit

The actual which have emerged from business operations are as follows.

Production – 8,000 units, material consumed – 16,500 kg @ Rs.2.40 each = Rs.39,600,

Wages paid 18,000 hours @ Rs.8 each = Rs.1, 44, 000

Calculate appropriate material and labour variances.

Solution:

Material Cost Variance = Standard Cost – Actual Cost

$$16, 500 \times \text{Rs.}2.40 - 16,000 \times \text{Rs.}2.50$$

$$\text{Rs.}39, 600 - \text{Rs.}40,000 = \text{Rs.}400[\text{F}]$$

Material Price Variance = Actual quantity [Standard price – Actual price]

$$= 16, 500 [\text{Rs.}2.50 - \text{Rs.}2.40] = \text{Rs.}1, 650 [\text{A}]$$

Material Quantity Variance = Standard price [Standard quantity – Actual quantity]

$$= 2.50 [16, 000 - 16, 500] = \text{Rs.}1, 250 [\text{A}]$$

Labour Cost Variance = Standard labour cost – Actual cost

$$= \text{Rs.}1, 60, 000 - \text{Rs.}1, 44, 000 = \text{Rs.}16, 000 [\text{F}]$$

Labour Rate Variance = Actual hours [Standard rate – Actual rate]

$$= 18, 000 [\text{Rs.}10 - \text{Rs.}8] = \text{Rs.}36, 000 [\text{F}]$$

Labour Efficiency Variance = Standard rate [Standard hours for actual production – Actual hours] = Rs.10

$$[16, 000 - 18, 000] = \text{Rs.}20, 000 [\text{A}]$$



7. The following data are available in respect of a manufacturing company

Particulars	Budget	Actual
Production - units	400	360
Man-hours to produce above	8,000	7,000
Variable overheads	Rs.10, 000	Rs.9, 150

The standard time to produce one unit of the product is 20 hours.

Calculate variable overhead variances.

Solution: The following working notes will have to be prepared for computation of variable overhead variances.

- A] Standard variable overhead per unit = $\text{Rs.10, 000} / 400 \text{ units} = \text{Rs.25 per unit}$
- B] Standard variable overhead per hour = $\text{Rs.10, 000} / 8, 000 \text{ hrs} = \text{Rs.1.25 per hour}$
- C] Recovered variable overhead = Actual output X Standard variable overhead per hour $360 \text{ units} \times \text{Rs.25} = \text{Rs.9, 000}$
- D] Budgeted variable overheads [Based on actual hours worked] – Actual hours worked X Standard variable overhead per hour = $7, 000 \text{ hrs} \times \text{Rs.1.25} = \text{Rs.8, 750}$
- E] Standard hours for actual output = Actual output X Standard hours per unit = $360 \text{ units} \times 20 \text{ hours} = 7,200 \text{ hours}$

Computation of Variable overhead variances

- I] Variable overhead cost variance – Recoverable variable overhead – Actual variable overhead = $\text{Rs.9, 000} - \text{Rs.9, 150} = \text{Rs.150 [A]}$
 - II] Variable overhead budget or expenditure variance – Budgeted variable overheads – Actual variable overhead = $\text{Rs.8, 750} - \text{Rs.9, 150} = \text{Rs.400[A]}$
 - IV] Variable overhead efficiency variance – Standard variable overhead per hour [Standard hours for actual output – Actual hours] = $\text{Rs.9, 000} - \text{Rs.8, 750} = \text{Rs.250[F]}$
8. The following information is available from the records of a manufacturing company using standard costing system.

Particulars	Standard	Actual
Production	4,000 units	3,800 units
Working days	20	21
Fixed overhead	Rs.40, 000	Rs.39, 000
Variable overheads	Rs.12, 000	Rs.12, 000

Calculate the following overhead variances

- I] Variable overhead variance
- II] Fixed overhead cost variance
- III] Fixed overhead expenditure variance



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- IV] Fixed overhead volume variance
- V] Fixed overhead efficiency variance
- VI] Fixed overhead calendar variance

Solution: Standard variable overhead rate per unit = Budgeted variable overheads/ budgeted number of units = Rs.12, 000/ 4, 000 units = Rs.3

Standard production per day = 4, 000 units/20 days = 200 units

Standard fixed overhead per day = 200 × Rs.10 = Rs.2, 000

Computation of Variances

- I] **Variable overhead cost variance:** Actual variable overheads – Recoverable variable overheads = Rs.12, 000 – 3, 800 units × Rs.3 = 600[A]
 - II] **Fixed overhead variance:** Standard fixed overheads for actual production – Actual fixed overheads = 3, 800 units × Rs.10 – Rs.39, 000 = Rs.1, 000 [A]
 - III] **Fixed overhead expenditure variance:** Budgeted fixed overheads – Actual fixed overheads = Rs.40, 000 – Rs.39, 000 = Rs.1, 000 [F]
 - IV] **Fixed overhead volume variance:** Recoverable overheads – Budgeted overheads
$$\text{Rs.38, 000} - \text{Rs.40, 000} = \text{Rs.2, 000 [A]}$$
 - V] **Fixed overhead efficiency variance:** Standard fixed overhead rate per day [Actual time – standard time for actual output] = Rs.2, 000 [21 – 19] = Rs.4, 000 [F]
 - VI] **Fixed overhead calendar variance:** Standard fixed overhead rate per day [Actual days – Budgeted days] = Rs.2, 000 [21 – 20] = Rs.2, 000 [F]
- 9] The following data has been collected from the cost records of a unit for computing the various fixed overhead variances for a period.
- Number of budgeted working days – 25
 - Budgeted man-hours per day – 6,000
 - Output [budgeted] per man-hours: 1 unit
 - Fixed overhead cost as budgeted: Rs.1, 50, 000
 - Actual number of working days: 27
 - Actual man-hours per day: 6, 300
 - Actual output per man-hours [in units]: 0.9
 - Actual fixed overhead: Rs.1, 56, 000, calculate fixed overhead variances

Solution:

- I] **Fixed overhead expenditure variance:** Budgeted fixed overheads – Actual fixed overheads = Rs.1, 50, 000 – Rs.1, 56, 000 = Rs.6, 000 [A]



II] **Fixed overhead calendar variance:** No. of excess working days × Fixed overhead rate per day = 2 X Rs.6, 000 = Rs.12, 000 [F]

III] **Fixed overhead capacity variance:** Standard overheads – Possible overheads
(Revised capacity) $Rs.1 \times 6,300 \times 27 - Rs.1,62,000 = Rs.8,100$ [F]

IV] **Fixed overhead efficiency variance:** Recoverable overheads – Standard overheads
 $1 \times .9 \times 6300 \times 27 - Rs.1,70,100 = Rs.17,010$ [A]

V] **Fixed overhead cost variance:** Variance I + II + III + IV = Rs.2, 910 [A]

10. ABC Ltd. produces an article by blending two basic raw materials. It operates a standard costing system and the following standards have been set for raw materials.

Material	Standard Mix	Standard Price
A	40%	Rs.4.00
B	60%	Rs.3.00

The standard loss in processing is 15%. During September 2007, the company produced 1, 700 kg of finished output.

The position of stock and purchases for the month of September 2007 is as under,

Material	Quantity as on 1/9/2007 Kg	Quantity as on 30/9/2007 -Kg	Purchases Kg	Cost Rs.
A	35	5	800	3,400
B	40	50	1,200	3,000

Calculate Material Cost Variance, Price Variance, Quantity Variance, Mix Variance and Yield Variance. Assume that First In First Out method is followed for material issues



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Solution: The following table is prepared for the computation of the variances.

Standard	Actual
Material A: 40 kg X Rs.4 = Rs.160	Material A: Total Quantity Used = Opening Stock + Purchases – Closing Stock i.e. 35 + 800 – 5 = 830 kg Actual Cost of Actual Quantity Opening Stock 35 kg @ Rs.4* = Rs.140.00 Purchases: 795 kg @ Rs.4.25 = Rs.3,378.25 Total = Rs.3518.25
Material B: 60 kg X Rs.3 = Rs.180	Material B: Total Quantity Used = Opening Stock + Purchases – Closing Stock 40 + 1200 – 50 = 1190 kg Actual Cost Of Actual Quantity From Opening Stock: 40 kg @ Rs.3 = Rs.120 From Purchases: 1150 kg @ Rs.2.5 = Rs.2875 Total Cost = Rs.2995
Total 100 kg = Rs.340	Total Actual Cost Rs.6513.25 [Rs.3518.25 + Rs.2995]
Less: Normal Loss 15% = 15 kg	Actual Loss = 320 kg
Normal Output = 85 kg	Actual Output = 1700 kg

Computation of Variances

- Material Cost Variance:** Standard Cost [For Actual Production] – Actual Cost
Rs.6800 – Rs.6513.25 = Rs.2,86.75 [F]

Note: Standard cost is computed as shown below:

For 85 kg output, standard cost is Rs.340

For actual output of 1700 kg, the standard cost is Rs.6800

- Material Price Variance:** Actual Quantity [Standard Price – Actual Price]

$$\begin{aligned} \text{Material A} &= 35[\text{Rs.4} - \text{Rs.4}] = \text{Nil} \\ &= 795[\text{Rs.4} - \text{Rs.4.25}] = \text{Rs.198.75 [A]} \end{aligned}$$

$$\begin{aligned} \text{Material B} &= 40[\text{Rs.3} - \text{Rs.3}] = \text{Nil} \\ &= 1150[\text{Rs.3} - \text{Rs.2.5}] = \text{Rs.575 [F]} \end{aligned}$$

$$\text{Total Material Price Variance} = \text{Rs.376.25 [F]}$$



3. **Material Quantity Variance:** Standard Price [Standard Quantity – Actual Quantity]

Material A = Rs.4 [800 – 830] = Rs.120 [A]

Material B = Rs.3 [1200 – 1190] = Rs.30 [F]

Total Material Quantity Variance = Rs.90 [A]

Note: Standard quantity for A and B is computed as under

A: $1700/85 \times 40 = 800$ kg

B: $1700/85 \times 60 = 1200$ kg

4. **Material Mix Variance:** Standard Cost of Standard Mix – Standard Cost of Actual Mix

Rs.6, 868 – Rs.6, 890 = Rs.22 [A]

Note: Standard Cost of Standard Mix is computed as under

Actual quantity of A and B consumed together = 830 + 1190 = 2020 kg

If this quantity were mixed in standard proportion, quantity of A would be 808 kg and B 1212 kg.

Standard cost of this mix then would be,

A: 808 kg × Rs.4 per kg = Rs.3, 232

B: 1212 kg × Rs.3 per kg = Rs.3, 636

Total standard cost of standard mix = Rs.6, 868

Standard cost of actual mix:

A: Actual quantity 830 × Rs.4 = Rs.3, 320

B: Actual quantity 1190 × Rs.3 = Rs.3, 570

Total standard cost for actual mix = Rs.6, 890

5. **Material Yield Variance:** Standard Yield Rate [Actual Yield – Standard Yield]

Rs.340/85 kg [1700 – 1717] = Rs.68 [A]

Note: Standard yield is computed as under

Actual input is A 830 + B 1190 = 2020 kg

Standard loss is 15% of the input, thus standard loss for actual input is 303 kg

Standard yield from actual input is 2020 kg – 303 kg = 1717 kg.

11. In a manufacturing process, the following standards apply,

Standard prices: Raw Material A Rs.10 per kg, Raw Material B Rs.50 per kg

Standard mix: 75% A and 25% B [by weight]

Standard output [weight of product as a percentage of weight of raw material] 90%

In a particular period actual cost, usages and output were as follows:

4400 kg of A costing Rs.46, 500



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1600 kg of B costing Rs.78, 500

Output 5670 kg of product

The budgeted output for the period was 7200 kg

Calculate Material cost variances

Solution:

The following table is prepared for computation of material variances

Standard	Actual
Material A 6000 kg × Rs.10 = Rs.60, 000	Material A 4400 kg = Rs.46, 500
Material B 2000 × Rs.50 = Rs.1, 00,000	Material B 1600 kg = Rs.78, 500
Total 8000 : Rs.1, 60, 000	Total 6000 kg = Rs.1, 25, 000
Less: Normal	Less: Actual
Loss 10%	Loss 330 kg
Normal Output 7200 kg at a standard cost Rs.1, 60, 000	Actual Output = 5670 kg at actual cost of Rs.1, 25, 000

1. **Material Cost Variance:** Standard Cost of Materials [For Actual Production] – Actual Cost. = Rs.1, 26, 000 – Rs.1, 25, 000 = Rs.1 000 [F]

Note: Standard cost of materials for actual production is computed as shown below.

For 7200 kg the standard cost is Rs.1, 60, 000 so for 5670 kg, the standard cost is
 $5670/7200 \times 1, 60, 000 = \text{Rs.1, 26, 000}$

1. **Material Price Variance:** Actual Quantity [Standard Price – Actual Price]

Material A = 4400 [Rs.10 – Rs.46.500/4400] = Rs.2500 [A]

Material B = 1600 [Rs.50 – Rs.78,500/1600] = Rs.1500 [F]

Total Material Price Variance: Rs.1000 [A]

3. **Material Quantity Variance:** Standard Price [Standard Quantity – Actual Quantity]

Material A = Rs.10 [4725 – 4400] = Rs.3250 [F]

Material B = Rs.50 [1575 – 1600] = Rs.1250 [A]

Total Material Quantity Variance = Rs.2000 [F]

4. **Material Mix Variance:** Standard Cost of Standard Mix – Standard Cost of Actual Mix

$\text{Rs.1, 20, 000} - \text{Rs.1, 24, 000} = \text{Rs.4000 [A]}$

Note: Standard Cost of Standard Mix is computed as shown below:

Actual total input is 6000 kg, if it is mixed in standard proportion, quantity of A would have been 4500 kg [75% of 6000] and that of B 1500 kg [25% of 6000]. The standard cost of this mix would be,

A: 4500 kg × Rs.10 per kg = Rs.45, 000



B: 1500 kg × Rs.50 per kg = Rs.75, 000

Total = Rs.1, 20, 000

Standard cost of actual mix is computed by multiplying the actual quantity of A and B by the standard price per kg

5. Material Yield Variance: Standard Yield Rate [Actual Yield – Standard Yield]

Rs.1, 60, 000/7200 [5670 – 5400] = Rs.5999.99 or Rs.6000 [F]

12. A company is manufacturing a chemical product making use of four different types of raw materials. The following information is available regarding the standards and actual.

Material	Share of total input Standard - %	Raw material cost Standard Rs/kg	Quantity consumed Actual	Raw material cost – Actual Rs./kg
A	40	50	42, 000	48
B	30	80	31, 000	80
C	20	90	18, 000	92
D	10	100	9, 000	110

There is an inevitable normal loss of 10% during the processing. Actual output 92, 000 kg

Calculate Material Cost, Price, Quantity, Mix and Yield variances.

Solution:

I] Statement Showing Details Regarding Standards

Materials	Quantity	Price – Rs/kg	Cost – Rs.
A	40	50	2000
B	30	80	2400
C	20	90	1800
D	10	100	1000
Total	100		7200
Less: Inevitable Loss 10%	10		
Normal Output	90		7200

II] Statement Showing Details Regarding Actual

Materials	Quantity	Price – Rs./kg	Cost – Rs.
A	42, 000	48	2, 016, 000
B	31, 000	80	24, 80, 000
C	18, 000	90	16, 20, 000
D	9, 000	110	9, 90, 000
Total	1, 00, 000		71, 06, 000
Less: Actual Loss	8, 000		
Actual Output	92, 000		71, 06, 000



Standard Costing

Computation of Variances:

1. **Material Cost Variance:** Standard Cost of Materials [For Actual Production] – Actual Cost
= Rs.73, 60, 000 – Rs.71, 06, 000 = Rs.2, 54, 000
2. **Material Price Variance:** Actual Quantity [Standard Price – Actual Price]
 - Material A = 42, 000 [Rs.50 – Rs.48] = Rs.84, 000 [F]
 - Material B = 31, 000 [Rs.80 – Rs.80] = Nil
 - Material C = 18, 000 [Rs.90 – Rs.92] = Rs.36, 000 [A]
 - Material D = 9, 000 [Rs.100 – Rs.110] = Rs.90, 000 [A]
 - Total Price Variance = Rs.42, 000 [A]
3. **Material Quantity Variance:** Standard Price [Standard Quantity – Actual Quantity]
 - Material A: Rs.50
 - Material B
 - Material C
 - Material D
 - Note: Standard Quantity for each material is computed as shown below:
 - Material A
 - Material B
 - Material C
 - Material D
4. **Material Mix Variance:** Standard Cost of Standard Mix – Standard Cost of Actual Mix
Note: Standard Cost of Standard Mix is computed as shown below.
5. **Material Yield Variance:** Standard Yield Rate [Actual Yield – Standard Yield]
13. The standard material inputs required for 1, 000 kg of a finished output are given below.

