

**Bachelor of Business Administration
(B.B.A.)**

BBA - 304

**COST & MANAGERIAL
ACCOUNTING**



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LESSON : 1

COST ACCOUNTING : NATURE AND SCOPE

Broadly speaking, there are three types of accounting - Financial Accounting, Cost Accounting and Management Accounting.

1.0 Financial Accounting : Financial Accounting is mainly concerned with recording business transactions in the books of accounts for the purpose of presenting final accounts to Board of Directors, shareholders and tax authorities etc. It is define as *“the art of recording, classifying and summarising in a significant manner and in terms of money, transactions and events, which are in part at least, of a financial character and interpreting the results thereof.* The purpose of financial accounting it is to summarise the information recorded in the following three-statements at the end of the year :

- (a) Profit and loss Account-showing the net profit or loss during the year;
- (b) Balance sheet-showing the financial position of the firm at a point of time; and
- (c) Statement of Sources and Application of Funds - showing the flow of funds arising from activities during the year.

However, financial accounting is faced with certain limitations. Financial accounting is so limited and inadequate in regard to the information which it can supply to management that business have been eager to adopt supplementary methods like cost accounting. The limitations of financial accounting are summarised as follows :

1. Provides only limited information : There are now no set patterns of business on account of radical changes in business but it may have to be incurred because it may bring advantage to the business in the long-run or may be necessary simply to sell the name of business. The management needs a lot of varied information to decide whether on the whole it will be justifiable to

incur a particular expenditure or not. Financial accounting fails to provide such information.

2. Treats figures as single, simple and silent items. Financial accounting fails to make the people realise that accounting figures are not mere isolated phenomena but they represent a chain of purposeful and pertinent events. The role of accountant these days is not only of a book-keeper and auditor, but also that of a financial adviser. Recording of transactions is now the secondary function of the accountant. His primary function now is to analyse and interpret the results.

3. Provides only a post-mortem record of business transactions. Financial accounting provides only a post-mortem record of business transactions since it records transactions only on historical basis. These days business decisions are made on the basis of estimates and projections rather than historical facts. Of course, past records are helpful in: making future projections but they alone are not sufficient. Thus, needs of modern management demand a break-up from the principles and practice of traditional accounting.

4. Considers only quantifiable information. Financial accounting considers only those factors which are capable of being quantitatively expressed. In modern times, the concept of welfare state has resulted in increased government interference in all sectors of the national economy. The management has, therefore, to take into account government decisions over and above purely commercial considerations. Some of these factors are not capable of being quantitatively expressed and hence their impact is not reflected in financial statements.

5. Financial accounting fails to provide information needs of different levels of management. Company form of business organisation has divorced ownership from management. The shareholders are only contributors of capital. The business is run in reality by different executives, each an expert in his area. There are usually three levels of management-Top Management, Middle Management and Lower Management. The type of information required by

each level of management is different. The top management is mainly concerned with the policy decisions. They, therefore, are interested in knowing about the soundness of the plans, proper structuring of the organisation, proper delegation of authority and its effectiveness. The middle management executives function as co-ordinators. They must know: (i) What happened? (ii) Where happened? and (iii) Who is responsible? The lower management, people function as operating supervisors. The reports submitted to them should give details about the planned performance, actual performance and the deviations with their reasons. Financial, accounting does not have a built-in system to provide all such information.

6. Inadequate information for price fixation - Costs are not available as an aid in determining prices of products, services or production orders.

7. No cost comparison - Comparison is the foundation of modern management control But financial accounting does not provide data for comparison of costs of different periods, different jobs or departments, or sales territories etc.

1.1 Cost Accounting : Compared with financial accounting, cost accounting is relatively a recent development. In fact, cost accounting started as a branch of financial accounting, but now it may well be regarded as a profession in its own right. The vital importance that cost accounting has acquired in the modern age is because of the growth of complexities in modern industry.

Financial information supplied by financial accounting in the form of financial statements stated above relate to past activity. Cost accounting is not so restricted and is concerned with the ascertainment of past, present and expected future costs of products manufactured or services supplied. Detailed meaning and definition of cost accounting is given later in this chapter. In brief, cost accounting is the activity of finding out the costs of products or services.

Cost accounting has primarily developed to meet the needs of management. Profit and Loss Account and Balance Sheet are presented to management by the financial accountant. But modern management needs much

more detailed information than supplied by these financial statements. Cost accounting provides detailed cost information to various levels of management for efficient performance of their functions. The information supplied by cost accounting acts as a tool of management for making optimum use of scarce resources and ultimately add to the profitability of business.

1.2 MANAGEMENT ACCOUNTING

Management accounting means accounting designed for the management, i.e., accounting which provides necessary information to the management for discharging its functions. It is basically concerned with presentation of accounting information in a manner which can assist the management in the creation of policy and in the day-to-day operations of an undertaking. Its aim primarily is to assist the management in performing its functions effectively.

The Chartered Institute of Management Accountants (CIMA) London, defines Management Accounting as follows: “The application of professional knowledge and skill in the preparation of accounting information in such a way as to assist management in the formation of policies and in the planning and control of the operations of the undertaking.”

The definition given by the Management Accounting Team of the Anglo-American Council of Productivity seems to be more precise. It reads :

“Management accounting is the presentation of accounting information in such a way as to assist management in the creation of policy and in the day-to-day operations of an undertaking”.

The above definitions clearly indicate that management accounting is concerned with accounting information which is useful to the management. Efficiency of the various phases of management is, as a matter of fact, the common thread which underlies all these definitions. However, it should be clearly understood that it does not supplement financial accounting but rather it supplements it in order to serve the diverse requirements of modern management.

1.2.1 Tools of Management Accounting : Management accounting uses the following tools to properly discharge its duty towards management

(i) **Financial Accounting :** As stated earlier management accounting is mainly concerned with re-arranging the information provided by the financial accounting in a way most suitable for managerial decision-making. Hence, it cannot effectively discharge its functions without a properly designed financial accounting system.

(ii) **Financial Statement Analysis:** Financial statement analysis is concerned with methodical classification and evaluation of the information provided by the income statement and the balance sheet so as to afford full diagnosis of the profitability and financial soundness of the business. Hence, financial statement analysis is also a useful tool of management accounting.

(iii) **Funds Flow Analysis :** This is based on funds flow statement, which reveals the changes in the working capital position over a period of time. Working capital is considered to be the life-blood of the business and hence its effective and efficient management is necessary for the very survival of the business. Funds flow analysis is, therefore, an important tool of management accounting.

(iv) **Cash Flow Analysis :** Cash flow analysis helps the business in its liquidity planning. It tells the management about the sources and applications of cash. It enables an enterprise for adjusting the liquidity position, re-arranging the maturity structure of its debts and making arrangements for availability of cash at the times desired.

(v) **Budgetary Control :** This involves framing of budgets, comparison of actual performance with the budgeted figures, computation of variances, and undertaking remedial measures for minimising the variances or revising the budgets, if necessary. The technique of budgetary control helps the management in planning their operations and improving their performance. Hence, it is an important tool of management accounting.

(vi) Management Reporting : The efficiency of a business to a large extent is governed by the pertinence and regularity of the information provided to the managerial personnel. As a matter of fact, the ultimate effectiveness of information is itself dependent upon the form and timing of its presentation. Hence, an effective and efficient management information or reporting system is one of the important tools of management accounting.

(vii) Cost Analysis : In today's world of competition, the importance of cost analysis cannot be under emphasised. Cost analysis includes applications of both costing methods, viz., job costing, process costing, etc., and costing techniques, viz., marginal costing, absorption costing, uniform costing etc. All these methods and techniques come in the ambit of "Cost Accounting".

1.3 MEANING AND NATURE OF COST ACCOUNTANCY

Cost accountancy is a wide term. It means and includes the principles, conventions, techniques and systems which are employed in a business to plan and control the utilisation of its resources. It is defined as "the application of costing and cost accounting principles, methods and techniques to the science, art and practice of cost control and the ascertainment of profitability. It includes the presentation of information derived there from for the purposes of managerial decision making" - C.I.M.A. London.

Cost accountancy is thus the science, art and practice of a cost accountant. It is a science in the sense that it is a body of systematic knowledge which a cost accountant should possess for the proper discharge of his duties and responsibilities. It is an art as it requires the ability and skill on the part of a cost accountant in applying the principles of cost accountancy to various managerial problems like price fixation, cost control, etc. Practice refers to constant efforts on the part of cost accountant in the field of cost accountancy. The theoretical knowledge alone would not enable a cost act, to deal with the intricacies, he should have sufficient practical training.

Cost accountancy includes several subjects. These are costing, cost accounting, cost control and cost audit. These are described below :

Costing : Costing refers to the process of cost finding. It is defined as “the technique and process of ascertaining costs”. It has also been defined as “the classifying, recording and appropriate allocation of expenditure for the determination of costs, the relation of these costs to sales value and the ascertainment of profitability. Thus costing consists of principles and rules which are used for determining: (a) the cost of manufacturing a product like chemicals, television, etc. and (b) the cost of providing a service, i.e., electricity, transport, etc.

Cost Accounting : Cost accounting is a system by means of which costs of products or services are ascertained and controlled. It is defined as “the application of accounting and costing principles, methods and techniques in the ascertainment of costs and the analysis of savings and/or excesses as compared with previous experience or with standards”.

Thus, whereas costing is simply cost finding, which can be carried out by means of memorandum statements, arithmetic process etc., cost accounting denotes the formal accounting mechanism by means of which costs are ascertained. In simple words, costing means finding out the cost of something, and cost accounting means costing using double entry book keeping methods as a basis for ascertainment of costs. However, cost accounting and costing are often used interchangeably.

Cost Control : Cost control is the function of keeping costs within prescribed limits. In other words, cost control is compelling actual costs to conform to planned costs. Amongst the various techniques used for cost control, the two most popular are budgetary control and standard costing. These will be discussed in detail in lessons 13 and 14 respectively.

Cost Audit : Cost audit is the specific application of auditing principles and procedures in the fields of cost accounting. It is defined as the verification

of cost accounts and a check on the adherence to the cost accounting plan. It has thus two functions - (a) to verify that the cost accounts have been correctly maintained and complied, and (b) to check that principles laid down have been properly followed.

1.4 APPLICATIONS OF COSTING

Cost accounting is not applicable only to manufacturing concerns. Its applications are in fact much wider. All types of activities, manufacturing and non-manufacturing, in which monetary value is involved, should consider the use of cost accounting. Wholesale and retail businesses, banking and insurance companies, railways, airways, shipping and road transport companies, hotels, hospitals, schools, colleges and universities, all may employ cost accounting techniques to operate efficiently. It is only a matter of recognition by the management of the applicability of these concepts and techniques in their own fields of endeavour.

1.5 COST ACCOUNTING VS. FINANCIAL ACCOUNTING

Financial accounting, as pointed out previously, is concerned with recording, classifying and summarizing financial transactions pertaining to an accounting period. The basic objective is to provide a commentary to the shareholders and outside parties on the financial status of an enterprise in the form of a profit and loss account and balance sheet. The profit or loss of business operations is revealed through these statements year after year, observing the statutory requirements of the Companies Act, 1956.

Cost accounting, on the other hand, aims at providing prompt cost data for managerial planning, controlling and decision making. It offers a complete explanation as to how the scarce inputs are put to use in business. The sources of efficiency or inefficiency are revealed through periodic reports. The profit or loss relating to each job, department or product can also be found out easily. The following table tries to draw the curtain between financial accounting and cost accounting :

Basis of distinction	Financial Accounting	Cost Accounting
Statutory Requirements	These accounts have to be prepared according to the legal requirements of Companies Act and Income Tax Act	Maintenance of these accounts is voluntary except in certain industries where it has been made obligatory to keep cost records under the Companies Act.
Purpose	The main purpose of financial accounting is to prepare profit and loss account and balance sheet for reporting to owners and outside agencies i.e., external users	The main purpose of cost accounting is to provide detailed cost information to management i.e., internal users.
Analysis of cost and Profit	Financial accounts reveal the profit or loss of the business as a whole during a particular period. It does not show the figures of cost and profit for individual products, departments and processes, etc.	Cost accounts show the detailed Cost and profit data for each product line, department, process etc.
Periodicity of Reporting	Profit and Loss Account and Balance Sheet are prepared periodically, usually on an annual basis.	Cost reporting is a continuous process and may be daily, weekly, monthly, etc.
Control aspect	It keeps records of financial transactions and does not attach any importance to control aspect.	It is used as a detailed system of controls. It takes the help of certain special techniques like standard costing and budgetary control.
Nature	It is concerned with historical records. The historical nature of financial accounting can be easily understood in the context of the purpose for which it was designed.	Cost accounting does not end with what has happened in the past. It extends to plans and policies to improve performance in the future.