Material in kg	Quantity [Rs.]	Standard Rate Per Kg – Rs.
P	450	20
Q	400	40
R	250	60
Total Input	1100	
Less: Standard Loss	100	
Standard Output	1000	



Actual production in a period was 20, 000 kg of the finished product for which the actual quantities of materials used and the prices paid thereof are as under.

Material	Quantity Used - Kg	Purchased Price Per Unit [Rs]
P	10, 000	19
Q	8, 500	42
R	4, 500	65

Calculate Material Cost, Price, Quantity, Mix and Yield Variances. Prepare reconciliation among the variances

Solution:

Table showing Standards and Actual Details

Material	Standard	Actual
P	450 kg @ Rs.20 = Rs.9, 000	10, 000 kg @ Rs.19 = Rs.1, 90, 000
Q	400 kg @ Rs.40 = Rs.16, 000	8, 500 kg @ Rs.42 = Rs.3, 57, 000
R	250 kg @ Rs.60 = Rs.15, 000	4, 500 kg @ Rs.65 = Rs.2, 92, 500
Total Input	1, 100 kg = Rs.40, 000	23, 000 kg = Rs.8, 39, 500
Less: Standard Loss	100 kg	3, 000 kg [Actual Loss]
Standard Output	1, 000 kg = Rs.40, 000	20, 000 [Actual Production]

1. Material Cost Variance: Standard Material Cost [for Actual Production] – Actual Cost

$$\text{Rs.8, 00, 000} - \text{Rs.8, 39, 500} = \text{Rs.39, 500 [A]}$$

Note: Standard Material Cost for actual production is computed as shown below.

For 1000 kg [standard production], the standard cost is Rs.40, 000, so for actual production of 20, 000 kg, the standard cost is $20, 000/1000 \times 40, 000 = \text{Rs.8, 00,000}$

2. Material Price Variance: Actual Quantity [Standard Price – Actual Price]

- Material P = 10, 000 [Rs.20 – Rs.19] = Rs.10, 000 [F]
- Material Q = 8, 500 [Rs.40 – Rs.42] = Rs.17, 000 [A]
- Material R = 4, 500 [Rs.60 – Rs.65] = Rs.22, 500 [A]
- Total Material Price Variance = Rs.29, 500 [A]

3. Material Quantity Variance: Standard Price [Standard Quantity – Actual Quantity]

- Material P = Rs.20 [9, 000 – 10, 000] = Rs.20, 000 [A]
- Material Q = Rs.40 [8, 000 – 8, 500] = Rs.20, 000 [A]
- Material R = Rs.60 [5, 000 – 4, 500] = Rs.30, 000 [F]
- Total Material Quantity Variance = Rs.10, 000 [A]
- Note: Standard quantity of materials for actual production is computed as shown below.



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- Material P = $20,000/1000 \times 450 = 9,000$ kg
- Material Q = $20,000/1000 \times 400 = 8,000$ kg
- Material R = $20,000/1000 \times 250 = 5,000$ kg

4. **Material Mix Variance:** Standard Cost of Standard Mix – Standard Cost of Actual Mix

$$\text{Rs.}8,36,360 - \text{Rs.}8,10,000 = \text{Rs.}26,360 \text{ [F]}$$

Note: Standard cost of standard mix is computed as shown below

If the actual input of 23,000 would have been mixed in standard proportion, the quantities along with cost of P, Q and R would have been,

- P: $23,000 / 1100 \times 450 = 9409 \times \text{Rs.}20 = \text{Rs.}1,88,180$
- Q: $23,000 / 1100 \times 400 = 8364 \times \text{Rs.}40 = \text{Rs.}3,34,560$
- R: $23,000 / 1100 \times 250 = 5227 \times \text{Rs.}60 = \text{Rs.}3,13,620$
- Total Cost = Rs.8,36,360

5. **Material Yield Variance:** Standard Yield Rate [Actual Yield – Standard Yield]

$$\text{Rs.}40,000/1000 [20,000 - 20,909] = \text{Rs.}36,360 \text{ [A]}$$

Note: Standard yield is computed as under

Standard loss is 1/11th of input, hence normal loss for actual input is, $23,000 / 11 = 2,091$

Therefore standard production for actual input is $23,000 - 2,091 = 20,909$ kg

14. From the following particulars of a manufacturing company, compute material and labour variances.

An input of 100 kg of material yields to standard output of 10,000 units.

Standard price per kg of material Rs.20

Actual quantity of material issued and used by production department 10,000 kg

Actual price per kg of material Rs.21 per kg

Actual output 9,00,000 units

Number of employees 200

Standard wage rate per employee per day = Rs.40

Standard daily output per employee = 100 units

Total number of days worked = 50 days

[Idle time paid for and included in the above half day for each employee]

Actual wage rate per day = Rs.45



Solution:

A] Material Variances:

1. **Cost Variance:** Standard Cost of Materials [For actual production] – Actual Cost

$$9,000 \text{ kg} \times \text{Rs.}20 - 10,000 \times \text{Rs.}21 = \text{Rs.}1,80,000 - \text{Rs.}2,10,000 \\ = \text{Rs.}30,000 \text{ [A]}$$

Note: For 10,000 units of finished product, 100 kg of materials is required, hence for actual output of 9,00,000 units, standard quantity of materials is 9,000 kg.

2. **Price Variance:** Actual Quantity [Standard Price – Actual Price]

$$10,000 [\text{Rs.}20 - \text{Rs.}21] = \text{Rs.}10,000 \text{ [A]}$$

3. **Quantity Variance:** Standard Price [Standard Quantity – Actual Quantity]

$$\text{Rs.}20 [9,000 - 10,000] = \text{Rs.}20,000 \text{ [A]}$$

Note: Standard quantity of materials required for actual production is computed in the same manner as shown in the Note to the Cost Variance

B] Labour Variances:

1. **Cost Variance:** Standard Cost of Labour [For actual production] – Actual Labour Cost

$$9,000 \text{ units} \times \text{Rs.}40 - 50 \text{ days} \times 200 \text{ employees} \times \text{Rs.}45 \\ \text{Rs.}3,60,000 - \text{Rs.}4,50,000 = \text{Rs.}90,000 \text{ [A]}$$

Note: Standard rate per unit = Rs.40 [daily wages per employee]/100 [number of employees] = Rs.40

2. **Rate Variance:** Actual Time Paid For [Standard Rate – Actual Rate]

$$50 \text{ days} \times 200 \text{ number of employees} [\text{Rs.}40 - \text{Rs.}45] \\ 10,000 \times \text{Rs.}5 = \text{Rs.}50,000 \text{ [A]}$$

3. **Efficiency Variance:** Standard Rate [Standard Time for Actual Production – Actual Time] = Rs.40
[9,000 – 5,000] = Rs.1,60,000 [F]

Note: Standard output per employee per day is 100 and so for 9,00,000 units of actual production, 9,000 days are required. Idle time is half day for each employee and hence idle time is 200 employees X 25 days = 5,000. Therefore the time taken is 10,000 man days less idle time of 5,000 man days i.e. 5,000 man days.

4. **Idle Time Variance:** Abnormal Idle Time X Standard Rate

$$5,000 \text{ man days} \times \text{Rs.}40 = \text{Rs.}2,00,000 \text{ [A]}$$

15. The following standards have been set to manufacture a product

Direct Materials:

- 2 units of A @ Rs.4 per unit: Rs.8
- 3 units of B @ Rs.3 per unit: Rs.9



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- 15 units of C @ Re.1 per unit: Rs.15
- Direct Labour 3 hrs @ Rs.8 per hour: Rs.24
- Standard Prime Cost: Rs.56

The company manufactured and sold 6000 units of the product during the year. Direct Material cost was as follows:

- 12,500 units of A @ Rs.4.40 per unit
- 18,000 units of B @ Rs.2.80 per unit
- 88,500 units of C @ Rs.1.20 per unit

The company worked for 17,500 direct labour hours during the year. For 2500 of these hours the company paid Rs.12 per hour while for the remaining the wages were paid at the standard rate. Calculate material price and usage variances and labour rate and efficiency variances.

Solution:

Statement showing details Regarding Standards and Actual

Material	Standards	Actual
A	12,000 @ Rs.4 = Rs.48,000	12,500 @ Rs.4.40 = Rs.55,000
B	18,000 @ Rs.3 = Rs.54,000	18,000 @ Rs.2.80 = Rs.50,400
C	90,000 @ Re.1 = Rs.90,000	88,500 @ Rs.1.20 = Rs.1,06,200
Total	1,20,000 = Rs.1,92,000	1,19,000 = Rs.2,11,600

I. Material Variances:

1. Material Price Variance: Actual Quantity [Standard Price – Actual Price]

- Material A = 12,500 [Rs.4 – Rs.4.40] = Rs.5,000 [A]
- Material B = 18,500 [Rs.3 – Rs.2.80] = Rs.3,600 [F]
- Material C = 88,500 [Re.1 – Rs.1.20] = Rs.17,700 [A]
- Total Material Price Variance = Rs.19,100 [A]

2. Material Usage [Quantity] Variance: Standard Price [Standard Quantity – Actual Quantity]

- Material A = Rs.4 [12,000 – Rs.12,500] = Rs.2,000 [A]
- Material B = Rs.3 [18,000 – 18,000] = Nil
- Material C = Re.1 [90,000 – 88,500] = Rs.1,500 [F]
- Total Material Usage [Quantity] Variance = Rs.500 [A]

II] Labour Variances:

1. Labour Rate Variance: Actual Hours [Standard Rate – Actual Rate]

- For 2,500 hours: 2,500 [Rs.8 – Rs.12] = Rs.10,000 [A]
- For 15,000 hours: 15,000 [Rs.8 – Rs.8] = Nil
- Total Labour Rate Variance: Rs.10,000 [A]



2. Labour Efficiency Variance: Standard Rate [Standard Time For Actual Output] – Actual Time]
: Rs.8 [18, 000 – 17, 500] = Rs.4, 000 [F]

Note: Standard time for actual output : 3 labour hours per unit is the standard and so for producing 6, 000 units, the number of hours required are 6, 000 X 3 = 18, 000.

16. The following information was obtained from the records of a manufacturing unit using standard costing system.

Particulars	Standard	Actual
Production	4, 000	3, 800
Working Days	20	21
Fixed Overheads	Rs.40, 000	Rs.39, 000
Variable Overheads	Rs.12, 000	Rs.12, 000

Calculate,

- Variable Overhead Variance
- Fixed Overhead Expenditure Variance
- Fixed Overhead Volume Variance
- Fixed Overhead Efficiency Variance
- Fixed Overhead Calendar Variance
- Also prepare a reconciliation statement for the standard fixed expenses worked out at standard fixed overhead rate and the actual fixed overhead.

Solution:

Basic Calculations: Standard Variable Overhead Rate Per Unit = Rs.12, 000/4,000 units = Rs.3 per unit

Standard production per day = 4, 000 units/20 days = 200 units

Standard fixed overheads per day = 200 × Rs.10 = Rs.2, 000

Standard fixed overheads per unit = Rs.40, 000/4, 000 = Rs.10

Computation of Variances:

- 1) **Variable Overhead Variance:** Standard Variable Overheads for Actual Production – Actual Variable Overheads: Rs.3 X 3, 800 units – Rs.12, 000 = Rs.600 [A]
- 2) **Fixed Overhead Variance:** Standard Fixed Overheads for Actual Production – Actual Fixed Overheads: Rs.10 X 3, 800 – Rs.39, 000 = Rs.1, 000 [A]
- 3) **Fixed Overhead Expenditure Variance:** Budgeted Fixed Overheads – Actual Fixed Overheads: Rs.40, 000 – Rs.39, 000 = Rs.1, 000 [F]
- 4) **Fixed Overhead Volume Variance:** Standard Rate [Budgeted Quantity – Actual Quantity] = Rs.10 [4, 000 – 3, 800] = Rs.2, 000 [A]
- 5) **Fixed Overhead Efficiency Variance:** Standard Rate [Standard Quantity * – Actual Quantity] = Rs.10 [4, 200 – 3, 800] = Rs.4, 000 [A]



Standard Costing

6) **Fixed Overhead Calendar Variance:** Standard Rate [Revised Budgeted Quantity ** – Budgeted Quantity] = Rs.10 [4, 200 – 4, 000] = Rs.2, 000 [F]

* Standard quantity: in 20 days, 4000 units are produced and hence in 21 days, the standard quantity will be $21/20 \times 4000 = 4, 200$ units

** Revised budgeted quantity is calculated in the similar manner as mentioned above. In this example, number of working hours is not given and hence the standard quantity and the revised budgeted quantity is one and the same. When working hours are given, standard quantity is always computed in relation to the working hours while the revised budgeted quantity is computed in terms of number of days.

- **Reconciliation Statement: Fixed Overheads**

Particulars	Rs.	Rs.
Standard Fixed Overheads: 3, 800 units X Rs.10		38, 000
Less: Fixed Overhead Expenditure Variance	1, 000 [F]	
Less: Fixed Overhead Calendar Variance	2, 000 [F]	3, 000 [F]
		35, 000
Add: Fixed Overhead Efficiency Variance		4, 000 [A]
Actual Fixed Overheads		39, 000

17. The following data has been collected from the cost records of a unit for computing various fixed overhead variances for a particular period.

Particular	Details
Number of budgeted working days	25
Budgeted man hour per day	6, 000
Output [budgeted] per man hours	1 unit
Fixed overhead cost as budgeted	Rs.1, 50, 000
Actual number of working days	27
Actual man hour per day	6, 300
Actual output per man hour	0.9 units
Actual fixed overheads	Rs.1, 56, 000

Calculate the following Fixed Overhead Variances

- Expenditure variance
- Calendar variance
- Capacity variance
- Efficiency variance
- Volume Variance
- Cost Variance



Solution: Fixed Overhead Variances

1. **Expenditure Variance:** Budgeted Fixed Overheads – Actual Fixed Overheads

$$\text{Rs.1, 50, 000} - \text{Rs.1, 56, 000} = \text{Rs.6, 000 [A]}$$

2. **Calendar Variance:** Standard Rate [Revised Budgeted Quantity – Budgeted Quantity]

$$\text{Re.1 [1, 62, 000} - \text{1, 50, 000]} = \text{Rs.12, 000 [F]}$$

Note: Standard Rate = 25 days X 6000 man hours per day X 1 unit per man hour

= 1, 50, 000 units is the budgeted production, fixed overheads budgeted are Rs.1, 50, 000 and hence standard rate is Rs.1, 50, 000/1, 50, 000 units = Re1

Revised Budgeted Quantity = in 25 days, 1, 50, 000 units, therefore in 27 days, the revised quantity will be $27/25 \times 1, 50, 000 = 1, 62, 000$ units

3. **Capacity Variance:** Standard Rate [Standard Quantity – Budgeted Quantity]

$$\text{Re.1 [1, 70, 100} - \text{1, 50, 000]} = \text{Rs.20, 100 [F]}$$

Note: Standard Rate is as per the computation in the Note to the Calendar variance. Standard quantity is computed as shown below.

Actual number of hours worked are, 27 days X 6300 man hrs per day = 1, 70, 100

As per the standard, 1 unit per man hour is the output and so in 1, 70, 100 man hours, 1, 70, 100 units are supposed to be produced which is the standard quantity in actual hours. The variance is favourable as the standard quantity is more than the budgeted one that indicates more number of working hours than budgeted.

4. **Efficiency Variance:** Standard Rate [Standard Quantity – Actual Quantity]

$$\text{Re.1 [1, 70, 100} - \text{1, 53, 090]} = \text{Rs.17, 010 [F]}$$

5. **Volume Variance:** Standard Rate [Budgeted Quantity – Actual Quantity]

$$\text{Re.1 [1, 50, 000} - \text{1, 53, 090]} = \text{Rs.3, 090 [F]}$$

6. **Cost Variance:** Standard Fixed Overheads for Actual Production – Actual Fixed Overheads = Re.1 × 1, 53, 090 – Rs.1, 56, 000 = Rs.2, 910 [A]

18. A company manufacturing two products uses standard costing system. The following data relating to August 2007 have been furnished to you:

Particulars	Product A	Product B
Standard Cost Per Unit –Direct Materials	Rs.2	Rs.4
Direct Wages	Rs.8	Rs.6
Fixed Overheads	Rs.16	Rs.12
Total	Rs.26	Rs.22
Units processed/in process		



Standard Costing

Particulars	Product A	Product B
Beginning of the month, all materials applied and 50% complete in respect of labour and overheads	4,000	12,000
End of the month, all materials applied and 80% complete in respect of labour and overheads	8,000	12,000
Units completed and transferred to warehouse during the month	16,000	20,000

You may use average cost method to analyse

The following were the actual costs recorded during the month.

Direct materials purchased at standard price amount to Rs.2,00,000 and actual cost of which is Rs.2,20,000. Direct materials used for consumption at standard price amount to Rs.1,75,000. Direct wages for actual hours worked at standard wages rates were Rs.4,20,000 and at actual wages rate were Rs.4,12,000.

Fixed overheads budgeted were Rs.8,25,000 and actual fixed overheads incurred were Rs.8,50,000. Required,

- I. Direct material price variance at the point of consumption and at the point of purchase
- II. Direct material usage variance
- III. Direct wage rate and efficiency variance
- IV. Fixed overheads volume and expenditure variance
- V. Standard cost of WIP at the end of the month.

Solution:

I] Statement Showing Equivalent Production Units – Materials, Labour & Overheads

Particulars	Units	M. % of Completion	Number of Units	L & O %	Units
Units completed -A	16,000	100%	16,000	100%	16,000
Closing WIP	8,000	100%	8,000	80%	6,400
Total	24,000		24,000		22,400
Units completed -B	20,000	100%	20,000	100%	20,000
Closing WIP	12,000	100%	12,000	80%	9,600
Total	32,000		32,000		29,600



II] Direct Materials:

Particulars	Product A	Product B	Total
Equivalent Units [1]	24,000	32,000	
Standard Cost per unit [II]	Rs.2	Rs.4	
Std. Cost of std. requirement of materials [1 X 2]	Rs.48,000	Rs.1,28,000	
Std. Cost of actual quantity of material used			Rs.1,75,000
Actual Cost of actual quantity of materials Rs.2,20,000/2,00,000 X 1,75,000			Rs.1,92,500

III] Direct Labour:

Particulars	Product A	Product B	Total
Equivalent Units [1]	22,400	29,600	
Standard direct wages per unit [2]	Rs.8	Rs.6	
Standard direct wages at standard rates [1 X 2]	Rs.1,79,200	Rs.1,77,600	Rs.3,56,800
Direct wages for actual hours at standard rates			Rs.4,20,000
Actual direct wages [actual rates]			Rs.4,12,000

IV] Fixed Overheads:

Particulars	Product A	Product B	Total
Equivalent Units [1]	22,400	29,600	
Fixed overheads per unit [2]	Rs.16	Rs.12	
Fixed overheads charged to production [1 X 2]	Rs.3,58,400	Rs.3,55,200	Rs.7,13,600
Budgeted fixed overheads			Rs.8,25,000
Actual Fixed Overheads			Rs.8,50,000

Computation of Variances:

- Direct Material Price Variance [At the point of consumption]: Standard Cost of Actual quantity – Actual Cost of Actual Quantity: Rs.1,75,000 – Rs.1,92,500 = Rs.17,500 [A] [Refer to Working Note Number II]
- Direct Material Price Variance [At the point of purchase]: Standard Price of material purchased – Actual Cost of material purchased:
Rs.2,00,000 – Rs.2,20,000 = Rs.20,000 [A]



Standard Costing

- Direct Material Usage Variance: Standard Cost of Standard Quantity of Materials – Standard Cost of Actual Quantity used:
Rs.1, 76, 000 – Rs.1, 75, 000 = Rs.1, 000 [F] *[Refer to Working Note 2]*
- Direct Wage Rate Variance: Direct Wages at Standard Rate – Actual Direct Wages at Actual Rate =
Rs.4, 20, 000 – Rs.4, 12, 000 = Rs.8, 000 [F]
[Refer to Working Note 3]
- Labour Efficiency Variance: Standard Direct Wages at Standard Rate – Direct Wages for Actual Hours at Standard Rate = Rs.3, 56, 800 – Rs.4, 20, 000
= Rs.63, 200 [A] *[Refer to Working Note 3]*
- Fixed Overhead Volume Variance: Fixed Overheads Charged to Production – Budgeted Fixed Overheads: Rs.7, 13, 600 – Rs.8, 25, 000 = Rs.1, 11, 400 [A]
[Refer to Working Note 4]
- Fixed Overhead Expenditure Variance: Budgeted Fixed Overheads – Actual Fixed Overheads:
Rs.8, 25, 000 – Rs.8, 50, 000 = Rs.25, 000 [A]
[Refer to Working Note 4]

Valuation of Closing Work in Progress:

Particulars	Material	Labour and Overheads	Total
Product A	8, 000	6, 400	
Equivalent Units			
Standard Cost Per Unit	Rs.2	Rs.24	
Value of WIP	Rs.16, 000	Rs.1, 53, 600	Rs.1, 69, 600
Product B			
Equivalent Units			
Standard Cost Per Unit	Rs.4	Rs.18	
Value of WIP	Rs.48, 000	Rs.1, 72, 800	Rs.2, 20, 800

19. Compute the following variances from the data given below.
- Total sales margin variance
 - Sales margin volume variance
 - Sales margin price variance
 - Sales margin quantity [sub volume] variance.



Product	Budgeted Quantity Units	Actual Quantity Units	Budgeted Sales Price Per Unit	Actual Sale Price Per Unit	Standard Cost Per Unit
X	240	400	Rs.50	Rs.45	Rs.30
Y	160	200	25	20	15

Solution:

Product	Budgeted Sale Price Per Unit	Standard Cost Per Unit	Standard Sales Margin	Budgeted Qty.	Budget Profit	Actual Sales Price	Actual Sales Margin	Actual Sales Qty	Actual Profit
X	Rs.50	Rs.30	Rs.20	240	Rs.4800	Rs.45	Rs.15	400	Rs.6000
Y	Rs.25	Rs.15	Rs.10	160	Rs.1600	Rs.20	Rs.5	200	Rs.1000
Total					Rs.6400				Rs.7000

Computation of Variances:

I] **Total sales margin variance:** Actual Profit – Budgeted Profit

$$\text{Rs.7,000} - \text{Rs.6,400} = \text{Rs.600 [F]}$$

II] **Sales margin volume variance:** Budgeted Margin Per Unit X [Actual Quantity – Budgeted Quantity]

$$\text{Product X} = \text{Rs.20} [400 - 240] = \text{Rs.3,200 [F]}$$

$$\text{Product Y} = \text{Rs.10} [200 - 160] = \text{Rs.400 [F]}$$

$$\text{Total Variance} = \text{Rs.3,600 [F]}$$

III] **Sales margin price variance:** Actual Quantity [Actual Margin Per Unit X Budgeted Margin Per Unit]

$$\text{Product X} = 400 [\text{Rs.15} - \text{Rs.20}] = \text{Rs.2,000 [A]}$$

$$\text{Product Y} = 200 [\text{Rs.5} - \text{Rs.10}] = \text{Rs.1,000 [A]}$$

$$\text{Total Variance} = \text{Rs.3,000 [A]}$$

IV] **Sales margin quantity [sub volume] variance:** Budgeted Margin Per Unit of Budgeted Mix [Actual Quantity – Budgeted Quantity] = $6400/400 [600 - 400] = \text{Rs.3200 [F]}$

20. From the following information, calculate the following sales variances

I. Total Sales Variance

II. Sales Price Variance

III. Sales Volume Variance

IV. Sales Mix Variance

V. Sales Quantity Variance



Standard Costing

Product	Number of Units	Standard Rate Per Unit Rs.	Amount Rs.	Actual Number of Units	Actual Rate Per Unit Rs.	Amount Rs.
A	5000	5	25,000	6000	6	36,000
B	4000	6	24,000	5000	5	25,000
C	3000	7	21,000	4000	8	32,000

Solution:

I] Total Sales Variance = Actual Sales – Standard Sales

$$\text{Rs.}93,000 - \text{Rs.}70,000 = \text{Rs.}23,000 \text{ [F]}$$

II] Sales Price Variance = Actual Quantity [Actual Price – Standard Price]

$$\diamond \text{ Product A} = 6000 [\text{Rs.}6 - \text{Rs.}5] = \text{Rs.}6000 \text{ [F]}$$

$$\diamond \text{ Product B} = 5000 [\text{Rs.}5 - \text{Rs.}6] = \text{Rs.}5000 \text{ [A]}$$

$$\diamond \text{ Product C} = 4000 [\text{Rs.}8 - \text{Rs.}7] = \text{Rs.}4000 \text{ [F]}$$

$$\diamond \text{ Total Sales Price Variance} = \text{Rs.}5000 \text{ [F]}$$

III] Sales Volume Variance: Standard Price [Actual Quantity – Standard Quantity]

$$\diamond \text{ Product A} = \text{Rs.}5 [6000 - 5000] = \text{Rs.}5000 \text{ [F]}$$

$$\diamond \text{ Product B} = \text{Rs.}6 [5000 - 4000] = \text{Rs.}6000 \text{ [F]}$$

$$\diamond \text{ Product C} = \text{Rs.}7 [4000 - 3000] = \text{Rs.}7000 \text{ [F]}$$

$$\diamond \text{ Total Sales Volume Variance} = \text{Rs.}18,000 \text{ [F]}$$

IV] Sales Mix Variance: [Actual Mix – Revised Sales Mix] Standard Price Per Unit

$$\text{Rs.}88,000 - \text{Rs.}87,500 = \text{Rs.}500 \text{ [F]} \text{ [Refer to Working Note 1]}$$

V] Sales Quantity Variance: Standard Unit Sales Price [Actual Quantity – Std. Quantity]

$$70,000/12 [15,000 - 12,000] = \text{Rs.}17,500 \text{ [F]}$$

Working Note 1

Product	Revised Mix	Amount Rs.	Actual Mix	Amount Rs. per unit	Amount Rs.
A	$15000/12000 \times 5000$ = 6250 @ Rs.5	31,250	6000	5	30,000
B	$15000/12000 \times 4000$ = 5000 @ Rs.6	30,000	5000	6	30,000
C	$15000/12000 \times 3000$ = 3750 @ Rs.7	26,250	4000	7	28,000
Total	15,000	87,500	15,000		88,000



21. A company producing a standard product is facing declining sales and dwindling profits. It has therefore decided to introduce a standard cost system to control cost. To motivate workers to improve the productivity, the management has also decided to introduce an incentive scheme under which employees are paid 20% of the standard cost of materials saved and also 40% of the labour time saved valued at standard labour rate.

The following are the details of the standard cost of the product.

Standard Cost Per Unit

Particulars	Amount Rs.
Direct material: 10 kg @ Rs.12 each	120
Direct labour: 3 hours @ Rs.10 each	30
Variable overheads: 3 hours @ Rs.5 each	15
Fixed overheads [based on a budgeted output of 10000 units]	25
Total standard cost per unit	190
Selling price per unit Rs.240	

During one particular month 9600 units of the product were manufactured and sold incurring the following actual cost:

Particulars	Amount Rs.
Direct materials 90000 kg	1210000
Direct labour 25000 hours	254000
Variable overheads 25000 hours	147000
Fixed overheads	250000
Total cost	1861000
Net profit	419000
Sales	2280000

Required: A] Variances that occurred during the month, duly reconciling the standard profits of actual production with actual profits. B] Bonus amount earned by the workers during the month under incentive scheme.

Solution:

A] Computation of Variances:

I] **Material Price Variance:** Actual Quantity [Standard Price – Actual Price]

$$90000 \text{ kg [Rs.12 – Rs.1210000/90000]} = \text{Rs.130000 [A]}$$

II] **Material Usage Variance:** Standard Price [Standard Quantity – Actual Quantity]

$$\text{Rs.12 [9600} \times \text{10 kg – 90000]} = \text{Rs.72000 [F]}$$

III] **Labour Rate Variance:** Actual Hours [Standard Rate – Actual Rate]

$$25000 \text{ [Rs.10 – Rs.254000 / 25000]} = \text{Rs.4000 [A]}$$



Standard Costing

IV] *Efficiency Variance*: Standard Rate [Standard Time – Actual Time]

$$\text{Rs.10 [9,600} \times 3 - 25,000] = \text{Rs.38,000 [F]}$$

V] *Variable Overhead Variance*: Standard Variable Overheads for actual production – Actual variable overheads

$$[\text{Rs.15} \times 9,600 - \text{Rs.1,47,000}] = \text{Rs.3,000 [A]}$$

VI] *Fixed Overheads Cost Variance*: Standard Fixed Overheads For Actual Production – Actual Fixed Overheads

$$[\text{Rs.25} \times 9,600 - \text{Rs.2,50,000}] = \text{Rs.10,000 [A]}$$

VII] *Sales Price Variance*: Actual Sales [Standard Sales Price – Actual Sales Price]

$$9,600 \text{ units } [\text{Rs.240} - \text{Rs.22,80,000}/9600] = \text{Rs.24,000 [A]}$$

Analysis of Variances

Particulars	Adverse Variance Rs.	Favourable Variances Rs.
Material price	130000	
Material usage		72000
Labour rate	4000	
Labour efficiency		38000
Variable overheads	3000	
Fixed overheads	10000	
Total	147000	
Sales price variance	24000	
Total	171000	110000
Net variance		
Rs.61,000 [A]		

Reconciliation of Standard Profit with Actual Profits

Particulars	Amount Rs.
Standard cost of 9600 units @ Rs.190	1,82,4000
Actual cost	18,01,000
Standard profit of actual production 9600 X Rs.50	4,80,000
Actual profits earned	4,19,000
Variance in profits	61,000 [A]



Bonus Earned By Employees

Materials usage = 20% of material saved = 20% of Rs.72, 000 = Rs.14, 400

Labour efficiency = 40% of time saved at 40% of Rs.38, 000 = Rs.15, 200

Total bonus earned = Rs.14, 400 + Rs.15, 200 = Rs.29, 600

Question Bank

A. *Essay Type Questions*

1. Define 'Standard Cost' and 'Standard Costing'. In which type of industries standard costing can be employed?
2. What is the difference between 'budgetary control' and 'standard costing'?
3. Discuss the benefits and limitations of standard costing.
4. Explain the various types of standards.
5. Discuss briefly the procedure of establishment of standard costs regarding material, labour and overheads.
6. Describe and compare the different methods of accounting for standard costs.
7. Define and explain briefly the following terms:
 - Material price variance
 - Material usage variance
 - Material mixture variance
 - Material yield variance
8. Define and explain briefly the following terms:
 - Wage rate variance
 - Labour efficiency variance
 - Variable overhead efficiency variance
9. Define and explain the following terms:
 - Fixed overhead cost variance
 - Fixed overhead volume variance
 - Fixed overhead capacity variance
 - Fixed overhead calendar variance
 - Fixed overhead efficiency variance.
10. Define and explain the sales variances based on a] profits and b] turnover.
11. Write short notes on investigation of variances and management by exception in connection with standard costing.



Standard Costing

12. Recently there have been significant developments in budgetary control and standard costing systems. You are required to discuss, a) five factors which should be kept in mind in deciding whether or not to investigate a variance and b) the importance of recognizing the behavioral aspects in effective system.
13. Explain the meaning, causes and disposal of labour variances.
14. What do you understand by 'learning curve'? State the uses of learning curve in cost and management accounting.
15. What are the behavioral aspects which should be borne in mind by those who are designing and operating standard costing and budgetary control system?

B] State whether the following statements are True or False

1. Standard costing works on the principle of exception.
2. Standard costs and estimated costs differ from each other.
3. Difference between the standard cost and actual cost is called as variance.
4. All variances should be investigated.
5. A variance may be either favourable or adverse.
6. There is no difference between standard costing and budgeting.
7. Standard costing cannot be followed in process costing.
8. Material yield variance arises due to the difference between the normal loss and actual loss in the production process.
9. Overhead standards are based on budgeted overhead costs and budgeted production.
10. Standards are arrived at on the basis of past performance.

C] State the correct answer in each of the following.

1. Cost variance is the difference between A] Standard cost and actual cost B] Standard cost and the budgeted cost C] Standard cost and the actual cost.
2. Standard cost is used A] As a basis for price fixation and cost control through variance analysis. B] To ascertain the break-even-point C] To establish cost-volume-profit relationship
3. A standard cost system may be used in A] Either job order costing or process costing B] Job order costing but not in process costing C] Process costing but not in the job order processing D] Neither process costing nor job order costing.
4. An unfavourable material price variance occurs because of A] Price increase in raw material B] Price decrease in raw material C] Less than anticipated normal wastage in the manufacturing process D] More than anticipated normal wastage in the manufacturing process.
5. Which of the following is a purpose of standard costing? A] Determine a break- even production level B] Control costs C] Allocate cost with more accuracy D] Eliminate the need for subjective decisions by management.



6. Material mix variance arises due to A] Increase or decrease in the cost of material consumed B] Increase or decrease in the normal loss C] Change in the standard proportion of mix D] None of these.
7. Material usage variance is normally chargeable to A] Production department B] Purchase department C] Finished goods D] Materials stores.
8. If actual hours worked exceed the standard hours allowed, the variance, which will occur is called as A] Favourable labour efficiency variance B] Favourable labour rate variance C] Unfavourable labour efficiency variance D] Unfavourable labour rate variance.
9. Standard costs are A] Estimated costs B] Budgeted costs C] Expected costs D] Scientifically pre-determined costs.
10. Standards are fixed for A] Costs only B] Costs and Profits C] Costs, profits and sales D] Only for profits.