Nature of statements prepared	General purpose statements like Profit and Loss Account and Balance sheet are prepared by it. That is to say that financial accounting must produce information that is used by many classes of people none of whom have explicitly defined information needs.	It generates special purpose statements and reports like Report of Loss of Materials, Idle Times Report Variance Report etc. Cost accounting identifies the user, discusses his problems and needs and provides tailored information.
Classification of Records purpose	Financial accounting classifies records and analysis transactions in subjective manner i.e. according to nature of expenditure.	Cost accounting records and classifies expenditure according to the purpose for which cost is incurred.

1.6 COST ACCOUNTING COMPARED WITH MANAGEMENT ACCOUNTING

Cost accounting and management accounting are both internal to an organisation. Both have, more or less, the same objective of assisting management in its planning, decision making etc. It is not worthwhile to distinguish the two inter-related disciplines as two branches of accounting. Consider what experts opine in this regard.

Dobson : Management accounting is so broad and comprehensive that it includes both financial and cost accounting.

C.T. Horngren : Cost accounting is management accounting plus a small part of financial accounting.

It is because of the overlapping nature of the two in many areas, that everyone talks of cost and management accounting as a single discipline. However, some distinctions can be drawn thus :

Table : Distinction between Cost Accounting and Management Accounting

Point of distinction	Cost accounting	Management accounting
Coverage	It deals with ascertainment, allocation, distribution and accounting aspects of costs	It is concerned with the impact and effect aspects of costs.
Position in the hierarchy	Cost accountant is generally placed at a lower level of hierarchy than a management accountant.	Management accountant assumes a superior level in the management hierarchy.
Approach	Narrow, as the focus is, primarily on cost data	Wider, as one may have to use certain economic and statistical data along with costing data to assist managerial decision making.
Emphasis	It lays emphasis on cost ascertainment and cost control.	It is used as a decision making technique.
Scope	The scope of cost accounting is limited to important techniques like variable costing, break-even analysis and standard costing.	It Makes use of other techniques like funds flow, ratio analysis, cash flow etc. in addition to variable costing, break-even analysis and standard costing. This includes financial accounting, tax planning and tax accounting.
Focus	It focuses on short term planning. Sophisticated tools not employed for forecasting purposes.	It focuses on sort range and long range planning and uses Sompsticated technique in the planning and control process.

Orientation	It deals with data supplied by financial accounting, orientation is not futuristic.	Futuristic in orientation, is more predictive in nature than cost accounting.
Evolution	The evolution of cost accounting is mainly due to the limitations of financial accounting.	It draws heavily on cost data and other information derived from cost accounting. It is merely an extension of the managerial aspects of cost accounting.
Purpose	Its main purpose is to report current and prospective costs of product, service, department, job or process	Its main objective is to provide all accounting information relevant for use in formulation of policies; planning, controlling decision making etc. to ensure maximum profits

1.7 IMPORTANCE OF COST ACCOUNTING

The shortcomings inherent in financial accounting have made the management to realize the importance of cost accounting. Whatever may be the type of business, it involves expenditure on labour, materials and other items required for manufacturing and disposing of the product. More over, big business requires delegation responsibility, division of labour and specialisation. Management has to avoid the possibility of waste at each stage. Management has to ensure that no machine remains idle, efficient labour gets due initiative, proper utilisation of by-products is made and costs are properly ascertained. Besides management, creditors and employees are also benefited in numerous ways by installation of a good costing system in an industrial organisation. Cost accounting increases the overall productivity of an industrial establishment and, therefore, serves as an important tool in bringing prosperity to the nation.

Thus, the importance of cost accounting in various spheres can be summarised under the following headings :

1.7.1 Cost Accounting and Management : Cost accounting provides invaluable aid to management. It is so closely allied to management that it is difficult to indicate where the work of the cost accountant ends and managerial control begins. Adequate costing data help management in reaching certain important decisions such as, whether hand labour should be replaced by the machinery or not; whether a particular product line should be discontinued or not etc.

Costing checks recklessness and avoids occurrence of mistakes. Costs can be reduced by proper organisation of the plant and executive personnel. As an aid to management it also provides important information to enable management, to maintain effective control over stores and inventory, to increase efficiency of the business, and to check waste and losses. It facilitates delegation of responsibility for important tasks and rating of employees. However, for all this, it is necessary for the management to be capable of using in a proper way the information provided by the cost accounts. The various advantages derived by managements on account of a good costing system can be put as follows:

1. Useful in periods of depression and competition : During trade depression the business cannot afford to have leakages which pass unchecked. The management should know where economies may be sought, waste eliminated and efficiency increased. The business has to wage a war for its survival. The management should know the actual cost of their products before embarking on any scheme of reducing the prices or giving tenders. Costing system facilitates this.

2. Helps in, pricing decisions : Though economic law of supply and demand and activities of the competitors, to a great extent, determine the price

of the article, cost to the producer does play an important part. The producer can take necessary guidance from his costing records.

3. Helps in estimates : Adequate costing records provide a reliable basis upon which tenders and estimates may be prepared. The chances of losing a contract on account of over-rating or the loss in the execution of a contract due to under-rating can be minimised. Thus, ascertained costs provide a measure for estimates, a guide to policy, and a control over current production.

4. Cost Accounting helps in channelising production on right lines : Costing makes possible for the management to distinguish between profitable and non-profitable activities. Profits can be maximised by concentrating on profitable operations and eliminating non-profitable ones.

5. Helps in reducing wastage : As it is possible to know the cost of the article at every stage, it becomes possible to check various forms of waste, such as of time, expense etc., or in the use of machinery, equipment and tools.

6. Costing makes comparison possible: If the costing records are regularly kept, comparative cost data for different periods and various volumes of production will be available. It will help the management in forming future lines of action.

7. Provides data for periodical profit and loss accounts : Adequate costing records supply to the management such data as may be necessary for preparation of profit and loss account and balance sheet, at such intervals as may be desired by the management. It also explains in detail the sources of profit or loss revealed by the financial accounts, thus helps in presentation of better information before the management.

8. Costing results into increased efficiency : Losses due to wastage of materials, idle time of workers, poor supervision etc. will be disclosed if the various operations involved in manufacturing a product are studied by a cost

accountant. The efficiency can be measured and costs controlled and through it various devices can be framed to increase the efficiency.

9. Costing helps in inventory control and cost reduction : Costing furnishes control which management requires in respect of stock of materials work-in-progress and finished goods. Costs can be reduced in the long-run when alternates are tried. This is particularly important in the present-day content of global competition. Cost accounting has assumed special significance beyond, cost control this way.

10. Helps in increasing productivity : Productivity of material and labour is required to be increased to have growth and more profitability in the organisation. Costing renders great assistance in measuring productivity and suggest ways to improve it.

1.7.2 Cost Accounting and Employees : Employees have a vital interest in their employer's enterprise and the industry, in which they are employed. They are benefited by a number of ways by the installation of an efficient costing system in their enterprise. They are benefited because of systems of incentives, bonus plans etc. They get benefit indirectly through increase in consumer goods and directly through continuous employment and higher remuneration.

1.7.3 Cost accounting and creditors : Investors, banks and other moneylenders have a stake in the success of the business concern and, therefore, are benefited immediately by installation of an efficient costing system. They can base their judgement about the profitability and further prospects of the enterprise upon the studies and reports submitted by the cost accountants.

1.7.4 Cost accounting and national economy : An efficient costing system brings prosperity to the concerned business enterprise resulting into stepping up of the government revenue. The overall economic development of a country takes place due to increase in efficiency of production. Control of costs,

elimination of wastages and inefficiencies lead to the progress of the industry and in consequence of the nation as a whole.

1.8 METHODS OF COSTING

The basic principles of ascertaining costs are the same in every system of cost accounting. However, the methods of analyzing and presenting the cost may vary from industry to industry. The method to be used in collecting and presenting costs will depend upon the nature of production. Basically there are two methods of costing, namely. Job costing and Process costing.

Job costing : Job costing is used where production is not repetitive and is done against orders. The work is usually carried out within the factory. Each job is treated as a distinct unit, and related costs are recorded separately. This type of costing is suitable to printers, machine tool manufacturers, job foundries, furniture manufactures etc. The following methods are commonly associated with job costing:

Batch costing : Where the cost of a group of product is ascertained, it is called 'batch costing'. In this case a batch of similar products is treated as a job. Costs are collected according to batch order number and the total cost is divided by the numbers in a batch to find the unit cost of each product. Batch costing is generally followed in general engineering factories which produce components in convenient batches, biscuit factories, bakeries and pharmaceutical industries.

Contract costing : A contract is a big job and, hence, takes a longer time to complete. For each individual contract, account is kept to record related expenses in a separate manner. It is usually followed by concerns involved in construction work e.g. building roads, bridge and buildings etc.

Process Costing : Where an article has to undergo distinct processes before completion, it is often desirable to find out the cost of that article at each process. A separate account for each process is opened and all expenses are

charged thereon. The cost of the product at each stage is, thus, accounted for. The output of one process becomes the input to the next process. Hence, the process cost per unit in different processes is added to find out the total cost per unit at the end. Process costing is often found in such industries as chemicals, oil, textiles, plastics, paints, rubber, food processors, flour, glass, cement, mining and meat packing. The following methods are used in process costing :

Output/Unit Costing : This method is followed by concerns producing a single article or a few articles which are indential and capable of being expressed in simple, quantitative units. This is used in industries like mines, quarries, oil drilling, cement works, breweries, brick works etc. for example, a tone of coal in collieries, one thousand bricks in brick works etc. The object here is to find out the cost per unit of output and the cost of each item of such cost. A cost sheet is prepared for a definite period. The cost per unit is calculated by dividing the total expenditure incurred during a given period by the number of units produced during the same period.

Operating Costing : This method is applicable where services are rendered rather than goods produced. The procedure is same as in the case of unit costing. The total expenses of the operation are divided by the units and cost per unit of service is arrived at. This is followed in transport undertakings, municipalities, hospitals, hotels etc.

Multiple Costing : Some products are so complex that no single system of costing is applicable. Where a concern manufactures a number of components to be assembled into a complete article, no one method would be suitable, as each component differs from the other in respect of materials and the manufacturing process. In such cases, it is necessary to find out the cost of each component and also the final product by combining the various methods discussed above. This type of costing is followed to cost such products as radios, aeroplanes, cycles, watches, machine tools, refrigerators, electric motors etc.

Operating Costing : In this method each operation at each stage of production or process is separately identified and costed. The procedure is somewhat similar to the one followed in process costing. Process costing involves the costing of large areas of activity whereas operation costing is confined to every minute operation of each process. This method is followed in industries with a continuous flow of work, producing articles of a standard nature, and which pass through several distinct operation sin a sequence to completion. Since this method provides for a minute analysis of cost, it ensures greater accuracy and better control of costs. The costs of each operation per unit and cost per unit up to each stage of operation can be calculated quite easily. This method is in force in industries where toys, leather and engineering goods are manufactured.

Departmental Costing : When costs are ascertained department by department, such a method is called 'departmental costing'. Where the factory is divided into a number of departments, this method is followed. The total cost of each department is ascertained and divided by the total units produced in that department in order to obtain the cost per unit. This method is followed by departmental stores, publishing houses etc.

1.9 TECHNIQUES OF COSTING

In addition to the different costing methods, various techniques are also used to find the costs. These techniques may be grouped under the following heads :

Historical Absorption Costing : It is the ascertainment of costs after they have been incurred. It is defined as the practice of charging all costs, both variable and fixed, to operations, process or products. It is also known as traditional costing. Since costs are ascertained after they have been incurred,

it does not help in exercising control over costs. However, It is useful in submitting tenders, preparing job estimates etc.

Marginal Costing : It refers to the ascertainment of costs by differentiating between fixed costs and variable costs. In this technique fixed costs are not treated as product costs. They are recovered from the contribution (the difference between sales and variable cost of sales). The marginal or variable cost of sales includes direct material, direct wages, direct expenses and variable overhead. This technique helps management in taking important policy decisions such as product pricing in times of competition, whether to make or not, selection of product mix etc.