STUDY NOTE 15

Uniform Costing and Inter Firm Comparison

Learning Objectives

After studying this topic, you should be able to,

1. To understand the meaning of Uniform Costing.
 2. To study the utility and importance of Uniform Costing.
 3. To study the objectives behind implementation of Uniform Costing.
 4. To understand the meaning of Inter firm Comparison.
 5. To study the method of Inter firm comparison.
 6. To understand the limitations of Inter firm comparison.
-





15.1 Introduction

In ideal competition, there should be availability of reliable data and information about the competitions. Such data may be absolute form or in coded form. But data must be reliable and information derived should be on equal or uniform bases and principles. In modern business where the competition is very tough, it is very much important to know the strength and weakness of the rival as well as the business unit itself. It makes call to inter firm comparison like rate of return on capital, rate of profit on sales and on cost, cost per unit, etc. it can be possible if the all concerned uniform principles and methodology for computation of the necessary data. This was the origin of evolution of inter firm comparison and uniform costing.

15.2 Meaning Of Uniform Costing

Uniform costing is not a distinct method of cost accounting, but it is probably the latest technique of costing and cost control. It is the acceptance and adherence of identical costing principles and procedures by all or several units in a same industry by mutual agreement. ICMA London defines Uniform Costing as,

“the use by several undertakings of the same costing systems, i.e. the same basic costing methods and superimposed principles and techniques.”

Another good definition is available by Prof. Glover –

“A system of uniform application of the principles of a costing method agreed upon and adopted by the whole or majority of the manufacturer or executives, in any specific industry.”

Thus uniform costing simply denotes that a number of undertakings in a same industry may use same costing principles and procedures to arrive to cost, so that mutual comparison may be possible among them.

15.3 Objective Of Uniform Costing

The important objectives of the uniform costing can be stated as follows –

1. To help for meaningful and valid cost comparison among the members.
2. To locate and eliminate inefficiencies in the firm by measuring own efficiency in terms of industry in general and in terms of close rivals in particular.
3. To stop cut-throat competition and create healthy competition.
4. To improve the productivity of men, machine production technology and methodology.
5. To provide uniform data and information to Government for different purposes like taxpolicy, subsidies, concessions, restrictions, etc.

15.4 Areas Of Uniform Costing

The more important areas where uniformity is to be achieved can be listed as follows –

1. Determination and adoption of the ‘cost unit’, ‘cost centers’ and ‘departments’.



2. Costing method to be used and cost treatment of the items in the costs.
3. System of Costing.
4. Cost control techniques.
5. Cost and accounts classification.
6. Methods of Valuation of different stocks.
7. Bases of apportionments and absorption of costs.
8. Depreciation methods and rates.
9. Treatments of waste, spoilage, defectives, scrap.
10. Costing period and reporting periods.
11. Treatment of interest on capital and on long-term loans.
12. Cost treatment of overtime, holiday pay, etc. items of Labor cost.
13. Treatment of R & D costs.
14. Formats of the cost reports and statements.
15. Codification of cost accounts and reports, statements, etc.

The different areas to be covered are depends on need of uniformity in the reporting and accuracy of the comparison required by the different units participated in the uniform costing system. So above is only an illustrative list of areas and not a comprehensive one.

15.5 Advantages of Uniform Costing

The benefits of the uniform costing to various interested groups can be summarized as follows –

To the Member Units –

These are the natural claimants to the advantages of the system. Such advantages are –

1. *High standards –*

Either highly qualified experienced professional and consultants or the experienced members in the industry design uniform costing system. So it ensures high standard of operation.

2. *Cost comparisons –*

It is the basic object of the system. A successful system of uniform costing always helps of the member units to locate the points of inefficiencies in comparison to industry in general and with close rival in particular. It results in improvement of work and establishing standards and benchmarking for achievements.

3. *Healthy competition –*

Uniform costing helps to create belief among the member units and stops the price-cutting or any other cut-throat competitions measures and tactics. It ensures to adopt all policies that give reasonable and fair rate of return on the investment.



4. *Automation of data –*

Uniform costing needs computerization of accounting, data collection, classification and reporting. So automation of data becomes necessary. It ensures reliability of data and information.

5. *Benefits to Smaller Units –*

The smaller units get benefits of R & D of large units and improve their competitiveness.

To the Workers –

1. Uniform, just and fair wage structure in the industry.
2. Reduced Labour turnover.
3. Higher productivity ensures higher wages and bonus.

To Consumers –

1. Cost reduction results into price reduction.
2. Fair prices.
3. Improved product and services.
4. Improved quality and assurance of after sales services.

To industry –

1. Reliable data and information can be supplied to the government and fair government policies can be adopted.
2. Introducing improved methodologies and technologies can eliminate all types wastages.
3. Industrial activities can be planned and directed in most meaningful way.

15.6 Disadvantages of Uniform Costing

Being a joint activity, the uniform costing suffers many limitations. Some of them are listed below –

1. It creates monopoly at end because the large units may manipulate the available data for their benefit and small units have to surrender to them.
2. The difference in the size of member units generally may not allow to adopt all rules and forms of the uniform costing, because many time such data is not available or is not affordable to make it available to some weak units.
3. Implementation and execution of this system needs utmost good faith among all members. So lethargy or unrealistic or ambiguous data supply by any one or more units creates confusion and defeats the objects of the system failure.
4. Many times it is observed that members are eager to receive the information of other units but hardly gives their own information clearly. So it creates operational hindrances in the system.

If we closely observe these limitations it can be understood that these are the operational problems and not basic difficulties in the system. The main point is the mutual understanding and belief. If that is built in good sense it certainly brings all benefits to the concerned parties.



15.7 Requisites for Uniform Costing

The success of the uniform costing is based on the following requisites -

1. *Mutual belief and understanding –*

The success or failure of the uniform costing is entirely depends on mutual trust and confidence among the all participants members in the system. It is primarily need for this system.

2. *Accounting policies and principles –*

The details of the method of the costing, various treatments of the cost items, the terminologies to be accepted, principles to be implemented, etc. are to be agreed and accepted by all members in the system.

3. *Classification and codification –*

The bases of classification of accounts to be used for recording and reporting, the codification of the accounts used should have to be as per the need of the object of the uniform costing. It should be acceptable for large and small units also. It should take care of operational difficulties of all members accounting traditions and customs.

4. *Bases of allocation and apportionment –*

The difference in cost calculation among different concerns is basically due to two things – classification of the cost items into direct and indirect costs and thereafter application of the different bases for allocation and apportionment of the overheads. The uniform costing is the good answer for such problem. So care fully equitable bases should be selected and be applied in cost treatment of the members.

5. *Absorption of overheads –*

The selection of the absorption method for the departmental overheads and its uniform application is prerequisite of the uniform costing. It is only capable to give correct comparable cost among the members.

6. *Areas to be covered –*

The areas to be covered under uniform costing depend on the object and depth of the system. All these areas to report must be ascertained in clear terms by the all members to avoid further misunderstanding and disputes. Actually the success of mutual confidence is depending on this factor. We have already listed such areas in section 3.4 of this chapter.

15.8 Uniform Cost-manual

Under uniform costing techniques, numbers of the units of different sizes and peculiarities are participated. On such background, the adoption of a uniform cost plan presupposes the existence of the uniform cost manual.

It can be defined as, “the set of instructions to be followed in cost ascertainment and cost control and it is the evidence of existence of the uniform cost plan among the member unit.”

The uniform cost manual describes the nature and scope of the cost plan. It also lays down the procedure



for implementing and operating such cost plan. It is a operating guide to the participants who have to bring about uniformity in costing principles and procedures in accordance with the statement of the objectives.

The United States Chamber of Commerce observes the prime objectives of such manual as follows –

1. Selling appeal, i.e. they should present in an interesting way the compelling reasons for the desirability of making use of uniform methods.
2. Serving as a comprehensive reference book on accounting procedures.
3. Usefulness to the executives and accountants in solving problems of installation of the recommended uniform methods.

Contents of the cost manual –

An explanatory cost manual may include the following contents in it however such contents are always depends on the numbers of the units, depth of the system and object of the system.

A. Introduction –

This part discusses the object, depth scope, of the system. It also highlights the advantages accrues to the members and clears the limitations also.

B. Accounting systems and procedures –

In this part the areas covered under the system are clearly mentioned. In addition general principles of accounting, conventions to be followed, nature of classification and codification, terminology to be used etc. are discussed in length. The method of costing, relation with the financial accounting, treatment of different items of cost which need special attention etc. are discussed in detail to clear all doubt of the user of the members.

C. Reporting and statements –

The cost manual gives detailed instructions about the presentation of data and information. It also prescribes use of uniform forms for various statements to be prepared and reports to be made. Even the periodicities of reports are also mentioned to the extent possible. The ratios to be calculated obligatory and mandatory, the graphs and diagrams to be prepared, etc. are also given in the manual.

D. Other information –

In this section different aspects such as tax impacts, interest on capital, depreciation, wastage, by-product costing, etc. are discussed. In addition in this part the doubts raised by the users, suggest remedies to the difficulties, suggest optional areas for the uniformity, etc. are cleared. This part is many times prepared in the form of Bulletin. It may be published by regular time interval.

15.9 Inter Firm Comparison – Meaning And Essentials

Meaning: Inter firm comparison can be defined as, " a management technique by the use of which it is made possible for an organization to compare its performance with that of the other units engaged in the same activity."

Thus, it is a technique of evaluation and is based upon comparison of productivity, efficiency, cost, profit as yardstick among the different business units in a same industry.



There are ways available for such comparison –

1. Where such comparison is made from freely available published information and
2. Where there is voluntary and authentic exchange of information among the different units systematically and scientifically.

The first type of comparison is a general one and can be carried out with reference to the data and information freely available such as published annual accounts, and reports, industrial bulletins, speeches or statements made by the key persons in the business, financial journals, newspapers, etc. However it is not inter firm comparison in its true sense. It has first limitation of the size of the units and thereafter there are numbers of other limitations such as lack of explanation of accounting policies, methods of treatments, pricing policy, methods and techniques of the productions etc.

The second comparison referred above is the point of our discussion at present. Such comparison helps the management to solve many problems such as to locate the bottlenecks in the operating efficiencies, the reasons of less productivity and profitability, lacunas in the organization, etc. Budgetary control and standard costing helps the management to understand and to control the internal inefficiencies and wastages in the business units but the inter firm comparison goes further. It reveals the veil over the external uncontrollable factors and shows the clear face of the organization in comparison with the external world. It focuses the position where the unit stands in comparison to the other units. It compels the management to challenge the standards accepted and adopted by the external world. The management has to improve the performances in the light of the current information gathered from efficient members of the industry.

The scheme of the internal comparison consists of two phases –

- a. Voluntary collection and exchange of information concerning costs, prices, profits, productivity and overall efficiency among the participating firms engaged in a similar types of the operation.
- b. Making systematic inter firm comparison of the available data for the purpose of improvement in efficiency and indicating the weaknesses and the strong points.

Of course such exchange poses certain threats to the secrecy and confidential information of individual firms. So there is a systematic exchange of information not in absolute figure but in processed forms like ratios, ranks, grades, so that the individual secrecy should be maintained and privacy of the firm should not be disturbed.

For this purpose a central organization is established. A code number is allotted to every member unit. All units require providing of data to this organization honestly and regularly. The team of professional accountants and consultants generally employed to look after the administration and processing of collected data the results out of the processed data is made available in the form of ratio, grades, ranks in respect of code number of unit and not in any absolute form with specific name of the individual firm. The results are commented and supplied to all members at request. Such results are in respect of entire industry as well as individual units (but in code numbers). Of course for effective execution of such scheme there should be uniform costing accepted by all concerned member units. Inter firm comparison without uniform costing has no relevance and effectiveness in its true meaning.

Essentials: While installing an inter firm comparison scheme, following requirements should be considered in detail –



Uniform Costing & Inter firm Comparison

1. *Existence of uniform costing* –

As pointed out earlier acceptance of uniform costing only makes such scheme successful, so all requirements for a good uniform costing system should have to fulfill.

2. *Scope of data collection* –

It is nothing but ascertaining the areas of such comparison. This depends on needs of the member units, value and usefulness of the information, efficiency of the central organization, etc.

3. *Central Organization* –

For effective operation of the scheme there is need of a central organization. Collection, analysis and representation of data are the primary responsibility of the organization. However maintenance of secrecy of absolute data of individual firm is the top function of the organization. Secrecy and confidentiality of the codification of the members and their absolute data should be at top priority. Only the analyzed and proceed data should be published to the use of members.

4. *Methodology* –

Normally the data is to be supplied by the firms by regular interval in the prescribed forms only. The general published data may be taken directly from such publication. While interpreting the analyzed data ratio analysis is resorted. The absolute data except that of the published data is never supplied to the other firms. It increases the confidence and utility of the comparison. The results of the comparison may be provided in the form of journals, articles, etc. through regular publications by the central organization.

15.10 Advantages of Inter Firm Comparison

The important benefits from the scheme can be listed as follows –

1. **Improvement in efficiency** –

Fixation of performance standards makes meaningful comparison. It helps to reveal the internal inefficiencies and helps to convert them into efficiency.

2. **Increased productivity** –

Inter firm comparison compels to accept new production methods, technical know-how. As a result the productivity of the individual firm and the industry also increases.

3. **Reliable information** –

Inter firm comparison is based on the uniform costing. So it is reliable information for decision making process.

4. **R & D** –

Inter firm comparison facilitates research and development. Individual firms as well as the group of them undertake different R & D projects to increase the competitiveness. So it more R & D is possible.

5. **Assistance to Government** –

Inter firm comparison helps Government to know true fact of industry in general and in particular to



a firm also. The Government can design just and fair industrial policies, tax policies with help of the data available from the Inter firm comparison.

6. Other benefits –

Other benefits from the Inter firm comparison can be traced as follows –

- a. Creation of cost consciousness.
- b. Introduction of standardization of materials, Labor operation, equipments, etc.
- c. Elimination of unfair competition.
- d. Acts as tool of cost control and cost reduction.
- e. Facilitates export promotion.
- f. Optimum utilization of available resources.

15.11 Disadvantages of Inter Firm Comparison

Actually these are the limitations and difficulties faced by the Inter firm comparison because Inter firm comparison in its honest use and since cannot be disadvantageous to any segment in it. The important limitations can be listed as follows.

1. Any misuse of the collected information by any influential firm may be possible.
2. Participant members do not provide timely and accurate data.
3. It is difficult to find out bases of comparison as there are differences in the size of the firms, their productivity, financial conditions, etc. so many times it renders meaningless comparison.
4. Lack of uniform costing renders difficulty in comparison.
5. The top management feels secrecy of absolute data as the top preference and may not render full cooperation.

Although these limitations and operational difficulties are in existence, there are success stories of Inter firm comparison in Europe e.g. "Centers for Inter firm comparison" at regional chambers of commerce in different parts of U.K., Germany, etc.

STUDY NOTE 16

Activity Based Costing

Learning Objectives

After studying this topic, you should be able to,

1. To understand the limitations of traditional costing system.
 2. To introduce the concept of Activity Based Costing including its features, benefits and limitations.
 3. To be familiar with concepts like Activity Based Budgeting, Activity Based Management and Activity Based Accounting.
-





16.1 Introduction

We have already discussed the concepts of cost, costing, cost accounting in the previous chapters. The accounting of 'overheads' is also discussed in detail in the chapter of 'overheads'. The main objective of any costing system is to determine scientifically the cost of a product or service. For facilitating the calculation, costs are divided into direct and indirect. Direct costs are the costs which are traceable to the products/services offered. On the other hand, indirect costs which are also called as 'overheads' are not traceable to the products/services. Hence these costs are first identified, classified, allocated, apportioned wherever allocation is not possible, reapportioned and finally absorbed in the products/services. Charging the direct costs to the products is comparatively a simple procedure and can be done with remarkable accuracy. However, the indirect costs present problems in charging them to the products and there is a possibility of distortion of costs though the basis of charging them is quite logical. This is one of the limitation of the traditional costing system. For example, one of the methods of absorption of overheads is direct labor cost and this method is quite satisfactory when the overhead costs of indirect activities is a small percentage compared to direct labor component in actual making of products. However, the increased technology and automation has reduced the direct labor considerably and so the indirect activities have assumed greater importance. Therefore, using the direct labor as a basis for absorbing the overheads can lead to distortions in the costs. Distortions in the costs resulting into incorrect cost calculations may lead to following wrong decisions.

- ❖ Errors in fixation of selling prices.
- ❖ Wrong decisions regarding deciding of product mix.
- ❖ Ignoring customer orientation.
- ❖ Missing of profitable opportunities.

In order to overcome the limitations of traditional costing systems Activity Based Costing has been introduced.

Before we proceed to the other aspects of Activity Based Costing, let us see the limitations of traditional costing system. A brief mention of the same has already been made in the above paragraph. Some more points are discussed below.

16.2 Limitations of Traditional Costing System

The following are the limitations of traditional costing system.