Differential Costing : Differential cost is the difference in total cost between alternatives-evaluated to assist decision making. This technique draws the curtain between variable costs and fixed costs. It takes into consideration fixed costs also (unlike marginal costing) for decision making under certain circumstances. This technique considers all the revenue and cost differences amongst the alternative courses, of action to assist management in arriving at an appropriate decision.

Standard Costing : It refers to the ascertainment and use of standard costs and the measurement and analysis of variances. Standard cost is a predetermined cost which is computed in advance of production on the basis of a specification of all factors affecting costs. The standards are fixed for each element of cost. To find out variances, the standard costs are compared with actual costs. The variances are investigated later on and wherever necessary, rectificational steps are initiated promptly. The technique helps in measuring the efficiency of operations from time to time.

1.10 Practical Difficulties in Installing Costing System : Apart from technical costing problems, a cost accountant is confronted with certain practical difficulties in installing a costing system. These are :

1. Lack of support of management : In order to make the costing system a success, it must have the whole-hearted support of every member of the management. Many a time, the costing system is introduced at the behest of the Managing Director or the Financial Director without the support of functional managers. They view the system as an interference in their work and do not make use of the system.

Before the system is installed, the cost accountant should ensure that the management is fully committed to the costing system. A sense of cost consciousness should be created in their minds by explaining them that the system is for their benefit. A cost manual should be prepared and distributed to them giving the details and functions of the system.

2. Resistance from the accounting staff : The existing accounting staff may not welcome the new system. This may be because they look with suspicion at a system which is not known to them: The co-operation of the employees should be sought by convincing them that the system is needed to supplement the financial accounting system and that it is for the betterment of all.

3. Non-co-operation of Working and Supervisory Staff : Correct activity data which is supplied by supervisory staff and workers is necessary for a costing system. They may not co-operate and resist the additional paper work arising as a result of the introduction of the system. Such resistance generally arises out of ignorance. Proper education should be given to the staff regarding benefits of the system and the important roles they have to play to make it successful.

4. Shortage of Trained Staff : In the initial stages, there maybe shortage of trained costing staff. The staff should be properly trained so that costing department can run efficiently.

1.11 IMPORTANT QUESTIONS :

1. Distinguish between 'Costing' and 'Cost Accounting'. Discuss the Objects of costing.
2. Define costing and discuss briefly its objectives and advantages.
3. State the differences between Financial Accounting, Cost Accounting and Management Accounting. Explain how financial accounts are inadequate to measure the performance of an industry.
4. What are the limitations of Financial Accounting? How far Cost Accounting has contributed in removing the defects of Financial Accounting?
5. "A good system of costing serves as a means of control over expenditure and helps to secure economy in manufacture". Discuss.
6. What are the main benefits that may be expected from the installation of costing system in a manufacturing business.
7. "Costing system has become an essential tool in the hands of management", Comment.
8. It is said, "Cost accounting is a system of foresight and not postmortem examination; it turns losses into profits, speeds up activities and eliminates wastes". Discuss in detail this statement.
9. Describe, in brief, the various methods of costing.

LESSON : 2

COST CONCEPTS AND CLASSIFICATIONS

2.1 CONCEPT OF COST

The scope of term 'cost' is extremely broad and general. It is therefore, not easy to define or explain this term without leaving any doubt concerning its meaning. Cost accountants, economists and others develop the concept of cost according to their needs. This concept should, therefore, be studied in relation to its purpose and use. Some of the definitions of 'cost' are reproduced below :

1. Cost is "the amount of expenditure (actual or notional) incurred on or attributable to a given thing". (C.I.M.A. London).
2. Cost is a foregoing, measured in monetary terms, incurred or potentially to be incurred to achieve a specific objective. (Committee on Cost Concepts and Standards of the American Accounting Association).
3. Cost is "an exchange price, a foregoing, a sacrifice made to secure benefit". (A tentative set of Broad Accounting Principles for Business Enterprises).

It is true that a cost must be understood in its relationship to the purposes which it is to serve. When the term 'cost' is used specifically it should be qualified with reference to the object costed by such descriptions as fixed cost, direct cost, labour cost, selling cost, marginal cost, standard cost, conversion cost, differential cost, out-of-pocket cost, imputed cost, prime cost, joint cost etc. All these terms have been explained in this lesson.

2.2 COST VERSUS EXPENSES AND LOSSES

Cost should be distinguished from expenses and losses though in practice the terms cost and expenses are sometimes used synonymously. An expense is defined as including "all expired costs which are deductible from revenue".

When a portion of the service potential of an asset is consumed, that portion of its cost is re-classified as an expense.

These expenses are then matched against the revenues that they helped to generate. Examples of expenses are depreciation, selling expenses, office salaries etc., which are charged against revenue in the period in which they are incurred. The unexpired costs, i.e. the costs for which economic benefit is yet to be received are known as deferred costs, such as prepaid insurance. Such items are shown in the balance sheet. In other words, an unexpired cost is an asset and is converted into an expense when the cost factor expires while helping to earn revenues.

In contrast, “losses are reduction in firms’s equity, other than by withdrawals of capital, for which no compensating value has been received.” A loss is an expired cost resulting from the decline in the service potential of an asset that generated no benefit to the firm. Obsolescence or destruction of stock by fire are examples of loss.

2.3 COST CENTRE AND COST UNIT

Cost is ascertained by cost centres or cost units or by both. The terms are discussed below:

Cost Centre : A cost centre is “a location, person, or item of equipment or group of these for which costs may be ascertained and used for the purpose of control”. Thus, a cost centre refers to a section of the business to which costs can be charged. It may be a location (a department, a sales area), an item of equipment (a machine, a delivery van), a person (a salesman, a machine operator) or a group of these (two automatic machines operated by one workman).

A cost centre is primarily of two types :

- (a) Personal cost centre-which consists of a person or a group of persons.
- (b) Impersonal cost centre- which consists of a location or an item of equipment or group of these.

From functional point of view, cost centres may be of the following two types :

- (a) Production cost centre-those cost centres where actual production work takes place. Examples are melting shop, machine shop, welding shop, finishing shop, etc.
- (b) Service cost centre- those cost centres which are ancillary to and render services to production cost centres. Examples of service cost centres are power house, tool room, stores department, repair shop, canteen, etc. Cost incurred in service cost centres are of indirect type.

Cost accountant sets up cost centres to enable him to ascertain the costs the needs to know. A cost centre is charged with all the costs that relate to it, e.g. if a cost centre is a machine, it will be charged with the costs of power, light, depreciation and its share of rent etc. The purpose of ascertaining the cost of a cost centre is cost control. The person incharge of a cost centre is held responsible for the control of cost of that centre.

The number of cost centres and the size of each vary from one undertaking to another. It all depends upon the expenditure involved and requirements of the management of the purpose of cost control. A large number of cost centres tend to be expensive but having too few cost centres defeat the very purpose of control.

Cost Unit : It has been seen above that cost centres help in ascertaining the costs by location, equipment or person. Cost unit is a step further which breaks up the cost into smaller sub divisions and helps in ascertaining the cost of saleable products or services.

A cost unit is a “unit of product, service or time in relation to which cost may be” ascertained or expressed”, (C.I.M.A. London). Cost units are the ‘things’ that the business is set up to provide of which cost is ascertained. For example, in a sugar mill, the cost per tonne of sugar may be ascertained, in a textile mill the cost per-metre of cloth may be ascertained. Thus a tonne of

sugar and 'metre' of cloth are cost units. In short, cost unit is unit of measurement of cost.

All sorts of cost units are adopted, the criterion for adoption being the applicability of particular cost unit to the circumstances under consideration. Broadly, cost unit may be :

- (i) **Units of production**, e.g. a metre of cloth, a ream of paper, a tonne of steel, a metre of cable, etc. or
- (ii) **Units of service**, e.g. passenger miles, cinema seats, consulting hours etc. A few more examples of cost units in various Industries are given below :

Industry	Cost Unit
Bricks	1000 bricks
Cement	Tonne
Chemicals	Tonne, kilogram, litre, gallon, etc.
Carpets	Square foot
Pencils	Dozen or gross
Electricity	Kilowatt hour (KWH)
Transport	Passenger kilometer or tonne kilometre
Printing Press	Thousand copies
Cotton or jute	Bale
Timber	Cubic foot
Mines	Tonne
Hotel	Room per day
Shoes	Pair or dozen pairs

Note : The cost units and cost centres should be those which are readily understood and accepted by all concerned.

2.4 COST CONCEPTS :

The clear understanding of various cost concepts is essential for the study of cost accounting and cost systems. Description of these concepts follows now.

Product and period costs : The product cost is aggregate of costs that are associated with a unit of product. Such Costs may or may not include an element of overheads depending upon the type of costing system in force-absorption or direct. Product costs are related to goods produced or purchased for resale and are initially identifiable as part of inventory. These product or inventory costs become expenses in the form of cost of goods sold only when the inventory is sold. Product cost is associated with unit of output. The costs of inputs in forming the product viz., the direct material, direct labour, factory overhead constitute the product costs.

The period cost is a cost that tends to be unaffected by changes in level of activity during a given period of time. Period cost is associated with a time period rather than manufacturing activity and these costs are deducted as expenses during the current period without having been previously classified as product costs. Selling and distribution costs are period costs and are deducted from the revenue without their being regarded as part of the inventory cost.

Common and joint costs : The common cost is an indirect cost that is incurred for the general benefit of a number of departments or for the whole enterprise and which is necessary for present and future operations. The joint costs are the cost of either a single process or a series of processes that simultaneously produce two or more products of significant relative sales value.

Short-run and long-run costs : The short-run costs are costs that vary with output when fixed plant and capital equipment remain the same and become relevant when a firm has to decide whether or not to produce more in the immediate

future. The long-run-costs are those which vary with output when all input factors including plant and equipment vary and become relevant when the firm has to decide whether to set up a new plant or to expand the existing one.

Past and future cost : The past costs are actual costs incurred in the past and are generally contained in the financial accounts. These costs report past events and the time lag between event and its reporting makes the information out of date and irrelevant for decision-making. These costs will just act as a guide for future course of action.

The future costs are costs expected to be incurred at a later date and are the only costs that matter for managerial decisions because they are subject to management control. Future costs are relevant for managerial decision making in cost control, profit projections, appraisal of capital expenditure, introduction of new products, expansion programmes and pricing etc.

Controllable and non-controllable costs : The concept of responsibility accounting leads directly to the classification of costs as controllable or uncontrollable. The controllable cost is a cost chargeable to a budget or cost centre, which can be influenced by the actions of the person in whom control the centre is vested. It is always not possible to predetermine responsibility, because the reason for deviation from expected performance may only become evident later. For example excessive scrap may arise from inadequate supervision or from latent defect in purchased material. The controllable cost is a cost that can be influenced and regulated during a given time span by the actions of a particular individual within an organisation.

The controllability of cost depends upon the level of responsibility under consideration. Direct costs are generally controllable by the shop level management. The uncontrollable cost is a cost that is beyond the control (i.e. uninfluenced by actions) of a given individual during a given period of time.

The distinction between controllable and uncontrollable costs are not very sharp and may be left to individual judgement. Some expenditure which may be uncontrollable on the short-term basis can be controllable on long-term basis, There are certain costs which are really difficult to control due to the following reasons.

- * Physical hazards arising due to flood, fire, strike, lockout etc.
- * Economic risks such as increased competition, change in fashion or model, higher prices of inputs, import restrictions, etc.
- * Political risk like change in Government policy, political unrests, war etc.
- * Technological risk such as change in design, know-how etc.

Replacement and Historical Costs : The Replacement costs and Historical costs are two methods for carrying assets in the balance sheet and establishing the amounts of costs that are used to determine income.

The *Replacement cost* is a cost at which material identical to that is to be replaced could be purchased at the date of valuation (as distinct, from actual cost price at the date of purchase). The replacement cost is a cost of replacing an asset at any given point of time either at present or the future (excluding any element attributable to improvement).

The *Historical cost* is the actual cost, determined after the event. Historical cost valuation states costs of plant and materials, for example, at the price originally paid for them whereas replacement cost valuation states the costs at prices that would have to be paid currently. Costs reported by conventional financial accounts are based on historical valuations. But during periods of changing price level, historical costs may not be correct basis for projecting future costs. Naturally historical costs must be adjusted to reflect current or future price levels.

Escapable and unavoidable costs : The *Escapable cost* is an avoidable cost that will not be incurred if an activity is not undertaken or discontinued. Avoidable cost will often correspond-with variable costs. Avoidable cost can be identified with an activity or sector of a business and which would be avoided if that activity or sector did not exist. The escapable costs refer to costs which can be reduced due to contraction in the activities of a business enterprise. It is the net effect on costs that is important, not just the costs directly avoidable by the contraction. Examples :

Closing an apparently unprofitable branch house-storage costs of other branches and transportation charges would increase.

Reducing credit sales costs estimated may be less than the benefits otherwise available.

Note: Escapable costs are different from controllable and discretionary costs.

Out of pocket and Book Costs : The out of pocket cost is a cost that will necessitate a corresponding outflow of cash. The costs involving cash outlay or payment to other parties are termed as out of pocket costs. Book costs are those which do not require current cash payments. Depreciation, is a notional cost in which no cash transaction is involved. The distinction between out of pocket costs and book costs primarily shows how costs affect the cash position. Out of pocket costs are relevant in some decision making problems such as fluctuation of prices during recession, make or buy decisions etc. Book-costs can be converted into out of pocket costs by selling the assets and having item on hire. Rent would then replace depreciation and interest.

Imputed and Sunk Costs : *The imputed cost* is a cost which does not involve actual cash outlay, which are used only for the purpose of decision making and performance evaluation. Imputed cost is a hypothetical cost from the point of view of financial accounting. Interest on capital is common type of imputed

cost. No actual payment of interest is made but the basic concept is that, had the funds been invested elsewhere they would have earned interest.

Thus, imputed costs are a type of opportunity costs.

The Sunk costs are those costs that have been invested in a project and which will not be recovered if the project is terminated. The sunk cost is one for which the expenditure has taken place in the past. This cost is not affected by a particular decision under consideration. Sunk costs are always results of decisions taken in the past. This, cost cannot be changed by any decision in future. Investment in plant and machinery as soon as it is installed its cost is sunk cost and is not relevant for decisions. Amortization of past expenses e.g. depreciation is sunk cost. Sunk, costs will remain the same irrespective of the alternative selected. Thus, it need not be considered by the, management in evaluating the alternatives as it is common to all of them. It is important to observe that an unavoidable cost may not be a sunk cost. The Managing Director's salary is generally unavoidable and also out of pocket but not sunk cost.

Relevant and Irrelevant Costs : The *relevant cost* is a cost appropriate in aiding to make specific management decisions. Business decisions involve planning for future and consideration of several alternative courses of action. In this process the costs which are affected by -the decisions are future costs. Such costs are called relevant costs because they are pertinent to the decisions in hand. The cost is said to be relevant if it helps the manager in taking a right decision in furtherance of the company's objectives.

Opportunity and Incremental Costs : The *opportunity cost* is the value of a benefit sacrificed in favour 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. The

opportunity cost of a good or service is measured in terms of revenue which could have been earned by employing that good or service in some other alternative uses. Opportunity cost can be defined as the revenue forgone by not making the best alternative use. Opportunity cost is the prospective change in cost following the adoption of an alternative machine process, raw materials etc. It is the cost of opportunity lost by diversion of an input factor from use to another.

The Incremental cost is the extra cost of taking one course of action rather than another. It is also called as different cost. The incremental cost is the additional cost due to a change in the level of nature of business activity. The change may take several forms e.g., changing the channel of distribution, adding a new machine, replacing a machine by a better machine, execution of export order etc. Incremental costs will be different in case of different alternatives. Hence, incremental costs are relevant to the management in the analysis for decision making.

Conversion cost : The *conversion cost* is the cost incurred for converting the raw material into finished product. It is referred to as the production cost excluding the cost of direct materials:

Committed cost : The *committed cost* is a cost that is primarily associated with maintaining the organisation's legal and physical existence over which management has little discretion. The committed cost is a fixed cost which results from decision of prior period. The amount of committed cost is fixed by decisions which are made in the past and not subject to managerial control in the short-run. Since committed cost does not fluctuate with volume and remains unchanged until action is taken to increase or reduce available capacity. Committed cost does not present any problem in cost behaviour analysis. Examples of committed cost are depreciation, insurance premium, rent, etc.

Shutdown and Abandonment costs : The *shutdown costs* are the cost incurred in relation to the temporary closing of a department/division/enterprise. Such costs include those of closing as well as those of re-opening. The shutdown costs are defined as those costs which would be incurred in the event of suspension of the plant operation and which would be saved if the operations are continued. Examples of such costs are costs of sheltering the plant and equipment and construction of sheds for storing exposed property. Further, additional expenses may have to be incurred when operations are restored e.g., re-employment of workers may involve cost of recruitment and training.

The *Abandonment cost* is the cost incurred in closing down a department or a division or in withdrawing a product or ceasing to operate in a particular sales territory etc. The abandonment costs are the cost of retiring altogether a plant from service; Abandonment arises when there is a complete cessation of activities and creates a problem as to the disposal of assets.

Urgent and Postponable costs : The *urgent costs* are those which must be incurred in order to continue operations of the firm. For example, cost of material and labour must be incurred if production is to take place.

The *Postponable cost* is that cost which can be shifted to the future with little or no effect on the efficiency of current operations. These costs can be postponed at least for some time, e.g., maintenance relating to building and machinery.

Marginal cost : The *marginal cost* is the variable cost of one unit of a product or a service i.e., a cost which would be avoided if the unit was not produced or provided. In this context, a unit is usually either a single article or a standard measure such as litre or kilogram, but may in certain circumstances be an operation, process or part of an organisation. The marginal cost is the amount at any given volume of output by which aggregate costs are changed if the volume of output is increased or decreased by one unit. The marginal costing

technique is the process of ascertaining marginal costs and of the effects of changes in volume of type of output on profit by differentiating between fixed and variable costs.

Notional cost : The *notional cost* is a hypothetical cost taken into account in a particular situation to represent the benefit enjoyed by an entity in respect of which no actual expense is incurred.

2.5 CLASSIFICATION OF COST

The process of grouping costs according to their common characteristics is called classification of cost. It is a systematic placement of like items together according to their common features. The followings are the important ways of classifying costs.

2.5.1 Classification According to Functions : This is a traditional classification. A business has to perform a number of functions like manufacturing, administration, selling, distribution and research. Cost may have to be ascertained for each of these functions. On this basis, costs are classified into the following groups:

(i) Manufacturing cost : This is the cost of the sequence of operations which begins with supplying materials, labour and services and ends with completion of production.

(ii) Administration cost : This is general administrative cost and includes all expenditure incurred in formulating the policy, directing the organisation and controlling the operations of an undertaking, which is not directly related to production, selling and distribution, research and development activity or function.

(iii) Selling and distribution costs : Selling cost is the cost of seeking to create and simulating demand and of securing orders.

Distribution cost is the cost of sequence of operations which begins with making the packed product available for despatch and ends with making the reconditioned returned empty package for re-use. The various items included in manufacturing administrative, selling and distribution costs are available in Table 2.1

Table 2.1
Functional Classification of Costs

Manufacturing Costs	Selling Costs
Materials	Advertising
Labour	Salaries & Commissions of salesmen
Factory rent	Showroom expenses
Depreciation	Samples
Power & lighting	Travel expenses
Insurance	Distribution Costs
Stores Keeping	Packing costs
Administration Costs	Carriage outward
Accounts office expenses	Warehousing costs
Audit fees	Upkeep and running costs of delivery vans
Legal expenses	
Office rent	
Director's remuneration	
Postage	

(iv) **Research and development cost** : Research cost is the cost of searching new or improved products or methods. It comprises wages and salaries of research staff, payments to outside research organisations, materials used in laboratories and research departments, etc.

After completion of research, the management may decide to produce a new improved product or to employ a new or improved method. Development cost is the cost of the process which begins with the implementation of the decision to produce a new product or to employ a new or improved method and ends with the commencement of formal production of that product or by that method.

Pre-production cost is that part of the development cost which is incurred in making in trial production run preliminary to formal production.

2.5.2 Classification based on cost behaviour : Depending on the variability behaviour costs can be classified into variable and fixed costs.

(a) Variable cost : The variable cost is a cost that tends to vary in accordance with level of activity within the relevant range and within a given period of time. The Prime product costs i.e., direct material, direct labour and direct expenses tend to vary in direct proportion to the level of activity. An increase in the volume means a proportionate increase in the total variable costs and a decrease in volume will lead to a proportionate decline in the total variable costs. There is a linear relationship between volume and variable costs. They are constant per unit.

Variable costs have an explicit physical relationship with a selected measure of activity and exists an optimum cause and effect relationship between the input and output, Therefore variable costs are also known as engineered costs. All variable costs are not engineered costs. Some of the variable components which are termed as discretionary variable costs and such costs will vary with fluctuations in the levels of activity merely because of the policy of the management. The variable element of research and development or advertisement costs, which are discretionary by nature may increase with increased activity and management may decide to spend more in periods of increased activity.

(b) Fixed cost : The fixed cost is a cost that tends to be unaffected by changes in the level of activity during a given period of time. The fixed costs remain constant in the total regardless of changes in volume upto a certain level of output. They are not affected by changes in the volume of production. There is an inverse relationship between volume and fixed cost per unit. Fixed costs tend to remain constant for all levels of activity within a certain range. It follows that some fixed costs will continue to be incurred even when the activity comes down to nil. Some fixed costs are liable to change from one period to another. For example salaries bill may go up because of annual increments or due to change in the pay rates and due to pay structure.

(c) Semi-variable cost or semi-fixed cost : Many costs fall between these two extremes. They are called as semi-variable cost or semi- fixed costs. They are neither perfectly variable nor absolutely fixed in relation to changes in volume. They change in the same direction as volume but not in direct proportion thereto. An example is found in telephone charges. The rental element is a fixed cost whereas charges for call made are a variable cost. The distinction between fixed and variable cost is important in forecasting the effect of short-run changes in volume upon costs and profits. This distinction has also given rise to the concepts of Marginal Costing, Direct Costing, Flexible Budgeting. Costs which have neither a linear or curvilinear relationship with output but they move in steps with fluctuations in activity levels. These are called stepped up costs. Basically these are fixed costs upto a certain level 'of activity specified but they change as soon as a new range is reached. Such costs are semi variable in the long-term but fixed in the short-term. Certain variable costs tend to vary during specific periods for reasons not related to fluctuations in activity level. For example, increased maintenance cost during periods of low production, increased costs on air-conditioning in summer. Costs which fluctuate with volume of production but after certain stage of production has reached the fluctuations in cost is disproportionate. It changes either at a retarded or accelerated rate.

2.5.3 Committed and Discretionary costs : It-is shown above ‘hat costs may be classified into fixed and variable.’ Fixed costs may be further classified as committed costs and discretionary (or programmed) costs. This classification is based on the degree to which firm is locked into the asset or service that is generating the fixed cost.

Fixed cost is committed if it is incurred in maintaining physical facilities and management set up. Committed costs cannot be avoided in the short run. For example, salary of the managing director may represent a committed cost if, by policy, the managing director is not to be released unless the firm is liquidated. Similarly, depreciation of plant and equipment is committed because these facilities cannot be easily changed in the short run.

Discretionary fixed costs are those which can be avoided by management. Such costs are not permanent. Advertising, research and development cost, salaries of low level managers are examples of discretionary costs because these costs may be avoided or reduced in the short run if so desired by the managements. This classification into committed and discretionary costs is important from the point of view of cost control and decision making.

2.5.4 Financial Costs

Cash costs : Cash costs are those sacrifices that are reflected in actual cash outflows. Business transactions usually involve both reward (or revenue) and sacrifice (or cost) with the difference between the two being gain (or profit). Thus

$$\begin{array}{lcl} \text{Reward-Sacrifice} & = & \text{Gain} \\ \text{Revenue – Cost} & = & \text{Profit} \end{array}$$

Non-cash costs : Non-cash costs are financial sacrifices that do not involve cash outlays at the time when the cost is recognised. These costs are found in depreciation, opportunity costs etc.

(b) Non-Financial costs : Non financial costs are those costs that are not directly traceable through a company’s cash flow. While such costs (e.g., low

morale of employees) certainly involve sacrifices and they may lead eventually, in complex ways to a reduced cash flow in the future. They do not represent an immediate cash outlays.