- ❖ In a traditional costing system, overheads i.e. indirect costs are allocated, apportioned and finally absorbed in the cost units. There can be distortion in computing costs due to the basis selected for absorption. The following example will clarify the situation.

Suppose a manufacturing company is producing two products, A and B. The direct material cost for the products is Rs.1,00,000 and Rs.2,00,000 respectively. The total overheads are Rs.1,50,000 and the company adopts direct material cost as the basis for absorption. The absorption percentage of overheads will be 50% of the direct material. [$1,50,000/3,00,000 \times 100 = 50\%$] Thus the overheads absorbed in the product A will be Rs. 50,000 and for B, they will be Rs.1,00,000 [50% of the overheads] Product B has a larger share of the overhead costs as the material costs are higher than that of A. However, actually product B may be



requiring lesser efforts in the indirect activities than A, but only because it has a higher material costs, it will be charged with larger amount of overheads. Thus there is a distortion in the total cost. This distortion in costs may lead to wrong decisions in several areas like make or buy, pricing decisions, acceptance of export offer etc.

- ❖ Another limitation of traditional costing system is the division between fixed and variable may not be realistic as there are many complications due to the complexity of the modern business.
- ❖ There should be linkage between the activities and the costs. Similarly the information should be available simultaneously which means that information should be made available while the activities are going on. Information available after the activity is over will not be of much use.

As mentioned above, the Activity Based Costing system is developed due to the limitations of the traditional costing system. The limitations of the traditional costing system have been discussed above. Now, in the following paragraphs, we will proceed to discuss the various aspects of Activity Based Costing.

16.3 Activity Based Costing – Various Issues

Meaning :- CIMA defines Activity Based Costing as, ‘cost attribution to cost units on the basis of benefit received from indirect activities e.g. ordering, setting up, assuring quality.’

One more definition of Activity Based Costing is, ‘the collection of financial and operational performance information tracing the significant activities of the firm to product costs.’

The following are the objectives of Activity Based Costing.

16.5 Objectives of Activity Based Costing

The objectives of Activity Based Costing are discussed below.

- ❑ To remove the distortions in computation of total costs as seen in the traditional costing system and bring more accuracy in the computation of costs of products and services.
- ❑ To help in decision making by accurately computing the costs of products and services.
- ❑ To identify various activities in the production process and further identify the value adding activities.
- ❑ To distribute overheads on the basis of activities.
- ❑ To focus on high cost activities.
- ❑ To identify the opportunities for improvement and reduction of costs.
- ❑ To eliminate non value adding activities.

16.6 Working of Activity Based Costing

The working of Activity Based Costing is explained below.

- **Understanding and analyzing manufacturing process :-** For installation of any costing system, study of manufacturing process is essential. For Activity Based Costing system also, it is necessary to study the manufacturing process and ascertain various stages involved in the same so that ‘activities’ involved in the same can be identified.



Activity Based Costing

- **Study of the Activities involved :-** The next step is to study the activities involved in the manufacturing process. This step is very crucial as the entire Activity Based Costing is based on identification of activities. In this step, the activities involved in a process are identified. For example, in a bank, opening of an account is one of the services offered to customers. In this service, activities involved are studied. It may be revealed that opening of a new account involves activities like issuing the application form, verification of the same and accepting the initial amount required for opening of an account. Similarly in case of a manufacturing company, purchase procedure may involve activities like receiving of purchase requisition for concerned department or the stores department, inviting quotations from various suppliers, placing of an order, follow up of the same and finally receiving and inspection of the goods. In case of an educational institute, activities in a library may include activities like issue of books, receipt of books, ordering new books, giving accession numbers, stock taking, removing obsolete and outdated books, identification of slow moving and fast moving items etc. In this manner, whether in manufacturing or in service sector, activities are identified and the next step is to divide the activities into value adding and non value adding. The objective behind this is that attention can be focused on the value adding activities while non value adding activities can be eliminated in the future.
- **Activity Cost Pool :-** Cost pool is defined by CIMA as, 'the point of focus for the costs relating to a particular activity in an activity based costing system.' For example, in case of a library, the cost of issue and receipts, cost of ordering, stock taking costs etc. can be identified with 'Library Cost'. In other words, 'Library' will be the cost pool in which all the costs mentioned above may be clubbed. In case of a manufacturing organization, as regards to stores, cost of classification, cost of issue of stores requisitions, inspection costs etc. can be pooled under the heading 'stores'. Thus cost pool concept is similar to the concept of cost center. The cost pool is the point of focus or in other words, it is the total cost assigned to an activity. It is the sum of all the cost elements assigned to an activity.
- **Cost Drivers :-** According to CIMA, 'cost driver is any factor which causes a change in the cost of an activity, e.g. the quality of parts received by an activity is a determining factor in the work required by that activity and therefore affects the resources required. An activity may have multiple cost drivers associated with it.' In other words, cost driver means the factors which determine the cost of an activity. For example, if we repeat the example of library, the number of receipts and issue of books will be cost drivers, in a stores, no. of stores requisitions will be cost drivers, in customer order processing the no. of customers as well as no. of orders will be cost drivers. Thus a cost driver is an activity which generates cost. Activity Based Costing is based on the belief that activities cause costs and therefore a link should be established between activities and product. The cost drivers thus are the link between the activities and the cost.
- **Identification of costs with the products :-** The final stage in Activity Based Costing is to identify the cost with the final products which can also be called as cost objects. Cost objects include, products, services, customers, projects and contracts. As mentioned earlier, direct costs can be identified easily with the products but the indirect costs can be linked with the products by identifying activities and cost drivers. Thus Activity Based Costing is the process of tracing costs first from resources to activities and then from activities to specific products.
- **Conclusion :-** It can be concluded that the Activity Based Costing is a costing system which tries to charge the indirect costs to the products and services fairly accurately. However for effective implementation there is a need of involvement of the staff and their training on continuous basis.



Similarly there is a need to review the working of the system at periodic intervals and keep a follow up of the feedback received. These actions will ensure effective implementation of the system. Support of top management is also required for effective implementation of this system. Activity Based Costing system is definitely a better system but much depends on the implementation of the same.

16.6 Limitations of Activity Based Costing

Though this system is quite effective, it suffers from some limitations. These limitations are given below.

- ❑ Activity Based Costing is a complex system and requires lot of records and tedious calculations.
- ❑ For small organizations, traditional cost accounting system may be more beneficial than Activity Based Costing due to the simplicity of operation of the former.
- ❑ Sometimes it is difficult to attribute costs to single activities as some costs support several activities.
- ❑ There is a need of trained professionals who are limited in number.
- ❑ This system will be successful if there is a total support from the top management.
- ❑ Substantial investment of time and money is required for the implementation of this system.

16.7 Activity Based Budgeting

A budget is a statement expressed in quantitative/monetary/both terms prepared prior to a defined period of time for the policy to be pursued during that period for the purpose of achieving a given objective. In other words, a budget is always prepared ahead of time, it is expressed either in quantitative terms or monetary terms or both, it reflects the objective to be achieved during that period and hence the policy to be followed during that period is put in the budget. Budget helps in planning for the future. It also helps in controlling as there is a continuous comparison of actual with budget. Any deviation between the two is identified for taking suitable action.

The traditional budgeting is based on traditional cost accounting i.e. on the basis of allocation, apportionment and absorption of overheads in the products. However, the Activity Based Budgeting is different from the traditional budgeting in the sense that it provides a strong link between the objectives of organization and objectives of a particular activity. In other words, it involves identification of activities and dividing them in value adding and nonvalue adding activities. The non value adding activities are eliminated in due course of time. Activity Based Budgeting, thus requires identification of activities of the organization, establishing the factors which cause costs, the cost drivers and then collecting the costs of the activities in cost pools. The following are the features of Activity Based Budgeting.

- ❖ It uses the activity analysis to relate costs to activities.
- ❖ It identifies cost improvement opportunities.
- ❖ There is a clear link between strategic objectives and planning and the tactical planning of the ABC process.

16.9 Activity Based Accounting

Activity Based Accounting is a broader term which involves in, 'collection, recording, analysis, controlling and reporting of activity related costs rather than departmental or cost centers related costs.' It involves



Activity Based Costing

several activities like Activity Based Budgeting, Cost management based on activities, performance measurement of activity, reducing the costs through elimination of non value adding activities and also initiating innovative measure for reduction of costs.

Solved Problems

- The budgeted overheads and cost driver volumes of XYZ are as follows.

Cost Pool	Budgeted Overheads (Rs.)	Cost Driver	Budgeted Volume
Material procurement	5,80,000	No. of orders	1,100
Material handling	2,50,000	No. of movements	680
Set-up	4,15,000	No. of set ups	520
Maintenance	9,70,000	Maintenance hours	8,400
Quality control	1,76,000	No. of inspection	900
Machinery	7,20,000	No. of machine hours	24,000

The company has produced a batch of 2,600 components of AX-15, its material cost was Rs. 1,30,000 and labor cost Rs. 2,45,000. The usage activities of the said batch are as follows.

Material orders – 26, maintenance hours – 690, material movements – 18, inspection – 28, set ups – 25, machine hours – 1,800

Calculate – cost driver rates that are used for tracing appropriate amount of overheads to the said batch and ascertain the cost of batch of components using Activity Based Costing.

Solution

The cost driver data will be determined as given below.

- Cost driver data – The rate will be determined by dividing the amount by relevant factors. The calculations are shown below.

Particulars	Details	Rate of cost drivers
Material procurement	Rs. 5,80,000 / 1100	Rs. 527
Material handling	Rs. 2,50,000 / 680	Rs. 368
Set up	Rs. 4,15,000 / 520	Rs. 798
Maintenance	Rs. 9,70,000 / 8400	Rs. 115
Quality control	Rs. 1,76,000 / 900	Rs. 195
Machine	Rs. 7,20,000 / 24,000	Rs.30

- Calculation of a Batch of 2,600 components of AX - 15

Particulars	Details	Amount in Rupees
Direct Materials		1,30,000
Direct Labor		2,45,000
Prime Cost – Direct Materials + Direct Labor		3,75,000
Add : Overheads		
Particulars	Details	Amount in Rupees



Material Procurement	26 × Rs. 527	13,702
Material handling	18 × Rs. 368	6,624
Set-up cost	25 × Rs. 798	19,950
Maintenance	690 × Rs. 115	79,350
Quality control	28 × Rs. 195	5,460
Machine	1,800 × Rs. 30	54,000
Total		5,54,086

Note :- From the above calculations, it is clear that by using Activity Based Costing, there can be substantial accuracy in the overhead absorption. The overheads are charged on the basis of cost drivers and not on the basis of absorption rate.

2. A company manufactures two products, X and Y. The product X is a low volume and its sales are only Rs.5,000 p.a. Product Y is high volume and labor intensive, its sales are 25,000 units pa. Product X takes 6 labor hours to make one unit but Y requires 8 hours per unit.

Details of costs for materials and labor for each product are as follows.

Particulars	Product X	Product Y
Direct Materials – Rs.	200	100
Direct Labor -@ Rs.10 per hour	60	80
Total	260	180

The company works 1,00,000 direct labor hours p.a. Total manufacturing overhead costs are Rs.17,50,000 p.a.

You are required to compute per unit cost of each product using,

- I. Direct labor hour rate method for absorption of overhead costs and
- II. Activity Based Costing technique for absorption of overhead costs

Solution

Firstly, we will calculate the Product Cost based on Direct Labor Hour Rate. The calculations are shown below.

- A. Direct Labor Hour Rate :- $\text{Total manufacturing overheads} / \text{Total direct labor hours}$

$$\text{Rs.17,50,000} / 1,00,000 = \text{Rs. 17.50}$$

- B. Absorption of manufacturing overheads :-

Particulars	Product X	Product Y
Manufacturing Overheads	Rs.17.50 X 6 Direct Labor Hours = Rs. 105	Rs. 17.50 X 8 Direct Labor Hours = Rs.140

Overheads based on Activity Based Costing :-



Activity Based Costing

A. Identification of Activities and Rate for each Activity :-

Particulars	Total Overheads	Details of Activity	Rate per Activity [Rs.]
Machine Set up	4,50,000	10,000	45 per set up
Quality inspection	3,00,000	15,000	20 per inspection
Production order	1,80,000	600	300 per order
Machine hours worked	6,25,000	50,000	12.5 per hour
Material receipts	1,95,000	1,500	130 per receipt
Total overheads	17,50,000		

B. Allocation of overheads to Products on the basis of Activity Rates :-

Particulars	Frequency of activity	Rate per activity	Product X Rs	Product Y Rs
Machine Set up	10,000	45	6,000 X Rs. 45 = Rs.2,70,000	4,000 X Rs.45 = Rs.1,80,000
Quality inspection	15,000	20	10,000 X Rs. 20 = Rs. 2,00,000	5,000 X Rs.20 = Rs.1,00,000
Production order	600	300	200 X Rs. 300 = Rs. 60,000	400 X Rs.300 = Rs.1,20,000
Machine hours worked	50,000	12.5	12,000 X Rs.12.5 = Rs. 1,50,000	38,000 X Rs.12.5 = Rs. 4,75,000
Material receipts	1,500	130	300 X Rs. 130 = Rs. 39,000	12,000 X Rs.130 = Rs. 1,56,000
Total overhead costs			7,19,000	10,31,000
Units produced			5,000	25,000
Overhead cost per unit			143.80	41.24

Computation of Total Cost under Traditional Cost Accounting and Activity Based Costing

Particulars	Product X – Activity Based Costing	Product Y – Activity Based Costing	Product X – Traditional Costing	Product Y – Traditional Costing
Direct Material	200	100	200	100
Direct Labor	60	80	60	80
Manufacturing overheads	143.80	41.24	105	140
Total cost of Manufacture	403.80	221.24	365	320

From the above comparative analysis it is clear that, under Traditional Costing, Product X is charged with Rs. 105 per unit as manufacturing overheads while in case of Product Y, the share of overhead cost is Rs. 140. Under Activity Based Costing the amount is Rs. 143.80 and Rs. 41.24 per unit. Thus due to Activity Based Costing, the distortion in cost is avoided.

3. A company manufacturing two products furnishes the following data for a year.



Product	Annual Output [Units]	Total machine hours	Total number of purchase orders	Total number of set ups
A	5,000	20,000	160	20
B	60,000	1,20,000	384	44

The annual overheads are as under

Particulars	Amount in Rupees
Volume related activity costs	5,50,000
Set up related costs	8,20,000
Purchase related costs	6,18,000
Total costs	19,88,000

You are required to calculate the cost per unit of each Product A and B, based on,

- I. Traditional method of charging overheads
- II. Activity Based Costing method.

16.10 Activity Based Management

The Activity Based Management is a tool of management that involves analyzing and costing activities with the goal of improving efficiency and effectiveness. Though it is closely related to the Activity Based Costing, still it differs from the same in its primary goal. The Activity Based Costing focuses on activities with the object of measuring the cost of products/services. It tries to compute the cost as accurately as possible. On the other hand Activity Based Management focuses on managing the activities themselves. In Activity Based Costing resources are traced to the activities for the purpose of computing the costs while in Activity Based Management, resources are traced to activities for evaluation of the activities themselves. In other words, efforts are made to improve the activities further. Thus Activity Based Management is a set of actions that management can take, based on information from an Activity Based Costing system, to increase/improve profitability.

For continuous improvement, Activity Based Management attempts the following analysis.

- **Cost Driver Analysis :-** The factors that cause activities to be performed need to be identified in order to manage activity costs. Cost driver analysis identifies these casual factors. For example, in a stores department, it may be observed that slow moving and obsolete stock is not disposed of in time, the reason being the staff in the stores is not trained properly in this area. Managers have to address this cost driver to correct the root cause of this problem and take proper action.
- **Activity Analysis :-** Activity Analysis identifies value added and non value added activities. This analysis identifies the activities in the organization and the activity centers that should be used in Activity Based Costing system. In Activity Based Management, as said above, identification of activities into value adding and non value adding is made and efforts are made to eliminate the non value adding activities.
- **Performance Analysis :-** Performance analysis involves the identification of appropriate measures to report the performance of activity centers or other organizational units consistent with each units goals and objectives. Performance Analysis aims to identify the best ways to measure the performance of factors that are important to organizations in order to stimulate continuous improvement.



16.11 Difference Between Activity Based Costing And Activity

Based Management :- Activity Based Costing is logical distribution of overheads, i.e. overheads are distributed on the basis of the consumption of resources. It helps to avoid distortion of costs of products/services. On the other hand, Activity Based Management, on the other hand, is a discipline that focuses on efficient management so as to value of services rendered to customers. This focus on activities is being used effectively for cost reduction, business process re-engineering, benchmarking and performance measurement. Activity Based Management brings about a change in viewing at the objective by incorporation of financial perspective, internal business perspective, innovation and learning perspective.