The above cost concepts are based on several factors like controllability, period, situation, input-output relationship, opportunity, urgency, historical, product, etc. The clear understanding of costs concepts will help the management in analysis of costs, reporting, cost control and decision making.

2.5.5 Product Costs and Period Costs : Product costs are those costs which are necessary for production and which will not be incurred if there is not production. These consist of direct materials, direct labour and some of the factory overhead. Product costs are 'absorbed by' or 'attached to' the units produced.

Period costs are those which are not necessary for production and are written off as expenses in the period in which these are incurred. Such cost are incurred for a time period and are charged to Profit and Loss Account of the period, rent, salary of company executives, travel expenses are examples of period costs. These costs are not inventoried i.e. these are not included in the value of closing stocks.

Classification into product-and period cost is important from the point of view of profit determination. This is so because product cost is carried forward to the next accounting period as part of the unsold finished stock whereas period cost is written off in the accounting period in which it is incurred.

2.5.6 Classification according to Identifiability with Cost Units : Costs are classified into direct and indirect on the basis of their identifiability with cost units or jobs or processes:

(i) **Direct costs :** These are those costs which are incurred for and may be conveniently identified with a particular cost unit, process or department.

(ii) Indirect costs : These costs cannot be conveniently identified with a particular cost unit, process or department. These are general costs and are incurred for the benefit of a number of cost units or cost centres.

Cost of raw materials used, wages of machine operators are common examples of direct costs. Examples of indirect costs are rent, repairs, depreciation, managerial salaries, coal, lubricating oil, wages of foreman, etc.

Costs are not traced or identified directly to a product for one of the three reasons :

1. It is impossible to do so e.g., rent of building etc.
2. It is not convenient or feasible to do, so e.g., nails used in furniture, sewing thread, etc.
3. Management chooses not to do so i.e. many companies classify certain items of cost as indirect because it is customary in the industry to do so e.g., carriage inward etc.

This classification is important from the point of view of accurate ascertainment of cost. Direct costs of product can be conveniently determined while the indirect costs have to be arbitrarily apportioned to various cost units. For example, in readymade garments, the cost of cloth and wages of tailor are accurately ascertained without any difficulty and are thus direct costs. But the rent of factory, managerial-salaries, etc., which are indirect costs, have to be apportioned to various cost units on some arbitrary basis and cannot be accurately ascertained.

2.5.7 Classification According to Controllability : The costs can also be classified into controllable and uncontrollable :

(i) Controllable costs : These are the costs which may be directly regulated at a given level of management authority. Variable costs are generally controllable by department heads. For example, cost of raw material may be controlled by purchasing in larger quantities.

(ii) Uncontrollable costs : These are those costs which cannot be influenced by the action of a specified member of an enterprise. Fixed costs are generally uncontrollable. For example, it is very difficult to control costs like factory rent, managerial salaries, etc. Two important points should be noted regarding this classification. First, controllable costs cannot be distinguished from uncontrollable costs without specifying the level and scope of management authority. In other words, a cost which is uncontrollable at one level of management may be controllable at another level of management. Secondly, in the long-run all costs are controllable.

2.6 COST ASCERTAINING AND COST ESTIMATION

Cost Ascertained : Cost ascertained is concerned with computation of actual costs incurred. It refers to the methods and process employed in ascertaining costs. In different types of industries, different methods are employed for ascertaining cost. These methods are job costing, contract costing, batch costing, process costing, operating costing, single costing and multiple costing. The basic principles underlying these methods are the same but these methods have been designed to suit the needs of individual business conditions. The ascertainment of actual cost has very little utility because of the following reasons :

1. Actual costs cannot be used for the purpose of price quotations and filing tenders.
2. Actual cost has practically no utility for control purposes
3. Actual costs are ineffective as means of measuring performance efficiency.

In spite of these limitations, ascertainment of actual cost proves very useful in many cases. For instance, ascertainment of actual costs reveals unprofitable activities and losses and inefficiencies occurring in the form of idle time, excessive scrap etc.

Cost Estimation : As against ascertainment of actual costs, costs may also be predetermined. Cost estimation is the process of predetermining cost of goods or services. These costs are prepared in advance of production and preceded the operations. Estimated costs are definitely the future costs and are based on the average of the past actual costs adjusted for anticipated changes in future. Cost estimates may have the following uses:

1. Cost estimates are used in making price quotations and bidding for contracts.
2. Cost estimates are used in the preparation of budgets.
3. It helps in evaluating performance.
4. It is used in preparing projected financial statements.
5. Cost estimates may serve as targets in controlling the costs.

Due care should be taken in cost estimation because a high price quotation may result in loss of business.

2.7 ELEMENTS OF COST :

Cost is made up of three elements i.e. Material, Labour and Expenses. Each of these can be direct or indirect. This is shown below :

<u>Direct</u>	<u>Indirect</u>
Material	Material
Labour	Labour
Expenses	Expenses

Material : The substance from which the product is made is known as material. It may be in a raw or a manufactured state. It can be direct as well as indirect.

Direct material : All material which becomes an integral part of the finished product and which can be conveniently assigned to specific physical units is

termed as “Direct Material”. Following are some of the examples of direct material :

- (i) All material or components specifically purchased, produced or requisitioned from stores.
- (ii) Primary packing material (e.g. carton, wrapping, cardboard, boxes etc.).
- (iii) Purchased or partly produced components.

Direct material is also described as raw material, process material, prime material, production material, stores material constructional material etc.

Indirect material : All material which is used for purposes ancillary to the business and which cannot be conveniently assigned to specific physical units is termed as “indirect Material”. Consumable stores, oil and waste, printing stationery etc. are a few examples of indirect material.

Indirect material may be used in the factory, the office or the selling and distribution divisions.

Labour : For conversion of materials into finished goods, human effort is needed, such human effort is called labour. Labour can be direct as well as indirect.

Direct Labour : Labour which takes an active and direct part in the production of a particular commodity is called direct labour. Direct labour costs are, therefore, specifically and conveniently traceable to specific products. Direct labour is also described as process labour, productive labour, operating labour, manufacturing labour, direct wages etc.

Indirect Labour : Labour employed for the purpose of carrying out tasks incidental to goods or services provided, is indirect labour. Such labour does not affect the construction, composition or condition of the product. It cannot be practically traced to specific units of output. Wages of store-keepers, foremen, time-keepers, directors fees, salaries of salesmen, etc. are all examples

of indirect labour costs. Indirect labour may relate to the factory, the office or the selling and, distribution divisions.

Expenses : Expenses may be direct or indirect.

Direct Expenses : These are expenses which can be directly, conveniently and wholly allocated to specific cost centres or cost units. Examples of such expenses are : hire of some special machinery required for a particular contract, cost of defective work incurred in connection with a particular job or contract etc. Direct expenses are sometimes also described as “chargeable expenses”.

Indirect Expenses : These are expenses which cannot be directly, conveniently and wholly allocated to cost Centres of cost units.

Overheads : It is to be noted that the term overheads has a wider meaning than the term indirect expenses. Overheads include the cost of indirect material, indirect labour besides indirect expenses.

Indirect expenses may be classified in the following three categories :

(a) ***Manufacturing (works, factory or production) Expenses :*** Such indirect expenses which are incurred in the factory and are concerned with the running of the factory or plant are known as manufacturing expenses. Expenses relating to production management and administration are included therein. Following are a few items of such expenses:

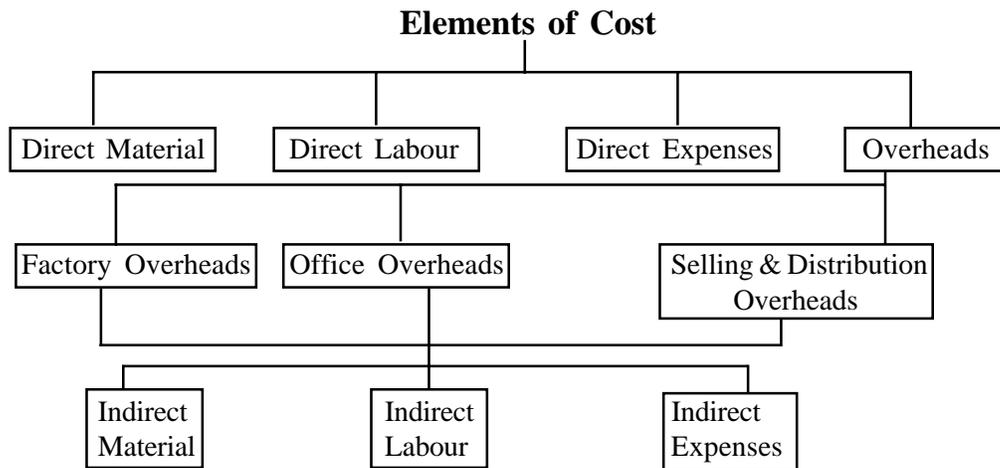
Rent, rates and insurance of factory premises, power used in factory, depreciation of factory building, plant and machinery, etc.

(b) ***Office and Administrative Expenses :*** These expenses are not related to factory but they pertain to the management and administration of business. Such expenses are incurred on the direction and control of an undertaking.

Examples are : Office rent, lighting and heating, postage and telegrams, telephone and other charges; depreciation of office building, furniture and equipment, bank charges, legal charges, audit fee etc.

(c) **Selling and Distribution Expenses** : Expenses incurred for marketing of a commodity, for securing orders for the articles, despatching goods sold, and for making efforts to find and retain customers, are called selling and distribution expenses. Examples are: Advertisement expenses, cost of preparing tenders, traveling expenses, bad debts, collection charges etc.

The above classification of different elements of cost can be presented in the form of the following chart :



2.8 COMPONENTS OF TOTAL COST

Prime cost : It consists of direct material, direct labour and direct expenses. It is also known as basic, first or flat cost.

Factory cost : It comprises of prime cost and, in addition, works or factory overheads which include costs of indirect material, indirect labour, and indirect expenses of the factory. The cost is also known as works cost, production or manufacturing cost.

Office Cost : If office and administrative overheads are added to factory cost, office cost is arrived at. This is also termed as administrative cost or the total cost of production.

Total Cost : Selling and distribution overheads are added to the total cost of production to get the total cost Or the cost of sales.

2.9 COST SHEET

The components of cost explained above can be presented in the form of a statement. Such a statement of cost giving total cost, cost per unit along with different cost components of termed as a cost sheet. The computation of different cost components and preparation is a cost sheet can be understood with the following illustration:

Illustration 2.1: Calculate the Prime cost, Factory cost, Total cost of production and Cost of sales from the following particulars

	Rs.	Rs.
Raw Materials consumed	- - -	20,000
Wages paid to labourers	- - -	5,000
Directly chargeable expenses	- - -	1000
Oil & Waste	- - -	100
Wages of Foremen	- - -	1, 000
Storekeepers' Wages	- - -	500
Electric Power	- - -	200
Lighting : Factory	500	
Office	<u>200</u>	700
Rent : Factory	2,000	
Office	<u>1,000</u>	3,000
Repairs & Renewals :		
Factory Plant	500	
Machinery	1,000	
Office Premises	<u>200</u>	1,700
Depreciation :		
Office Premises		500
Plant & Machinery	<u>200</u>	700

Consumable Stores	- - -	1,000
Manager's Salary	- - -	2,000
Directors' Fees	- - -	500
Office Printing & Stationery	- - -	200
Telephone Charges	- - -	50
Postage & Telegrams	- - -	100
Saltsmen's Commission & Salary	- - -	500
Travelling Expenses	- - -	200
Advertising	- - -	500
Warehouse Charges	- - -	200
Carriage Outward	- - -	150

Solution :

COST SHEET

	Rs.	Rs.
Direct material : Raw material consumed		20,000
Direct labour : Wages paid to labourers		5,000
Direct expenses : Directly chargeable expenses		1,000
PRIME COST		26,000
<i>Add</i> : Factory Overhead :		
Indirect material : Consumable stores	1,000	
Oil and waste	<u>100</u>	1,100
Indirect labour : Wages of foreman	1,000	
Storekeepers' wages	<u>500</u>	1,500
Indirect expenses: Electric power	200	
Factory lighting	500	
Factory rent	2,000	

Repairs & Renewals:			
Plant	500		
Machinery	1,000		
Depreciation :			
Plant & machinery	200	4,400	7,000
			<u>33,000</u>
FACTORY OR WORKS COST			
<i>Add</i> : Office and administrative over heads :			
Indirect material :	Office printing and stationery	<u>200</u>	
Indirect labour :	Manager's salary	2,000	
	Directors' fees	<u>500</u>	2,500
Indirect expenses :	Office lighting	200	
	Office rent	1,000	
	Repairs and renewals		
	office premises	200	
	Dep. on office premises	500	
	Telephone charges	50	
	Postage & telegrams	100	2,050
			<u>4,750</u>
			37,750
TOTAL COST OF PRODUCTION			
<i>Add</i> : Selling & Distribution overheads:			
Indirect labour :	Salesmen's commission and salary		500
Indirect expenses :	Travelling expenses	200	
	Advertising	500	
	Warehouse charges	200	
	Carriage outward	150	11,050
			<u>1,550</u>
COST OF SALES			<u>39,300</u>

Illustration 2.2 : The following figures have been extracted from the books of XYZ Ltd. for the year ending 31st March, 2000.

	Rs.
Direct materials	70,000
Direct wages	75,000
Indirect wages	10,000
Other direct expenses	15,000
Factory rent and rates	500
Office rent and rates	500
Indirect materials	500
Depreciation of plant	1,500
Depreciation of office furniture	100
Managing Director's remuneration	12,000
General factory expenses	5,700
General office expenses	1,000
General selling expenses	1,000
Travelling expenses	1,100
Office salaries	4,500
Carriage outward	1,000
Advertisements	2,000
Sales	2,50,000

From the above figures, calculate the following :

(a) Prime cost

- (b) Works cost
- (c) Cost of production
- (d) Cost of sales
- (e) Net profit

Solution :

XYZLTD.

Cost Sheet for the year ending 31st March, 2000

	Rs.	Rs.
Direct materials consumed		70,000
Direct wages		75, 000
Direct expenses		15,000
Prime Cost		1,60,000
Factory overhead :		
Indirect wages	10,000	
Factory rent & rates	5,000	
Indirect materials	500	
Depreciation of plant	1,500	
General factory expenses	5,700	22,700
Works cost		1,82,700
Office and Administration Overhead		
Office rent and rates	500	
Depreciation of office furniture	100	
Managing Director's remuneration	12,000	

Office salaries	4,500	
General office expenses	1,000	18,100
Cost of Production		2,00,800
Selling and distribution overhead :		
Travelling expenses	1,100	
General selling expenses	1,000	
Advertisements	2,000	
General selling expenses	1,000	5,100
Cost of Sales		2,05,900
Profit		44,100
Sales		2,50,000

2.10 EXAMINATION QUESTIONS

1. Comment on 'Notional Costs' and 'Imputed Costs' mean the same thing.
2. Distinguish between 'Product and period Cost'.
3. Write short notes on 'Cost Centre'.
4. Distinguish between :
 - (a) controllable costs and uncontrollable costs.
 - (b) Variable cost and direct cost.
 - (c) Cost control and profit control
 - (d) Sunk cost and out of Pocket cost.
 - (e) Job costing and process costing.
5. Explain what is meant by : 'Cost Centre'. What are the different types of cost centres? What purpose do cost centres serve?

6. What is meant by “Profit Centre”?
7. IOCosts may be classified in a variety of ways accord to their nature and the information needs of management. Explain and discuss this statement giving examples of classifications required for different purposes.
8. Below is the enumerated expenditure in the manufacture of Commodity X :

	Three months ended
	31-12-1999
Raw materials	28,000
Fuel	6,900
Electric power	1,340
Process and general wages	63,500
Repairs	2,400
Haulage	1,060
Light & Water	400
Rent	2,000
Rates and Insurance	300
Office salaries and general expenses	7,000
Administration (office)	5,000
Depreciation on Machinery	2,500
Total	1,20,400
Tons manufacturers	17,200

Prepare a Cost-Sheet showing the cost per each item of expenses and total cost per ton for the period.

LESSON : 3

MATERIALS : PURCHASE, STORAGE, PRICING AND CONTROL

3.1 MEANING OF MATERIALS :

The term 'materials' refers to the raw materials used for production, sub assemblies and fabricated parts. It may be defined as "anything that can be stored stocked or stockpiled". The terms "materials" and "stores" are sometimes used interchangeably. However, both the terms differ. The term "stores" has wider meaning and includes not only the raw materials used in production but also other items held in stock in the store room, such as components, tools, patterns, maintenance materials, consumable stores etc. It also includes stock of finished goods and partly finished goods. 'Consumable' stores are items used in, production but do not become a part of the finished product, such as oil, grease, sand paper, soap, and other cleaning materials etc.

3.2 MATERIALS CONTROL : Concept and Objectives

Materials form an important part of the cost of a product and, therefore, proper control over materials is necessary. No cost accounting system can become effective without proper and efficient control of materials. Materials control basically aims at efficient purchasing of materials, their efficient storing and efficient use or consumption. Materials or inventory control may be defined as "systematic control and regulation of purchase, storage and usage of materials in such a way that maintain smooth flow of production and at the same time avoids excessive investments in inventories. Efficient material control cuts out losses and wastes of materials that otherwise pass unnoticed".

The broad objectives of material control are listed below :

1. It eliminates the problem of understocking and, therefore, materials of the desired quality will be available when needed for efficient and uninterrupted production.
2. Material will be purchased only when need exists. Hence, it avoids the chances of over-stocking.
3. By purchasing materials at the most favourable prices, the purchase is able to make a valuable contribution to the reduction in cost.
4. Materials are protected against loss by fire, theft; handling with the help of proper physical controls.
5. Issues of materials are properly authorised and properly accounted for.
6. Vouchers will be approved for payment only if the material has been received and is available for issue.
7. Materials are, at all times, charged as the responsibility of some individual.

3.3 PROCEDURE OF PURCHASING AND RECEIVING MATERIALS:

Purchasing procedure vary with different business firms, but all of them follow a general pattern in the purchases and receipt of materials and payment obligations. The important steps may be listed as follows :

Purchase Requisition : The initiation of purchase begins with the receipt of a purchase requisition by the purchasing department. The purchase requisition is prepared by the storekeeper for regular stock items and by the departmental head for special equipment or materials not stocked as regular items. The requisition is approved by one or more executives in addition to one originating

the requisition. The requisition is prepared in triplicate, the original copy is sent to the purchasing department, the second is retained by the storekeeper or executive initiating the purchase requisition and the third copy is sent to the costing department. The requisition contains particulars regarding quantity, the quality or material specifications, and the date by which purchase of materials is required. The requisition may be in the following form :

PURCHASE REQUISITION				
No.102		Date 1st May, 2000		
Please Purchase for X Department/Work Order No. 301				
Serial No.	Stock Code No.	Description of Articles	Quantity	Remarks
1	B.36	1½” Coppier Nails	5 Kg.	Materials required by 16th May, 2000
Requested by Ram			Approved by Mohan	

Fig. 3.1

Purchase order : If the purchase requisition received by the purchasing department is in order, then it will call for tenders and/or quotations from the suppliers of materials. It will send enquiries to prospective suppliers giving details of requirement and requesting details of available materials, prices, terms and delivery etc. Quotations will then be compared and will place order with those suppliers who will provide the necessary goods at competitive price. The number of copies and routing of purchase orders depend on the procedure followed in the organisation. Normally, the copies of the purchase order will be sent to the supplier, the department originating purchase requisition, Inspection department, Accounting department. The specimen of the purchase order is given in Fig. 3.2.

XYZ Ltd.				Sl. No. :			
PURCHASE ORDER				Date:			
To				Purchase Order No. :			
_____				Supplier Quotation :			
_____				No. and Date :			

Please supply the following items on the terms and conditions mentioned below :							
Sl. No.	Description	Material	Size	Qty.	Price	Amount	Delivery
Terms of Delivery :				For XYZ Ltd.			
Terms of Payment :							
Special Conditions :				Purchase Manager			

Fig. 3.2

Materials inspection note : When materials are delivered, a supplier's carrier will usually provide a document called Delivery note or Delivery advice to confirm the details of materials delivered. When materials are unloaded the warehouse staff check the materials unloaded with the delivery note. Then the warehouse staff prepares a Materials Receipt Note, a copy of which is given to the supplier's carrier as a proof of delivery. After receiving the materials the inspection department thoroughly inspects whether the quality of material is in accordance with the purchase order a note called Material Inspection Note, copies of which are sent to the supplier and stores department. A specimen of Material Inspection Note is given in Fig. 3.3.

MATERIAL INSPECTION NOTE						
Purchase Order No..... Dt.....			Inspection Note No.....			
Material Receipt No..... Dt.....			Date.....			
Sl.No.	Description	Stores	Quantity			Reasons for rejection
		Code	Inspection	Accepted	Rejected	
Special remarks						
Inspector						

Fig. 3.3

Goods Received Note : One the inspection is completed a Goods. Received Note (GRN) is prepared by the stores department, and copies of GRN is sent to the Purchasing department Costing department, Accounts department and Production department; which initiated purchase requisition. A specimen of Goods Received Note is given in Fig.3.4

GOODS RECEIVED NOTE						
Purchase Order No.....				Sl. No.....		
Supplier's Name.....				Date.....		
Purchase order No.....				Date.....		
Sr. No.	Description	Material Code	Size	Qty.	Price Rs.	Amount Rs.
Date of entry in Bin Card.....						Stores Manager
Stores ledger.....						

Fig. 3.4

After receipt of GRN from the stores department and invoice from the supplier the Accounts department will check the purchase order and take necessary steps for making payment to the supplier.

Stores Requisition Note : It is also called Materials Requisition Note. When Production or other departments requires material from the store is raises a requisition, which is an order on the stores for the material required for execution of the work order. This note is signed by the department incharge of the concerned department. It is a document which authorise the issue of a specified quantity of materials. It will include the cost centre of job number for which the requisition is being made. A specimen Stores Requisition Note is given in Fig. 3.5

STORES REQUISITION NOTE					
Job No.....			Sl. No.....		
Department.....			Date.....		
Sr. No	Description	Code No.	Quantity	Rate Rs.	Value Rs.
Entered in <div style="display: flex; justify-content: space-between; margin-top: 20px;"> Bin Card..... Stores ledger..... Department incharge </div>					

Fig. 3.5

Any person who requires materials from the stores must submit Stores Requisition Note. The store keeper should only issue materials from stores against such a properly authorised requisition and this will be entered in the Bin card and Stores Ledger. A copy of the requisition will be sent to the Costing

department for recording the cost or value of materials issued to the cost centre or job.

Material Transfer Note : If materials are transferred from one department or job to another with in the organisation, then material transfer note should be raised. It is record of the transfer of materials between stores, cost centres of cost units showing all data for making necessary accounting entries. A specimen of Material Transfer Note is given in Fig. 3.6.

MATERIAL TRANSFER NOTE					
Job No.....			Sl. No.....		
Department.			Date.....		
Sr. No.	Description	Material code	Quantity	Rate Rs.	Amount Rs.
Issuing Deptt.			Receiving Deptt.		

Fig. 3.6

Material Return Note : If materials received from the stores is not of suitable quality or if there is surplus material remaining with the department, they are returned to stores with another called ‘Material Return Note’ evidencing return of material from Department to Stores. A copy of Material Return Note is sent to the Costing department for making necessary adjustments in accounts.

Bin Card : A bin card indicates the level of each particular item of stock at any point of time. It is attached to the concerned bin, rack or place where the

raw material is stored. It records all the receipts of a particular item of materials and its issues. It gives all the basic information relating to physical movements.

It is record of receipts, issue and balance of the quantity of an item of stock handled by a store. A specimen bin card is given in Fig. 3.7.

BIN CARD							
Bin No.		:				Maximum Level	:
Material Code No.		:				Minimum Level	:
Material description		:				Re-order Level	:
Stores Ledger Folio No.		:					
Receipts			Issues			Balance	Remarks
Date	G.R.N. No.	Qty.	Qty.	Date	Req.	Qty.	Qty.