Question Bank

1. What is Activity Based Costing? Why is it needed?
2. What is a 'Cost Driver'? What is the role of cost driver in tracing cost to products?
3. Discuss the steps in applying Activity Based Costing in a manufacturing company.
4. How are activities grouped in a manufacturing company?
5. Distinguish between traditional costing system and activity based costing.
6. What are the benefits of activity based costing?

STUDY NOTE 17

Transfer Pricing

Learning Objectives

After studying this topic, you should be able to,

1. To understand the concept of 'Transfer Pricing' and its objectives.
 2. To understand the methods of fixation of 'Transfer Pricing'.
 3. To understand the practical problems involved in 'Transfer Pricing'.
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17.1 Introduction And Meaning

Transfer pricing has assumed lot of importance today. It is one of the important tools in the hands of management for performance evaluation of a division or department. Transfer pricing has become necessary in highly decentralized companies where number of divisions/departments are created as a part and parcel of the decentralized organization. In the modern days, production is on the mass scale due to technological advancement and upgradation. Organizations grow in course of time and for such growing organizations, decentralization becomes absolutely necessary. It becomes inevitable for such organizations to establish separate divisions and departments to ensure smooth working. However it is also necessary to evaluate the performance of these departments/divisions. Transfer pricing is one of the tools in the hands of management for measuring the performance.

A 'Transfer Price' is that notional value at which goods and services are transferred between divisions in a decentralized organization. Transfer prices are normally set for intermediate products, which are goods, and services that are supplied by the selling division to the buying division. As explained in the above paragraph, in large organizations, each division is treated as a 'profit center' as a part and parcel of decentralization. Their profitability is measured by fixation of 'transfer price' for inter divisional transfers.

A question arises as to how the transfer of goods and services between divisions should be priced. The transfer price can have impact on the divisions performance and hence lot of care is to be taken in fixation of the same. The following factors should be taken into consideration before fixing the transfer prices.

- ❖ Transfer price should help in the accurate measurement of divisional performance.
- ❖ It should motivate the divisional managers to maximize the profitability of their divisions.
- ❖ Autonomy and authority of a division should be ensured.
- ❖ Transfer Price should allow 'Goal Congruence' which means that the objectives of divisional managers match with those of the organization.

17.2 Transfer Pricing Methods

In the previous paragraph, we have seen that the transfer prices are fixed basically for the evaluation of divisional performance. It is the notional value of goods and services transferred from one division to other division. In other words, when internal exchange of goods and services take place between the different divisions of a firm, they have to be expressed in monetary terms. The monetary amount for those inter divisional exchanges is called as 'transfer price'. However the determination of transfer prices is an extremely difficult and delicate task as lot of complicated issues are involved in the same. Inter division conflicts are also possible. There are several methods of fixation of 'Transfer Price'. They are discussed below.

- **Cost Based Pricing:** - In these methods, 'cost' is the base and the following methods fall under this category.
 - **Actual Cost of Production:** - This is in fact the simplest method of fixation of transfer price. In this method, the actual cost of production is taken as transfer price for inter divisional transfers. The actual cost of production may consist of only variable costs or total costs including fixed cost.



- **Full Cost Plus:** - In this method, the total cost of sales plus some percentage of profit is charged by the transferring division to the transferee division. The percentage of profit may be on the capital employed or on the cost of sales. The benefit of this method is that the profit measurement becomes possible.
- **Standard Cost:** - Standard cost is 'predetermined cost' based on technical analysis for material, labor and overhead. Under this method, transfer price is fixed based on standard cost. The transferring unit absorbs the variance, i.e. difference between standard cost and actual cost. This method is quite simple for operation once the standards are set. However it becomes essential to revise the standards at regular intervals, otherwise the standard cost may become outdated.
- **Marginal Cost Pricing:** - Under this method, only the marginal cost is charged as 'transfer prices'. The logic used in this method is that fixed costs are in any case unavoidable and hence should not be charged to the buying division. Therefore only marginal cost should be taken as transfer price.
- **Market Based Pricing:** - Under this method, the transfer price will be determined according to the market price prevailing in the market. It acts as a good incentive for efficient production to the selling division and any inefficiency in production and abnormal costs will not be borne by the buying division. The forces of demand and supply will determine the market price in the long run and profit generated will be a very good parameter for measuring efficiency. The logic used in this method is that if the buying division would have purchased the goods/services from the open market, they would have paid the market price and hence the same price should be paid to the selling division. One of the variation of this method is that from the market price, selling and distribution overheads should be deducted and price thus arrived should be charged as transfer price. The reason behind this is that no selling efforts are required to sale the goods/services to the buying division and therefore these costs should not be charged to the buying division. Market price based transfer price has the following advantages.
 - ❑ Actual costs are fluctuating and hence difficult to ascertain. On the other hand market prices can be easily ascertained.
 - ❑ Profits resulting from market price based transfer prices are good parameters for performance evaluation of selling and buying divisions.

However, the market price based transfer pricing has the following limitations.

- ❑ There may be resistance from the buying division. They may question buying from the selling division if in anyway they have to pay the market price?
- ❑ Like cost based prices, market prices may also be fluctuating and hence there may be difficulties in fixation of these prices.
- ❑ Market price is a rather vague term as such prices may be ex-factory price, wholesale price, retail price etc.
- ❑ Market prices may not be available for intermediate products, as these products may not have any market.
- ❑ This method may be difficult to operate if the intermediate product is for captive consumption.



Transfer Pricing

- ❑ Market price may change frequently.
- ❑ Market prices may not be ascertained easily.
- **Negotiated Pricing:** - In the above two methods, transfer prices are fixed on the basis of either the cost price or market price. However the transfer prices may be fixed on the basis of 'Negotiated Prices' that are fixed through negotiations between the selling and the buying division. Sometimes it may happen that the concerned product may be available in the market at a cheaper price than charged by the selling division. In this situation the buying division may be tempted to purchase the product from outside sellers rather than the selling division. Alternatively the selling division may notice that in the outside market, the product is sold at a higher price but the buying division is not ready to pay the market price. Here, the selling division may be reluctant to sell the product to the buying division at a price, which is less than the market price. In all these conflicts, the overall profitability of the firm may be affected adversely. Therefore it becomes beneficial for both the divisions to negotiate the prices and arrive at a price, which is mutually beneficial to both the divisions. Such prices are called as 'Negotiated Prices'. In order to make these prices effective care should be taken that both, the buyers and sellers should have access to the available data including about the alternatives available if any. Similarly buyers and sellers should be free to deal outside the company, but care should be taken that the overall interest of the organization is not jeopardized.
 - The main limitation of this method is that lot of time is spent by both the negotiating parties in fixation of the negotiated prices.
 - Negotiating skills are required for the managers for arriving at a mutually acceptable price, otherwise there is a possibility of conflicts between the divisions.
- **Opportunity Cost Pricing:** - This pricing recognizes the minimum price that the selling division is ready to accept and the maximum price that the buying division is ready to pay. The final transfer price may be based on these minimum expectations of both the divisions. The most ideal situation will be when the minimum price expected by the selling division is less than the maximum price accepted by the buying division. However in practice, it may happen very rarely and there is possibility of conflicts over the opportunity cost.
- **Conclusion:** - From the above discussion, it is very clear that fixation of transfer prices is a very delicate decision. There might be clash of interests between the selling and buying division and hence while fixing the transfer price, overall interests of the organization should be taken into consideration. As mentioned in the introduction, 'Goal Congruence' should be given highest importance rather than interests of the selling or buying division alone.

Solved Problems

- 1 The following information relates to budgeted operations of Division X of a manufacturing company.

Particulars	Amount in rupees
Sales – 50,000 units @ Rest. 8	4,00,000
Less :- Variable Costs @ Rest. 6 per unit	3,00,000
Contribution margin	1,00,000
Less : Fixed Costs	75,000
Divisional Profits	25,000



The amount of divisional investment is Rs. 1,50,000 and the minimum desired rate of return on the investment is the cost of capital of 20%

Calculate

- i] Divisional expected ROI and ii] Divisional expected RI

Solution

i] $ROI = \frac{Rs. 25,000}{1,50,000} \times 100 = 16.7\%$

ii] $RI = \text{Divisional Profits} - \text{Minimum desired rate of return} = 25,000 - 20\% \text{ of } 1,50,000 = (Rs. 5,000)$

2. A company has two division, A and B. Division A manufactures a component which is used by Division B to produce a finished product. For the next period, output and costs have been budgeted as follows.

Particulars	Division A	Division B
Component units	50,000	-----
Finished units	-----	50,000
Total variable costs - Rupees	2,50,000	6,00,000
Fixed Costs Rupees	1,50,000	2,00,000

The fixed costs are separable for each division. You are required to advise on the transfer price to be fixed for Division A's component under the following circumstances.

- A. Division A can sell the component in a competitive market for Rs. 10 per unit. Division B can also purchase the component from the open market at that price.
- B. As per the situation mentioned in (A) above, and further assume that Division B currently buys the component from an external supplier at the market price of Rs. 10 and there is reciprocal agreement between the external supplier and another Division C, within the same group. Under this agreement, the external supplier agrees to buy one product unit from Division C at a profit of Rs. 4 per unit to that division, for every component which Division B buys from the sup

Solution

Transfer price decisions can be taken on the following basis.

A. **Transfer Price :-** Marginal Cost + Opportunity Cost i.e. Rs. 5 + Rs. 5 = Rs.10

Note :- Marginal Cost = $\frac{Rs. 2,50,000}{50,000 \text{ units}} = Rs. 5$

Opportunity cost Rs. 5 is computed on the basis that the Division A will sacrifice Rs.5 if they sell the product to Division B.

- B. In this situation, the transfer price will be worked out as under,

Transfer Price = Marginal Cost + Contribution + Profit foregone by Division C

$Rs. 5 + Rs. 5 + Rs. 4 = Rs. 14$

In situation (B), if Division B purchases from Division A, it will not purchase from external supplier. Hence, the supplier will stop purchasing from Division C, which will result in a loss of profit to Division C @ Rs.4 per unit, and therefore this amount will be recovered from the transfer price.



However there is a constraint in marketing and only 1,50,000 units of the component X can be directly sold to the market at the proposed price.

It has been gathered that Division B can take up the balance 50,000 units of component X. A wants a price of Rs. 4 per unit but B is prepared to pay Rs. 2 per unit of X.

Division A has another option on hand, which is to produce only 1,50,000 units of component X. This will reduce the holding of assets by Rs. 2,00,000 and fixed overheads by Rs. 25,000.

You are required to advise the most profitable course of action for Division A.

Solution

For arriving at the solution, we will have to find out the amount of desired profit and the sales value of Product X alongwith the selling price per unit. The following working notes are required for this.

Working Note I – Amount of desired profit = 20% of average assets employed

$$\begin{aligned} \text{Average Assets Employed} &= \text{Debtors} + \text{Inventories} + \text{Plant and Equipments} \\ &= \text{Rs. } 2,00,000 + 5,00,000 + 5,00,000 = \text{Rs. } 12,00,000 \end{aligned}$$

Desired profit – 20% of average assets, i.e. of Rs.12,00,000 = Rs.2,40,000

Working Note II -

Particulars	Amount in Rupees
Fixed Cost	5,00,000
Variable Cost	2,00,000 [2,00,000 units @ Re. 1 per unit]
Profit [As per Working Note No.I]	2,40,000
Total Sales	9,40,000

Selling Price Per Unit = Rs.9,40,000/2,00,000 units = Rs. 4.70 per unit

Now, we will evaluate the two options available to Division A. The first option is to sell 1,50,000 units of the product @ Rs. 4.70 to outsiders and 50,000 units to Division B @ Rs. 2. The second option is to produce and sell only 1,50,000 units to outsiders @ Rs. 4.70 per unit. The statement of evaluation is prepared as given below.

Statement Showing Comparative Profitability of Option I and Option II

Particulars	Option I – Amount in Rupees	Option II – Amount in Rupees
Sales – 1,50,000 units @ Rs. 4.70 per unit	7,05,000	7,05,000
Transfer to Division B 50,000 units @ Rs. 2 per unit	1,00,000	
Total Sales	8,05,000	7,05,000
Variable Overheads	2,00,000	1,50,000
Contribution Margin [Sales – variable overheads]	6,05,000	5,55,000
Less :- Fixed Costs	5,00,000	4,75,000
Profit	1,05,000	80,000
Capital Employed	12,00,000	10,00,000
Return on Capital Employed	1,05,000/12,00,000 X 100 = 8.75%	80,000/10,00,000 X 100 = 8%



Transfer Pricing

Observation – From the above calculation, it is clear that the Option I results into 8.75% rate of return while Option II results into 8% return on Capital Employed. Hence, Option I is recommended.

- 5 XYZ Ltd which has a system of assessment of Divisional Performance on the basis of residual income has two Divisions, Alfa and Beta. Alfa has annual capacity to manufacture 15,00,000 numbers of a special component that it sells to outside customers, but has idle capacity. The budgeted residual income of Beta is Rs. 120,00,000 while that of Alfa is Rs.100,00,000. Other relevant details extracted from the budget of Alfa for the current years were as follows.

Particulars	Details
Sale (outside customers)	12,00,000 units @ Rs. 180 per unit
Variable cost per unit	Rs. 160
Divisional fixed cost	Rs.80,00,000
Capital employed	Rs.750,00,000
Cost of Capital	12%

Beta has just received a special order for which it requires components similar to the ones made by Alfa. Fully aware of the idle capacity of Alfa, Beta has asked Alfa to quote for manufacture and supply of 3,00,000 numbers of the components with a slight modification during final processing. Alfa and Beta agree that this will involve an extra variable cost of Rs. 5 per unit.

You are required to calculate,

- I. Calculate the transfer price which Alfa should quote to Beta to achieve its budgeted residual income.
- II. Also indicate the circumstances in which the proposed transfer price may result in a sub optimal decision for the Company as a whole.

Solution

We will have to prepare a statement showing details of cost and income desired as shown below.

Division - Alfa

Particulars	Amount in Rupees
Fixed Cost	80,00,000
Return on Capital Employed	12% of 750,00,000 = 90,00,000
Residual income desired	100,00,000
Total	270,00,000

Contribution per unit = Rs. 180 [Selling Price per unit] – Rs. 160 [Variable cost] = Rs. 20

Total desired contribution = 12,00,000 units X Rs. 20 per unit = Rs. 240,00,000

Minimum contribution to be earned from additional 3,00,000 units = Rs. 270 lakhs – Rs. 240 lakhs = Rs. 30 lakhs.

Contribution per unit Rs. 30,00,000/3,00,000 = Rs. 10 per unit

Additional variable cost for modification = Rs. 5 per unit



Hence, the minimum transfer price per unit = Rs. 160 + Rs. 10 + Rs. 5 = Rs. 175 per unit

If Beta can buy from outside at less than the variable cost of manufacture, i.e. Rs. 165 then only the decision to transfer at a price of Rs. 175 will be sub optimal for the group as a whole.

6. Transferor Ltd. have two processes – Preparing and Finishing. The normal output per week is 7,500 units [completed] at a capacity of 75%.

Transferee Ltd. Had production problems in preparing and require 2,000 units per week of prepared material for their finishing process.

The existing cost structure of one prepared unit of Transferor Ltd. at the existing capacity is as follows.

Material: Rs. 2.00 [variable 100%]

Labor: Rs. 2.00 [variable 50%]

Overheads: Rs. 4.00 [variable 25%]

The sale price of a completed unit of Transferor Ltd. is Rs. 16 with a profit of Rs. 4 per unit.

Contrast the effect on the profits of Transferor Ltd. for 6 months [25 weeks] of supplying units to Transferor Ltd. with the following alternative transfer prices per unit.

- I] Marginal Cost II] Marginal Cost + 25% III] Marginal Cost + 15% return on capital employed. [Assume capital employed Rs. 20 lakhs] IV] Existing Cost V] Existing Cost + a portion of profit on the basis of preparing cost/total cost X unit profit. VI] At an agreed market price of Rs. 8.50

Assume no increase in the fixed costs.

Solution

The existing normal output of Transferor Ltd. is 7,500 units per week or 1,87,500 units for 6 month [25 weeks] The rate of profit is Rs. 4 per unit. Thus the total profit for 6 months will be Rs. 4 X 1,87,500 units = Rs. 7,50,000. The impact on profit under various alternatives is as follows.