Fig. 3.7

Stores Ledger : Stores department will maintain a record called stores ledger in which a separate folio is kept for each individual item of stock. It records not only the quantity details of stock movements but also record the rates and values of stock movements. With the information available in the stores ledger, it is easier to ascertain the value of any stock item at any point of time. The minimum, maximum and re-order levels of stock are also mentioned for taking action to replenish the stock position. A specimen stores ledger account is given in Fig. 3.8

STORES LEDGER ACCOUNT											
Folio No. :				Minimum Level :							
Material Code :				Re-order Level :							
Material description :				Maximum Level :							
Date	Receipts				Issues				Balance		
	GRN No.	Qty.	Rate Rs.	Amount Rs.	Stores	Qty.	Rate Rs.	Amount Rs.	Qty.	Rate Rs.	Amount Rs.

Fig 3.8

Centralised and Decentralized Purchasing :

Organisation of the purchase function will vary according to particular conditions and ideas. Purchases may be centralised or decentralised.

In centralised purchasing, there is a separate purchasing department entrusted with the task of making all purchases of all types of materials. The head of this department is usually designated as Purchase Manager or Chief Buyer.

In decentralised purchasing, each branch or department makes its own purchases. If the branches of plants are located at different places, it may not be possible to centralise all purchases. In such cases, the decentralised purchasing can better meet the situation by making purchases in the local market by plant or branch managers.

Advantages of Centralised Purchasing :

A centralised centralised purchasing system is generally preferred because of the following advantages of it :

1. Specialised and expert purchasing staff can be concentrated in one department.

2. A firm policy can be initiated which may result in favourable terms of purchase, e.g., higher trade discount, easy terms of payment, etc.
3. Standardisation of quality of raw material is facilitated.
4. Better control over purchasing is possible because reckless buying by various individuals is avoided. Keeping all records of purchase transactions at one place also helps in control.

Disadvantages of Centralised Purchasing :

1. The creation and maintenance of a special purchasing department leads to higher administration costs which small concerns may not be in a position to afford.
2. Centralised purchasing is not suitable for plants or branches located at different places which are far apart.

3.4 METHODS OF PRICING MATERIAL ISSUES :

The important methods followed pricing of issue of materials are discussed below :

1. **Actual Cost Method :** Where materials are purchased specially for a specific job, actual cost of materials is charged to that job. -Such materials will normally be stored separately and issued only to that particular job.
2. **First in First out Method (FIFO) :** Under this method materials are issued out of stock in the order in which they were first received into stock. His assumed that the first material to come into stores will be the first material to be used. CIMA defines FIFO as “a method of pricing the issue of material using, the purchase price of the oldest unit in the stock”.

Advantages :

1. It is easy to understand and simple to price the issues.
2. It is good store keeping practice which ensures that raw material leave the stores in a chronological order based on their age.

3. It is a straight forward method which involves less clerical cost than other methods of pricing.
4. This method of inventory valuation is acceptable under standard accounting practice.
5. It is consistent and realistic practice in valuation of inventory and finished stock.
6. The inventory is valued at the most recent market prices and it is near to the valuation based on replacement cost.

Advantages

- There is no certainty that materials which have been in stock longest will be used, if they are mixed up with other materials purchased at a later date at different
- If the price of the materials purchased fluctuates considerably it involves more clerical work and there is possibility of errors.
- In a situation of rising prices, production cost is understand.
- In the inflationary market there is a tendency to under pricing of material issues and deflationary market this is the tendency to overprice such issues.
- Usually mote than one price has to be adopted for a single issue of materials.
- It makes cost comparison difficult of different jobs when they are charged with varying price for the same materials.

This method is more suitable where the size of the raw materials is large and bulky and its price is high and can be easily identified in the stores separately. This method is useful when the frequency of material issues is less and the market price of the material is stable and steady.

Last in First out Method : Under this method most recent purchase will be the first to be issued. The issues are ,priced out at the most recent batch

received and continue to be charged until a new batch is arrived into stock. It is method of pricing the issue of material using the purchase price of the latest unit in the stock.

Advantages :

- Stocks issued at more recent price represent the current market value based on the replacement cost.
- It is simple to understand and easy to apply.
- Products cost will tend to be more realistic since material cost is charged at mere recent price.
- In times of rising prices, the pricing of issues will be at a more recent current market price.
- It minimise unrealised inventory gains and tends to show the conservative profit figure by valuation of inventory at value before price rise and provides a hedge against inflation.

Disadvantages:

- Valuation of inventory is not acceptable in preparation of financial accounts.
- It is an assumption of a cost flow pattern and is not intended to represent the true physical flow of materials from the stores.
- It renders cost comparison between jobs difficult.
- it involves more clerical work and some times valuation may go wrong.
- In times of inflation, valuation of inventory under this method will not represent the current market prices.

Illustration 3.1:

From the records of an oil distributing company, the following summarised information is available for the month of March 1996:

Sales of month : Rs. 19,25,000

Opening Stock as on 1.3.1996 : 1,25,000 litre @ 6.50 per litre

Purchases (including freight and Insurance) :

March 5 150,000 litre @ Rs. 7.10 per litre

March 27 100,000 litre @ Rs. 7.00 per litre

Closing stock as on 31.3.96 : 1,30,000 litres.

General administrative expenses for the month : Rs. 45,000

On the basis of the above information, work out the following using FIFO and LIFO methods of inventory valuation assuming that pricing of issues is being done at the end of the month after all receipts during the month:

- (a) Value of closing stock as on 31.3.96
- (b) Cost of goods sold during March 1996
- (c) Profit or loss for March 1996

Solution:

(A) FIFO Method of Pricing Issues

Store Ledger

Date	Particulars	Receipts			Issues			Balance		
		Qty. Litres	Rate Rs. Per Litre	Value Rs.	Qty. Litres	Rate Rs. Litre	Value Rs.	Qty. Litres	Rate Rs. Per Litre	Value Rs.
1.3.96	Balance b/d							1,25,000	6.50	8,12,500
5.3.96	Purchases	1,50,000	7.10	10,65,000				2,75,000		18,77,500
27.3.96	Purchase	1,00,000	7.00	7,00,000				3,75,000		25,77,500
	Issues (3,75,000				1,25,000	6.50	8,12,500	2,50,000		17,65,000
	-1,30,000									
	=2,45,000 units)				1,20,000	7.10	8,52,000	1,30,000		9,13,000
		2,50,000		17,65,000	2,45,000		16,64,500			

(B) LIFO Method of Pricing Issues.**Store Ledger**

Date	Particulars	Receipts			Issues			Balance		
		Qty. Litres	Rate Rs. Per Litre	Value Rs.	Qty. Litres	Rate Rs. Litre	Value Rs.	Qty. Litres	Rate Rs. Per Litre	Value Rs.
1.3.96	Balance b/d							1,25,000	6.50	8,12,500
5.3.96	Purchases	1,50,000	7.10	10,65,000				2,75,000		18,77,500
27.3.96	Purchase	1,00,000	7.00	7,00,000				3,75,000		25,77,500
	Issues				1,00,000	7.00	7,00,000			
					1,45,000	7.10	10,29,500	1,30,000		8,48,000
		2,50,000		17,65,000	2,45,000		17,29,500			

Closing Stock, cost of goods sold, profit under FIFO

(a)	Value of closing stock	Rs. 9,13,000
(b)	Cost of goods sold	Rs. 16,64,500
	(8,12,500 + 8,52,000)	
(c)	Profit	
	Sales	Rs. 19,25,000
Less:	Cost of goods sold	Rs. 16, 64,500
	General administration expenses	Rs. 45,000
	Profit	<u>Rs. 2,15,500</u>

Closing stock, cost of goods sold, profit under LIFO

(a)	Value of closing stock	Rs. 8,48,000
(b)	Cost of goods sold	Rs. 17,29,500
	(7,00,000 + 10,29,500)	
(c)	Profit :	
	Sales	Rs. 19,25,000

Less: Cost of goods sold	17,29,500	
General administration expenses	<u>45,000</u>	<u>17,74,500</u>
Profit		<u>Rs. 1,50,500</u>

4. Highest in First Out Method (HIFO) : Under this method the materials with highest prices are issued first, irrespective of the date upon which they were 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. This method is used when the material is in short supply and in execution of cost plus contracts. This method is not popular and not acceptable under standard accounting practices.

5. Simple Average Cost Method : Under this method all the materials received are merged into existing stock of materials, their identity being lost. The simple average price is calculated without any regard to the quantities involved. The simple average cost is arrived at by adding the different prices paid during the period for the batches purchased by dividing the number of batches. For example, three batches of materials received at Rs. 10, Rs. 12 and Rs. 14 per unit respectively.

$$= \frac{\text{Rs. 10} + \text{Rs. 12} + \text{Rs. 14}}{3}$$

$$= \frac{\text{Rs. 36}}{3} = \text{Rs. 12 per unit.}$$

This method is not popular because it takes into consideration the prices of different batches but not the quantities purchased in different batches. This method is used when prices do not fluctuate very much and the stocks are small in value.

Illustration 3.2

Prepare a stores ledger account by following the simple average method on the basis of information given below :

Date		Rate per unit (Rs.)
January 1,2000	Received 500 units	20
January 10, 2000	Received 300 units	24
January 15,2000	Issued 700 units	-
January 20, 2000	Received 400 units	28
January 25,2000	Issued 300 units	-
January 27,2000	Received 500 units	22
January 31, 2000	Issued 200 units	-

Solution :

Stores Ledger Account
(Simple Average Price Method)

Date	Receipts			Issues			Stock		
	Qty.	Rate	Amount	Qty.	Rate	Amount	Qty.	Rate	Amount
1994									
Jan 1	500	20	10,000	-	-	-	500	20	10,000
Jan. 10	300	24	7,200	-	-	-	500	20	10,000
							300	24	7,200
Jan.15	-	-	-	700	22	15,400	100		1,800
Jan.20	400	28	11,200	-	-	-	500		13,000
Jan.25	-	-	-	300	26	7,800	200		5,200
Jan.27	500	22	11,000	-	-	-	700		16,200
Jan.31	-	-	-	200	25	5,000	500		11,200

Average price for different issues has been calculated, as follows :

Jan. 15 700 units = $(20 + 24) / 2 =$ Rs. 22 per unit

Jan. 25 300 units = $(24 + 28) / 2 =$ Rs. 26 per unit

Jan. 31 700 units = $(20 + 24) / 2 =$ Rs. 22 per unit

6. Weighted Average : Under this method, issue of materials is priced at the average cost price of the materials in hand, a new average being computed whenever materials are received. In this method, total quantities and total costs are considered while computing the average price and not the total of rates divided by total number of rates as in simple average. The weighted average is calculated each time a purchase is made. The quantity bought is added to the stock in hand, and the revised balance is then divided into the new cash value of the stock. The effect of early price is thus eliminated. This method avoids fluctuations in price and reduces the number of calculations to be made, as each issue is charged at the same price until a fresh purchase necessitates the computation of a new average. It gives an acceptable figure for stock values.

Advantages :

1. The method is logical and consistent as it absorbs cost while determining the average for pricing material issues.
2. The changes in the prices of materials do not much affect the materials issues and stock.
3. The method follows the concept of total stock and total valuation
4. Both cost of materials issued and in stock tend to reflect actual costs.

Disadvantages :

The weighted average method also the following disadvantages :

1. Simplicity and conveniences are lost when there is too much change in the prices of materials.
2. An average price is not based on actual price incurred, and therefore is not realistic. It follows only arithmetical convenience.

Illustration 3.3

Prepare a store ledger account on the basis of information given in Illustration 3.2 by following the weighted average method.

Solution:

Stores Ledger

Date	Receipts			Issues			Stock		
	Qty.	Rate	Amount	Qty.	Rate	Amount	Qty.	Rate	Amount
2000									
Jan. 1	500	20	10,000	-	-	-	500	20	10,000
Jan. 10	300	24	7,200	-	-	-	500	20	17,200
Jan.15	-	-	-	700	21.50	15,050	800	21.50	2,150
Jan.20	400	28	11,200	-	-	-	500	26.70	13,350
Jan.25	-	-	-	300	26.70	8,010	200		5,340
Jan.27	500	22	11,000	-	-	-	700	23.34	16,340
Jan.31	-	-	-	200	23.34	4,668	500	23.34	11,672

7. Periodic Average Cost Method : Under this method, instead of recalculating the simple or weighted average cost every time there is a receipt, an average for the accounting period as a whole is computed. The average price calculated for all the materials issued during the period is computed as follows:

$$\begin{array}{r} \text{Cost of} \\ \text{Opening Stock} \end{array} + \begin{array}{r} \text{Total Cost of all receipts} \\ \text{during the period} \end{array}$$

$$\begin{array}{r} \text{Units in Opening} \\ \text{Stock} \end{array} + \begin{array}{r} \text{Total Units received} \\ \text{during the period} \end{array}$$

8. Standard Cost Method : Under this method, material issues are priced at a predetermined standard issue price. Any variance between the actual purchase price and standard issue price is written off to the profit and loss account. Standard cost is a predetermined cost set by the management prior to the actual material costs being known and the standard issue price is used for all issues to production and for valuation of closing stock. If initially the standard price

is set carefully then it reduces all the clerical work and errors tremendously and the stock recording procedure is simplified. The realistic production cost comparisons can be made easier by eliminating fluctuations in cost due to material price variance. In a situation of fluctuating prices, this method is not suitable.

9. Replacement Cost Method (Market Price Method) : The replacement cost is a cost at which material identical to that is to be replaced could be practised at the date of pricing material issues as distinct from the actual cost price at the date of purchase. The replacement price's the price of replacing the material at the time of issue of materials or on the date of valuation of closing stock. This method is not acceptable for standard accounting practice since it reflects a cost which has not really been paid. If stocks are held at replacement cost for balance sheet purposes when they have been bought at a lower price, an element of profit which has not yet been realised will be built into the profit and loss account.

Illustration 3.4 :

From the following details of stores receipts and issues of material in a manufacturing unit, prepare the Stock Ledger using "Weighed Average" method of valuing the issues :

Nov. 1	Opening Stock 2,000 units @ Rs. 5 each.
Nov. 3	Issued 1,500 units to Production.
Nov. 4	Received 4,500 units @ Rs. 6.00 each.
Nov. 8	Issued 1,600 units to Production.
Nov. 9	Returned to stores 100 units by Production Department (from the issues of November, 3)
Nov. 16	Received 2,400 units @ Rs. 6.50 each.
Nov. 19	Returned to the supplier 200 unit out of the quantity received on November, 4

- Nov. 20 Received 1,000 units @ Rs. 7.00 each.
 Nov. 24 Issued to Production 2,100 units.
 Nov. 27 Received 1,200 units @ Rs. 7.50 each.
 Nov. 29 Issued to Production 2,800 units
 (use rates upto two decimal places).

Solution :

Stock Ledger
(Weighted Average Method)

Date	Reference	Receipts			Issues			Stock		
		Qty.	Rate	Amount	Qty.	Rate	Amount	Qty.	Rate	Amount
Nov. 1	Opening Balance							2,000	5.00	10,000
3	Issues to Production				1,500	5.00	7,500	500	5.00	2,500
4.	Receipts	4,500	6.00	27,000				5,000	5.90	29,500
8	Issues to Production				1,600	5.90	9,440	3,400	5.90	20,060
9.	Returns by Producing	100	5.00	500				3,500	5.87	20,560
16	Receipts	2,400	6.50	15,600				5,900	6.13	36,160
19	Returns to Supplier				200	6.00	1200	5,700	6.13	34,960
20	Receipts	1000	7.00	7000				6,700	6.26	41960
24	Issues to Production				2900	626	13446	4600	6.26	28814
27	Receipts	1200	7.50	9000				5800	6.52	37814
29	Issues to Production				2800	652	18256	3000	6.52	19558

3.5 AN APPRAISAL OF PRICING METHODS :

We have examined in the previous pages the relative merits and demerits of different methods of materials issues. No single method can be appropriate under all circumstances. The choice of a method will depend upon the following factors :

1. The nature of materials - e.g. if materials are to be kept for some time for maturing or seasoning, an inflated price will have to be charged.
2. The management desire - e.g., if the management wants that the cost accounts should represent the current position and correspond with estimates and besides that they should disclose efficiency in buying, pricing materials issues at market price may be suitable.
3. The nature and size of the business - a big business can bear heavy expenses, on clerical staff while a small business cannot. A method which will result in more clerical work cannot be recommended for a small business.
4. Stability or otherwise of the price of materials. In case of fluctuating prices, weighted average method may be more suitable than any other method.
5. Whether the cost accounts are maintained according to the standard costing system, if so, method of issuing materials on standard cost should be used.
6. Whether business enters into long term contracts at a fixed price, if so, materials may be issued to contracts at a specific price fixed by the management in advance irrespective of the costs.

On the whole “periodic weighted average price method” gives satisfactory results. However, in case the concern is using standard costing, the standard cost method should be used.

3.6 STOCK VALUATION :

The method of valuing stock for balance sheet purposes is quite independent of the system of pricing for costing purposes. The valuation of stock in financial accounts is done on the basis of the principle that it is

imprudent to consider unrealised profits and ignore anticipated losses. Therefore, stock for balance sheet purposes is valued at lower of the cost or market price. For calculating the cost price of stock of materials in hand, it is assumed that stock consists of most recent purchases.

3.7 INVENTORY CONTROL TECHNIQUES :

Inventory control models deal with the raw material inventory. The following are the models of inventory control:

3.7.1 Economic order quantity : Economic order quantity is a quantity of materials to be ordered which takes into account the optimum combination of:

- Bulk discounts from high volume purchases
- Usage rate.
- Stock holding costs.
- Storage capacity.
- Order delivery time.
- Cost of processing the order.

It is an optimum size of either a normal outside purchase order or an internal production order that minimises total annual holding and ordering costs of inventory. The major objective of managing inventory is to discover and maintain the optimum level of investment in inventory. The optimum level will be that quantity which minimises the total costs associated with inventory.

Costs of ordering stocks include the following :

- Preparation of purchase order.
- Costs of receiving goods.
- Documentation processing costs.
- Transport costs.
- Intermittent costs of cashing orders, rejecting faulty goods.
- Additional costs of frequent or small quantity orders.

- Where goods are manufactured internally, the set up and tooling costs associated with each production run.

Cost of carrying stocks include the following :

- Storage costs (rent, lighting, refrigeration, air conditioning etc.)
- Stores staffing, equipment maintenance and running costs. Handling costs.
- Audit, stock taking or perpetual inventory costs.
- Required rate of return on investment in current assets.
- Obsolescence and deterioration costs.
- Insurance and security costs.
- Costs of money tied up in inventory.
- Pilferage and, damage costs.

Stock-out costs : These are the costs associated with running out of stock. The avoidance of these costs is the basis reason why stocks are held in the first instance.

The costs of carrying the inventory, and ordering costs change in the reverse order. The costs of placing the order decrease as the size of the order increase since with a bigger size of order, the number of the order will be lower, However, simultaneously the costs of carrying the inventory will go up because purchases have been made in large quantities. It may be possible to have a point which provides the lowest total cost and this point (ideal size) is known as the EOQ. The equilibrium can be determined mathematically as follows :

$$EOQ = \sqrt{\frac{2 \times U \times O}{IC}}$$

Where U = Annual usage in units
 O = Cost of placing an order
 I = Per cent cost of currying inventory
 C = Cost per unit of material

Illustration 3.5 :

Annual usage units	=	6000
Cost of placing an order	=	Rs. 30
Carrying cost as a percent of inventory	=	20%
Cost per unit of material	=	Rs. 5
Determine EOQ	=	

Solution:
$$\begin{aligned} \text{EOQ} &= \sqrt{\frac{2 \times 60,000 \times 30}{5 \times 20\%}} \\ &= \sqrt{3,60,000} \\ &= 600 \text{ units} \end{aligned}$$

In the above illustration, the EOQ is 600 units. That is ten orders per year are needed. At the level of 600 units, the ordering costs and the carrying costs are equal and also the total cost is at minimum as it is clear from Table 3.1

Table 3.1 Table showing Economic Order Quantity

Annual usage	Orders per year	Units per order	Average inventory (units)	Value per order (Rs.)	Average inventory amount (Rs.)	Order cost	Carrying cost (20%)	Total cost (Rs.)
6,000 units	1	6,000	3,000	30,000	15,000	30	3,000	3030
	2	3,000	1,500	15,000	7,500	60	1,500	1500
	3	2,000	1,000	10,000	5,000	90	1,000	1090
	4	1,500	750	7,500	3,750	120	750	870
	5	1,200	600	6,000	3,000	150	600	750
	6	1,000	500	5,000	2,500	180	500	680
	7	857	429	4,285	2,142	210	428	638
	8	750	375	3,750	1,875	240	376	616
	9	667	334	3,335	1,668	270	334	604
	10	600	300	3,000	1,500	300	300	60
	11	545	273	2,725	1,363	300	1:72	002
	12	500	250	2,500	1,250	360	250	610

Table 3.1 shows that quantities of other orders resulting in more or less than ten orders per year are not so economical as they involve higher total costs.

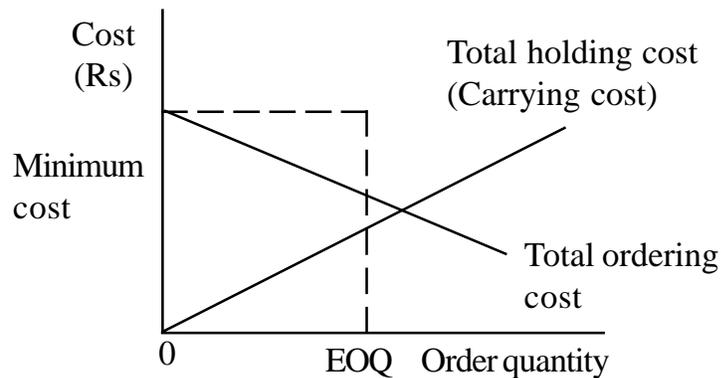


Fig. 3.9

The EOQ formula is sometimes expressed in the following manner which is not in any way different from the formula explained earlier.

$$EOQ = \sqrt{\frac{2U \times P}{S}}$$

- Where
- U = Annual demand or consumption or purchased quantity (in units)
 - P = Cost of placing an order
 - S = Annual cost of carrying inventory per unit (Storage and interest)

The ordering costs, holding costs, total costs and EOQ can be shown graphically also as displayed in Fig. 3.9

When to Order (Reorder Level)

The EOQ determines how much to buy at a particular time. But the question “when to buy” is equally important for business firms. This question

is easy to answer only if we know the lead time - the time interval between placing an order and receiving delivery - and know the EOQ, and are certain of the consumption pattern during lead time. The order point or re-order level is a point or quantity level at which if materials in stores reach, the order for supply of materials must be placed. This point automatically initiates a new order. The order point is calculated from three factors :

1. The expected usage.
2. The time interval between initiating an order and its receipt, referred to as the lead time.
3. The minimum inventory, or safety stock.

For example, if daily usage is 400 Units of material which have a lead time of 20 days and the safety (minimum) stock is 500 units, the order point' will be calculated as follows:

Daily consumption × lead time	=	400 × 20	=	8,000
Add safety stock				500
Order point units			=	8,500

The order point is determined after considering the worst possible expected conditions. This only ensures that the minimum stock will always remain in the inventory and will not be used atleast in the short run. However, situations may arise where there will be stock-out and thus, the order point may not be an absolutely accurate forecasting.

Determinations of Safety of Minimum Stock Levels :

It is advisable to carry a reserve or safety stock to prevent stock-out. The safety stock should be used only in abnormal circumstances, and the working stock in ideal or normal conditions. Therefore, for normal working conditions, the stock should not be allowed to fall below the safety limit, kept only for emergencies. If the usage pattern is known with certainty, and the lead time is also known accurately, then no safety stock would be needed. However, if

either usage or lead time is subject to variation then it is necessary for a business firm to maintain safety stock levels equal to the difference between the expected usage over lead time and the maximum usage over lead time that the firm feels is necessary for cost minimisation. The safety stock level can be computed by using the following formula:

$$\text{Safety stock level} = \text{Ordering levels} - (\text{Average rate of consumption} \times \text{Re-order period})$$

OR

$$\text{Safety stock level} = (\text{Maximum rate of consumption} - \text{Average rate of consumption}) \times \text{Lead time}$$

$$\begin{aligned} \text{That is,} &= (425 - 400) \times 20 \text{ days} \\ &= 500 \text{ units} \end{aligned}$$

Maximum Stock level : The maximum level ensures that the stocks will not exceed this limit although there may be low demand for materials or quick delivery from the suppliers. Maximum stock level can be computed as follows:

$$\text{Maximum stock level} = \text{EOQ} + \text{Minimum