- I. Marginal Cost: Rs. 4 per unit [material Rs. 2 + Labor Re. 1 + Overhead Re .1] If output is transferred at Rs. 4, there will be no change in the profits.
- II. Marginal Cost + 25% = Rs. 4 + Re. 1 = Rs. 5 Extra profit = Rs. 5 - Rs. 4 = Re. 1 per unit. Number of units required by Transferee Ltd. = 2,000 units per week or 50,000 units in 25 weeks. Extra profit earned = 50,000 X Re. 1 = Rs. 50,000
- III. Marginal Cost + 15% return on capital = Rs. 4 + 15% p.a. of Rs. 20 lakhs. Extra profits = $15/100 \times 20,00,000 \times 6/12 = \text{Rs. } 1,50,000$
- IV. Existing cost = marginal + fixed = Rs. 8 per unit. Existing profit = Rs. 4 per unit [excluding selling and distribution expenses overheads which are not given directly in the example] At existing cost, the profit is Rs. 4 per unit, hence total profit = Rs. 4 X 50,000 units = Rs.2,00,000
- V Existing cost + portion of profit on the basis of preparing cost/total cost X unit profit Rs. $8/12 \times \text{Rs. } 4 = \text{Rs. } 2.67$. Existing cost Rs. 8 + Rs. 2.67 = Rs. 10.67 – existing marginal cost Rs. 4 = profit per unit = Rs. 6.67. Total profit = 50,000 X Rs. 6.67 = Rs. 3,33,500.



Transfer Pricing

VI Agreed market price = Rs. 8.50 – existing marginal cost Rs. 4.00 = Rs. 4.50 profit per unit. Total profit = 50,000 units X Rs. 4.50 = Rs. 2,25,000.

7. A company is organized into two divisions namely A and B. A produces three products, K, L and M. The relevant data per unit is given below.

Particulars	K	L	M
Market price	Rs. 120	Rs. 115	Rs. 100
Variable costs	84	60	70
Direct labor hours	4	5	3
Maximum sales potential - units	1600	1000	600

Division B has a demand for 600 units of product L for its use. If division A cannot supply the requirements, division B can buy a similar product from market at Rs.112 per unit. What should be the transfer price of 600 units of L for division B, if the total direct labor hours available in division A are restricted to 15,000

Solution

Statement showing contribution per direct labor hour

Particulars	K	L	M
Market price	Rs. 120	Rs. 115	Rs. 100
Variable costs	84	60	70
Contribution	36	55	30
Direct labor hours	4	5	3
Contribution per direct labor hours	9	11	10
Ranking	III	I	II

Statement showing utilization of labor hours

Product	Hours per unit	Max. sales/ production	Hours used	Balance hours
L	5	1000	5000	100000
M	3	600	1800	8200
K	4	1600	6400	1800

Transfer price of 600 units of L for division B

Balance hours available = 1,800 hours [15,000 – 13,200]

Hour per unit of product L = 5 hours

Number of units of L = 1,800 / 5 = 360 units

360 units of L can be produced by utilizing balance hours and this means that balance 240 units of product L will have to be transferred to B from existing production. Thus there will be foregoing of contribution.

As per the statement number one, contribution per hour for K is the lowest. Thus 240 units of L can be produced by foregoing contribution on K.



Opportunity cost per hour [product K] = Rs. 9

Hours per unit of L = 5

Hence opportunity cost Rs. $9 \times 5 = \text{Rs. } 45$ Thus price for 240 units = Rs. 60 + Rs. 45 [opportunity cost] = Rs. 105 Price for 360 units = Rs. 60

Transfer price for 600 units = $[\text{Rs. } 105 \times 240 + \text{Rs. } 60 \times 360] / 600 = \text{Rs. } 78$ per unit

Unsolved Problem

A large company is organized into several manufacturing divisions. The policy of the company is to allow the divisional managers to choose their sources of supply and when buying from or selling to sister divisions, to negotiate the prices just as they will for outside purchases or sales.

Division X buys all of its requirements of its raw materials R from Division Y. The full manufacturing cost of R for Division Y is Rs. 88 per kg at normal volume. Till recently Division Y was willing to supply R to Division X at a transfer price of Rs. 80 per kg. The incremental cost of R for Division Y is Rs. 76 per kg. Since Division Y is now operating at its full capacity, it is unable to meet the outside customers' demand for R at its market price of Rs. 100 per kg. Division Y, therefore threatened to cut-off supplies to Division X unless the latter agrees to pay the market price for R.

Division X is resisting the pressure because its budget based on the consumption of 1,00,000 kg per month at a price of Rs. 80 per kg. is expected to yield a profit of Rs. 25,00,000 per month and so a price increase to Rs. 100 per kg will bring the division close to break-even point.

Division X has even found an outside source for a substitute material at a price of Rs. 95 per kg. Although the substitute material is slightly different from R, it would meet the needs of Division X. Alternatively, Division X is prepared to pay Division Y even the manufacturing cost of Rs. 88 per kg.

Required :-

1. Using each of the transfer price of Rs. 80, Rs. 88, Rs. 95 and Rs. 100 show with supporting calculations, the financial results as projected by the Manager of Division X and Manager of Division of Y and the Company.
2. Comment on the effect of each transfer price on the performance of the managers of Division X and Division Y.
3. If you were to make a decision in the matter without regard to the views of the divisional managers, where should Division X obtain its raw materials from and at what price?

Question Bank

1. What do you understand by 'Transfer Pricing'? What are the objects of the same?
2. Explain various methods of fixation of 'Transfer Prices'.



Sets of
Objective
Questions
Cost and
Management
Accounting



Set : 1

Q.1)

(a) State whether the following statements are True (T) or False (F):

- (i) ABC analysis is made on the basis of unit prices of materials.
- (ii) Cost of tube used for packing tooth paste is indirect material cost.
- (iii) Value analysis helps in cost control.
- (iv) No distinction is made between direct and indirect materials in Process Costing.
- (v) Cost industry makes use of output costing.
- (vi) Standard hour is the standard time required per unit of production.

(b) Match the following correctly:

Merit rating	Pure finance not included in cost
Flexible budget	Profitability rate
Differential cost analysis	Evaluation of a job
Debenture interest	Liquidity
Angle of incidence	Considers costs by behavior
	Decision taking
	Budgetary control
	Basis for remunerating employees

(c) Choose the correct answer from the brackets:

- (i) The annual demand of a certain component bought from the market is 1,000 units. The cost of placing an order is Rs. 60 and the carrying cost per unit is Rs. 3 p.a. The Economic Order Quantity for the item is _____ (200, 400, 600)
- (ii) The monthly cost of maintenance of machinery for 12,000 machine hours run is Rs. 1,70,000 and for 18,500 hours it is Rs. 2,02,500. The cost of maintenance for 14,000 hours is Rs. _____. (1,90,000, 1,80,000, 1,85,000)
- (iii) A company's fixed cost amounts to Rs. 120 lakhs p.a. and its overall P/V ratio is 0.4. The annual sales of the company should be Rs. _____ lakhs to have a Margin of Safety of 25%. (400, 500, 600)

Ans.1)

- (a) (i) – False; (ii) – False; (iii) – False; (iv) – True; (v) – True; (vi) – False.



(b)

Merit rating	Basis for remunerating employees
Flexible budget	Considers cost by behavior
Differential cost analysis	Decision making
Debenture interest	Pure finance not included in cost
Angle of incidence	Profitability rate

(c) (i) – 200 units; (ii) – 1,80,000; (iii) – Rs. 400 lacs;

Set : 2

Q.1)

(a) State whether the following statements are True (T) or False (F):

- (i) Marginal costing is useful for long-term planning.
- (ii) Standards are arrived at based on past performance.
- (iii) Cost of floppy disk used for office computer is administration overhead.
- (iv) Opportunity cost is the value of benefit sacrificed in favor of an alternative course of action.
- (v) Bin cards show quantity and value of stores.
- (vi) A production order is an order received from a customer.
- (vii) LIFO method of pricing issues is useful during periods of inflation.
- (viii) Obsolete stocks can be determined by the frequency of issues.

(b) Fill in the blanks correctly:

- (i) _____ cost is the difference in total cost that results from two alternative courses of action.
- (ii) _____ is a must for meaningful inter firm comparison.
- (iii) The most powerful tool used to analyze and interpret the health of an enterprise is _____.
- (iv) Under _____ plan employees receive a constant portion of value added.
- (v) Idle time variance is always _____.
- (vi) Generally an item of expense, when identified with a specific cost unit is treated as _____.
- (vii) Contribution earned after reaching BEP is _____ of the firm.
- (viii) In 'make or buy' decisions, it is profitable to buy from outside only when the suppliers price is below the firm's own _____.



(c) Choose the correct answer from the brackets, giving brief workings:

- (i) In a company there were 1,200 employees on the rolls at the beginning of a year and 1,180 at the end. During the year 120 persons left service and 96 replacements were made. The rate of labor turnover according to flux method is _____ % (5.04, 4.03, 9.08)
- (ii) The variable cost of a product increases by 10% and the management raise the unit selling price by 10%. The fixed cost remain unchanged. Then BEP of the firm ____ (increases, decreases, remain the same)
- (iii) In a factory where standard costing is followed, 4,600 Kg. of materials at Rs. 10.50/Kg. were actually consumed resulting in a price variance of Rs. 4,800 (A) and usage variance of Rs. 4,000 (F). The standard cost of actual production is Rs. _____ (1,00,000, 96,000, 1,20,000)

Ans.1)

- (a) (i) – False; (ii) – False; (iii) – True; (iv) – True; (v) – False; (vi) – False; (vii) – True; (viii) – False.
- (b) (i) – Differential; (ii) – Uniform Costing;
(iii) – ratio analysis; (iv) – Ruckev;
(v) – Adverse; (vi) – Direct expense;
(vii) – Profit; (viii) – Variable Cost
- (c) (i) – 9.08%; (ii) – remains the same; (iii) – Rs.1,00,000

Set : 3

Q.1)

(a) Match the following correctly:

Relevant costs	Practical capacity
Primary packing materials	Indirect materials
Subsidised canteen facility	Control of inventory
Normal capacity	Long-term average capacity based on sales expectancy
JIT system	Value analysis
	Future costs affected by decisions taken
	Direct materials
	Non-monetary incentive

(b) Fill in the blanks correctly:

- (i) Work study consists of _____ and _____.
- (ii) Two methods used for calculation of equivalent production are _____ and _____.



- (iii) Economic Batch Quantity depends on _____ and _____ costs.
- (iv) Normal idle time cost should be charged to _____ while that due to abnormal reasons should be charged to _____.
- (v) Flexible budget recognizes the difference between _____ and _____.

(c) Choose the correct answer from the brackets, supported by brief workings:

- (i) If the capacity usage ratio of a production department is 90% and activity ratio is 99% then the efficiency ratio of the department is _____. (120, 110, 90)
- (ii) The output of three different products P, Q and R in a factory are 20,000 kg., 15,000 kg. and 15,000 kg. respectively. If the costs are in the proportion 4:6:7 then the cost per equivalent unit is Rs. _____. (10, 7, 5)
- (iii) The budgeted fixed overheads for a budgeted production of 10,000 units is Rs. 20,000. For a certain period the actual production was 11,000 units and actual expenditure came to Rs. 24,000. Then the volume variance is Rs. _____. [4,000 (A), 2,000 (F), 2,000 (F)]

Ans.1)

(a) Matching Statements:

- Relevant Costs : Future costs affected by decision taken
- Primary packing materials : Direct materials
- Subsidized canteen facility : Non-monetary incentive
- Normal Capacity : Long-term average capacity based on Sales expectancy
- JIT System : Control of inventory

(b) Fill in the blanks.

- (i) method study, time and motion study
- (ii) FIFO, average method
- (iii) Set up costs, storage
- (iv) Production overhead, Costing Profit and Loss Account
- (v) Variable, fixed costs.

(c) Choosing correct Answer :

- (i) 110%; (ii) Rs. 5; (iii) Rs. 2,000 (FAV)



Set : 4

Q.1)

(a) Match the following correctly:

Pareto distribution	Cost reduction
Angle of incidence	Semi-variable cost
Standard costing	Engineered cost
Electricity under taking	Profit earning capacity
Direct materials	Cost control
Telephone charges	Operating costing
	Margin of safety
	ABC analysis
	Relevant cost

(b) Fill in the blanks suitably:

- (i) Two broad methods of costing are _____ and _____
- (ii) A cost which does not involve any cash out flow is called _____ or _____
- (iii) Reorder level is _____ multiplied by _____.
- (iv) The normal value of current ratio is _____ and that of quick ratio is _____
- (v) Margin of safety is _____ or _____.
- (vi) Material usage variance is the sum of _____ and _____.

(c) Choose the correct answer from the brackets, giving brief workings:

- (i) The budgeted annual sales of a firm is Rs. 80 lakhs and 25% of the same is cash sales. If the average amount of debtors of the firm is Rs. 5 lakhs, the average collection period of credit sales _____ months.
(1/2; 1 ; 1.1/2)
- (ii) A firm requires 16,000 nos of a certain component which it buys at Rs. 60 each. The cost of placing an order and following it up is Rs. 120 and the annual storage charges works out to 10% of the cost of the item. To get maximum benefit the firm should place order for _____ units at a time. (1000; 900; 800)
- (iii) The repairs and maintenance of machinery in a factory is found to be a semi-variable cost having some relationship with the no. of machine hours run. It was Rs. 17,500 during October 2004 for 7,500 machine hours worked and Rs. 15,400 for November 2004 when only 5,400 machine hours were worked. The budgeted cost of repairs and maintenance for December 2004 when 6,200 machine hours are expected to be worked will be Rs. _____ (17,200; 16,800; 16,200)



- (iv) The standard variable overhead cost of a product is Rs. 10 (5 hours @ Rs. 2/hr.). In a certain months it took 1,800 hours at a cost of Rs. 4,200 to manufacture 400 units. The variable overhead expenditure and efficiency variances are _____ and _____ respectively. [Rs. 600 (F) and Rs. 400 (F); Rs. 600 (A) and Rs. 400 (F); Rs. 600 (F) and Rs. 400(A)]

Ans.1)

(a) Match the following correctly:

Pareto distribution	ABC analysis
Angle of incidence	Profit earning capacity
Standard costing	Cost Control
Electricity undertaking	Operating Costing
Direct materials	Engineering Cost
Telephone charges	Semi-variable cost

(b) (i) Specific order costing, Operation Costing

(ii) Notional Cost, Imputed Cost

(iii) Maximum usage, Maximum lead period

(iv) 2,1

(v) Sales minus B.E. Sales, Profit / (C/S)

(vi) Mix variance, Yield variance

(c) (i) – 1 month;

(ii) – 800 unit (EOQ);

(iii) Rs. 16,200;

(iv) – Variable overhead expenditure variance : Rs.600 (A)

Set : 5

Q.1)

(a) Match the following correctly with what it relates:

Uniform costing	Supervisors' salaries
Variance analysis	Decision making
Point rating	Design of the product
Value engineering	Technique to assist inter - firm comparison
Stepped cost	Job evaluation
	Engineered cost
	Management by exception
	Method of costing



(b) State whether the following statements are True (T) or False (F):

- (i) If an expense can be identified with a specific cost unit, it is treated as direct expense.
- (ii) Time and motion study which is a function of the engineering department, is useless for the determination of wages.
- (iii) Fixed costs vary with volume rather than time.
- (iv) The relationship of value, function and cost can be expressed as: $\text{Cost} = \text{Value}/\text{Function}$.
- (v) Future costs are not relevant while making management decisions.
- (vi) In break-even analysis it is assumed that variable costs fluctuate inversely with volume.

(c) In the following cases one of the answers is correct. Choose the correct answer and give your workings/reasons briefly:

- (i) A company maintains a margin of safety of 25% on its current sales and earns a profit of Rs. 30 lakhs per annum. If the company has a profit volume (P/V) ratio of 40%, its current sales amount to
 - A: Rs. 200 lakhs
 - B: Rs. 300 lakhs
 - C: Rs. 325 lakhs
 - D: none of the above.
- (ii) In a factory of PEE Ltd. where standard costing is followed, the budgeted fixed overheads for a budgeted production of 4,800 units is Rs. 24,000. For a certain period actual expenditure incurred was Rs. 22,000 resulting in a fixed overhead volume variance of Rs. 3,000 (Adv.). Then actual production for the period was
 - A: 5,400 units
 - B: 4,200 units
 - C: 3,000 units
 - D: none of the above.
- (iii) ZEE Ltd. uses material A for the production of product M. The safety stock of material A is 300 units: the supplier quotes a delivery delay of two or three weeks. If the company uses 500 to 800 units a week according to the activity levels, the re - order level of material A will be
 - A: 2,300 units
 - B: 2,400 units
 - C: 2,700 units
 - D: 2,800 units



Ans.1)

(a) Match the following correctly with what it relates:

Uniform costing	Technique to assist interfirm comparison
Variance analysis	Management by exception
Point rating	Job evaluation
Value engineering	Design of the product
Stepped cost	Supervisors' salaries

(b) (i) – True; (ii) – False; (iii) – False; (iv) – False; (v) – False; (vi) – False.

(c) (i) – B : Rs. 300 lacs

(ii) – B : 4,200 units

(iii) – C : 2,700 units

Set : 6

Q.1)

(a) Match the following correctly:

Scatter Diagram	Production Order
Escalator Clause	Reverse Cost Method
Perpetual Inventory	Splitting of Semi-variable Costs
Material Requisition	Contract Costing
By-product Cost Accounting	Method of maintaining Store records
	Purchase Order
	Continuous Verification of Stores

(b) State whether the following are True (T) or False (F):

- (i) Variable Cost varies with time.
- (ii) ABC analysis is based on the unit price of materials.
- (iii) Cenvat credit is allowed on the basis of Central Excise Gate Pass.
- (iv) Differential Costing and Marginal Costing mean the same thing.
- (v) Integral accounts merge financial and cost accounts in one set of accounts.



(c) Choose the correct answer from the answers given for each of the following questions. Indicate workings briefly:

(i) A worker has a time rate of Rs. 15/hr. He makes 720 units of a component (standard time:5 minutes/unit in a week of 48 hours. His total wages including Rowan bonus for the week is _____.

- (A) Rs. 792 (B) Rs. 820 (C) Rs. 840 (D) Rs. 864.

(ii) A television company manufactures several components in batches. The following data relates to on component:

Annual demand:32,000 units; Set-up cost per batch:Rs. 120.

Annual rate of interest: 12%; Cost of production per unit: Rs. 16.

The Economic Batch Quantity is _____ units

- (A) 2,500 (B) 4,000 (C) 3,000 (D) 2,000

(iii) A company has annual turnover of Rs. 200 lakhs and an average C/S ratio of 40%. It makes 10% profit o sales before charging depreciation and interest which amount to Rs.10 lakhs and Rs. 15 lakhs respectively The annual fixed cost of the company is _____.

- (A) Rs. 85 lakhs (B) Rs. 75 lakhs (C) Rs. 60 lakhs (D) Rs. 55 lakhs.

(iv) Sales for two consecutive months of a Company are Rs. 3,80,000 and Rs.4,20,000. The Company's net profits for these months amounted to Rs. 24,000 and Rs. 40,000 respectively. There is no change in C/S ratio or fixed costs. The C/S ratio of the Company is _____.

- (A) 1/3 (B) 2/5 (C) 1/4 (D) None of these.

(v) The average period of credit allowed by a Company which has an annual credit sales of Rs. 120 lakhs is one month. By reducing the period of credit to half-a-month, sales fall to Rs. 108 lakhs. The fall in the amount of average Debtors is _____.

- (A) Rs. 5 lakhs (B) Rs. 4 lakhs (C) Rs. 5.5 lakhs (D) Rs. 6 lakhs.

(vi) In activity based costing, costs are accumulated by

- (A) Cost objects (B) Cost benefit analysis
(C) Cost Pool (D) None of the above

Ans.1)

(a) Match the following correctly:

Scatter Diagram	Splitting of Semi-variable costs
Escalator Clause	Contract Costing
Perpetual Inventory	Method of maintaining store records
Material Requisition	Production order
By-product Cost Accounting	Reverse cost method

(b) (i) – False; (ii) – False; (iii) – True; (iv) – False; (v) – True.



- (c) (i) – D : Rs. 864
- (ii) – D : Rs. 2000 units
- (iii) – A : Rs. 85 lacs
- (iv) – B : 2/5
- (v) – C : Rs. 5 lacs
- (vi) – A : Cost pool

Set : 7

Q.1)

(a) Match the Statement in Column I with that in Column II:

Column I	Column II
(i) Cost driver	(i) Delivers what is required in the correct place at the correct time.
(ii) Value analysis	(ii) Measures the divisional performance
(iii) Material requirement planning	(iii) Purchase order processed
(iv) Residual income	(iv) Shows profitability and capacity utilization
(v) Performance of public	(v) Promotes innovation and creativity

(b) Fill in the blanks:

- (i) Transfer Pricing have a significance for the purpose of measurement of _____ performance.
- (ii) MNC consciously manipulate the transfer prices as an instrument of maximizing achievement of _____.
- (iii) Efficiency is basically a ratio of _____ and _____.
- (iv) A flexible budget recognizes the behavior of _____ and _____.
- (v) Profit volume graph shows the relationship between _____ and _____.

(c) Which of the following statements are True or False:

- (i) In ZBB important reference is made to previous level of expenditure.
- (ii) Just-in-time deals with controlling defects in time.
- (iii) Production budget is prepared before sales budget.
- (iv) A key factor, which at a particular time or over a period, will not limit the activities of the organization.
- (v) Profit planning and control is not a part of budgetary control mechanism.



Ans.1)

(a)	Column I	Column II
	(i) Cost driver	(iii) Purchase order processed
	(ii) Value analysis	(v) Promotes innovation and creativity
	(iii) Material requirement planning	(i) Delivers what is required in the correct place at the correct time.
	(iv) Residual income	(ii) Measures the divisional performance
	(v) Performance of public enterprises	(iv) Shows profitability and capacity utilization.

(b) (i) – divisional; (ii) – corporate goal; (iii) – input, output; (iv) – variable, fixed costs (v) – sales, profit

(c) (i) – False; (ii) – False; (iii) – True; (iv) – False; (v) – False.



Appendix One

- Formulae



Study Note : 1 Financial, Cost and Management Accounts

Techniques

Methods	Character	Suitable for
1. Process Costing	Continuous Production	Sugar, Cement, Chemical, Fertilizer
2. Job / Contract Costing	One Job differ from other Job. (Tailor made job)	Construction of Road, Bridge, Hospital
3. Operation Costing	Service Provider	Transportation, Hospital, Hotel, Telecom, Bank
Variation of above methods		Information technology
Batch Costing	A lot produce at once	Pharma, Jewelry
Joint Costing	To some extent Joint then separate	Crude Oil
Multiple Costing	Various method applied	Car, Radio, TV and Electronics Items

Techniques :

	Techniques can be used in any industries at any time. These techniques more than one can be applied at a time	
1. Marginal Costing	For Decision Making	Decision for Price & Volume
2. Standard Costing	For Control & Reduction Cost	Variance Analysis
3. Budgetary Control	For Control & Reduction Cost	Control of element wise cost
4. Uniform Costing	For Control & Reduction Cost	Compare with other units in the same industry
5. Inter firm Comparison	For Control & Reduction Cost	Compare with other firm
6. Target Costing	For Control & Reduction Cost	Phasewise controlling
7. Activity Base Budget	For Control & Reduction Cost	Control through value added activity
8. Activity Base Management	For Control & Reduction Cost	Control through value added use of resources

Study Note : 2 Material Costing

- (1) $EOQ = \sqrt{2AO/C}$ = A = Annual Demand
 O = Ordering Cost
 C = Carrying Cost p.a.

Carrying Cost is the cost incurred for storage of Material, Space cost, Insurance and Interest of Working Capital to hold inventory.



(2) Stock Level

- (i) Reorder level = Maximum consumption x Max period for Delivery
- (ii) Minimum Level = ROL – (Normal consumption x Normal period for Delivery)
- (iii) Maximum Level = ROL + ROQ – (Minimum consumption x Min. period for Delivery)
- (iv) Average Level = Max. Level + Min. Level / 2
- (v) Safety Level = Maximum Lead time demand – Mean Lead time demand

(3) Stock Turnover Ratio = Consumption of Material/Average Stock

(4) Average Inventory Cost = (Order Size/2) x Price per unit.

ABC Analysis - Illustrative

Category	% of Value	% of Qty	Example	Control	Valuation
A	60 to 70%	10 to 20%	Electrical Motor	Tight	Accurate
B	20 to 30%	20 to 30%	Belt	Moderate	Accurate
C	10 to 20%	60 to 70%	Bolt	Loose	Estimated

Study Note : 3 Labor Costing

Illustration of Pay slips in Industry

Basic	Cost to the Company Concept (CTC)
VDA	includes
FDA	<u>Monthly Basis</u>
<u>Allowances</u>	Basic
Transport	Variable DA
Education	Fixed DA
<u>House Rent Allowance</u>	<u>Allowances</u>
<u>Gross</u>	HRA
Deduction for	Medical
PF	Education
Credit Society	Transport
Income tax	<u>Contribution of Company</u>
Professional Tax	Contribution of PF



Appendix One - Formulae

Canteen	<u>Yearly Basis</u>
Net Salary	Total Amount / 12
	Ex-gratia or Bonus
	Super annuation
	Production or any other annual incentive
	Annual incentives

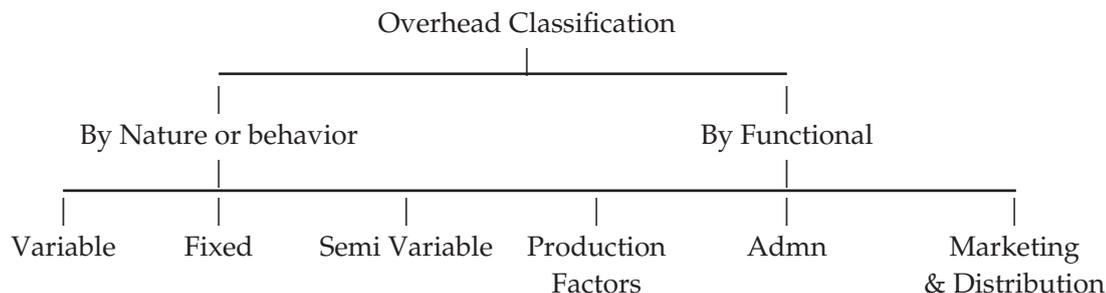
	Total CTC _____
	(This is not complete list of items)

Study Note : 4 Overheads

Overhead (Sum total of Indirect Material + Indirect Labor + Indirect Expenses)

(Indirect Material – Stores, consumables, Depreciation, power, Indirect Labor – Wages of Indirect employees, salary of supervisor etc.)

Indirect expenses – Admn Expenses, Traveling, Audit Fee, Computer Expenses



Absorption Methods

<u>Method</u>	<u>Suitable</u>
(1) % of Direct Material	Where material to each product substantial Diff. say in pharma. Some material Rs.10/Kg. and one may be Rs. 5,000/Kg.
(2) % of Direct Labor	When Direct Labor is substantially engaged
(3) % Prime cost	When material and labor unequally important
(4) Labor hour Rate	Labor oriented (Manual work is important)
(5) Machine Hour Rate	When precision machining like Engineering is important

Finding under Absorption / Over absorption

- (1) Step I - Finding Absorption Rate = Estimated OH/Estimated Basis
- (2) Step II - Recovered/ Absorption OH = Absorption Rate x Actual Activity
- (3) Step III - Under/Over Absorption Recovered OH – Actual OH = + (over) – (under).



Basis of Apportionment of overheads (some illustration)

<u>Expenses</u>	<u>Suitable Basis</u>
(1) Electricity	Electrical Points
(2) Power	Horse Power
(3) Indirect Wages	Direct Wages
(4) Depreciation	Value of Machinery
(5) Insurance	Value of Machinery
(6) Canteen Exp.	No. of employees
(7) Sundry Exp.	Direct Wages
(8) Rent, Rates & taxes	Sq. Area

Study Note : 12 Marginal Costing

(1) Cost Sheet under Marginal Costing

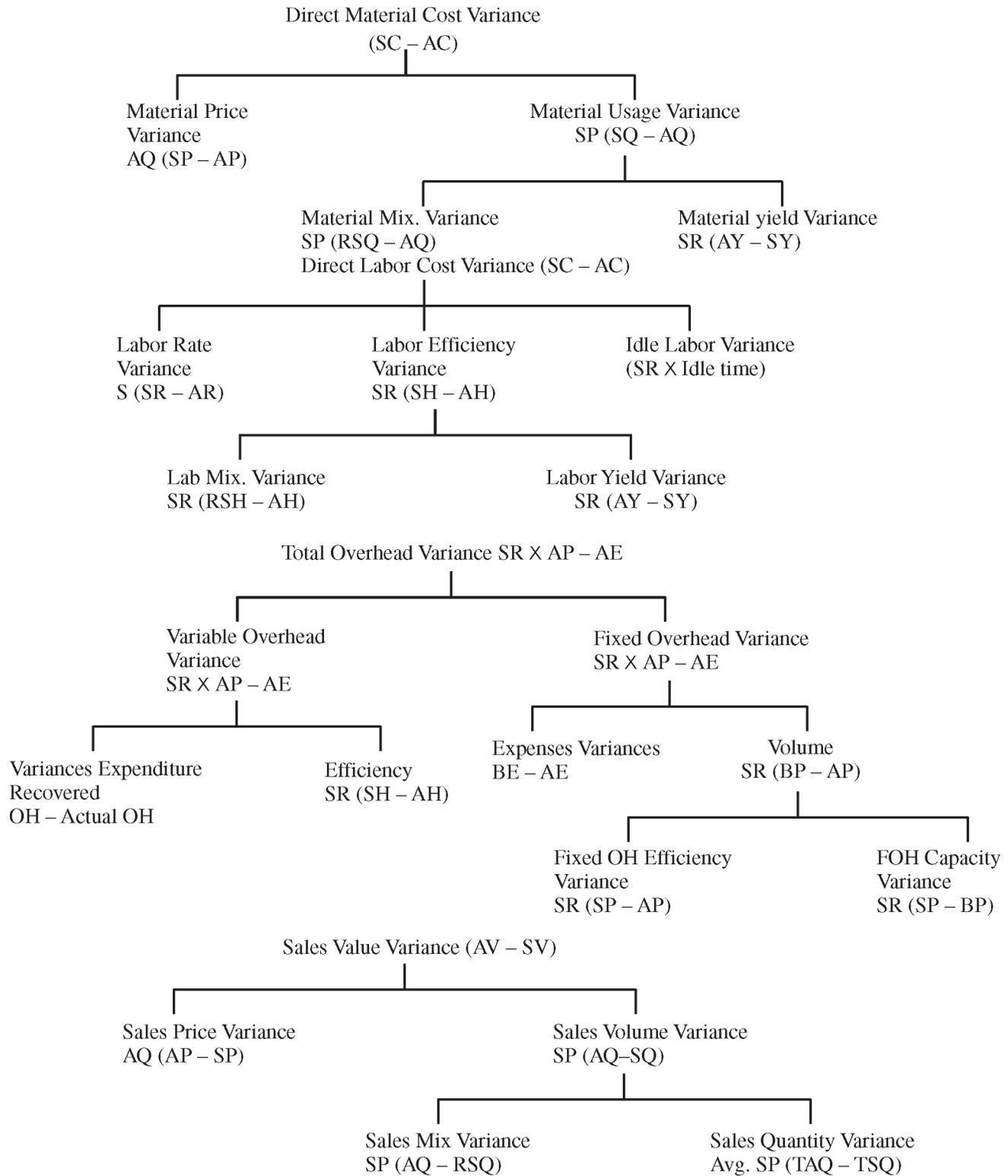
Element	Total	Per unit
	Rs.	Rs.
(A) Sales		
(B) Variable cost		
(i) Direct Material		
(ii) Direct Labor		
(iii) Variable OH		
Total Variable (B)	_____	_____
(C) Contribution		
(A – B)	_____	_____
(D) Fixed Cost		
(E) Profit (C – D)	_____	_____

(2) Important Formula

- (1) $P/V \text{ Ratio} = \text{Contribution}/\text{Sales} \times 100$
- (2) $\text{BEP in units} = \text{Fixed Cost}/\text{Contribution per unit}$
 $\text{BEP in Rs.} = \text{Fixed Cost}/(\text{PV Ratio})$
- (3) $\text{Margin of Safety} = \text{Sales} - \text{BEP}$
- (4) Expected Profit when sales is given
 $\text{Sales} \times \text{PV Ratio} = \text{Contribution}$
 $\text{Contribution} - \text{Fixed Cost} = \text{Profit}$
- (5) Expected Sales, when expected profit is given
 $\text{Fixed Cost} + \text{Expected Profit}/\text{Pv Ratio}$



Study Note : 14 - Standard Costing





Study Note : 16 Activity Base Costing

Illustration

<u>Activity</u>	<u>Cost Drivers</u>
1. Purchase	Purchase Order
2. Stores	Issue slips
3. Inspection	Inspection orders
4. Engineering	Production Run/Setup
5. Maintenance	Repairs order
6. Despatch	Deliveries
7. Material Handling	No. of Movement
8. Machine Shop	Machine Hours

Methodology of Application of ABC

Activity or Dept.	Total OH (O) Rs.	Driver	Measurement of Driver	Pull Rate Rs. (O/D)	Product wise Driver			
Purchase	1,00,000	P.O.	500	200	X	Y	Z	
Stores	2,00,000	I.S.	2000	100	P.O	100	200	200
Engineering	1,00,000	P.R.	10	10000	I.S.	1000	400	600
					P.R.	6	3	1

Application to Product Cost Sheet under ABC

Department	X Rs.	Y Rs.	Z Rs.
Purchase	200 x 100 20,000	200 x 200 40,000	20 x 200 40,000
Stores	100 x 1,000 1,00,000	100 x 400 40,000	100 x 600 60,000
Engineering	10,000 x 6 60,000	10,000 x 3 30,000	10,000 x 1 10,000
Total	1,80,000	1,10,000	1,10,000
Production	1,000	2,000	2,200
Per unit	180	55	50

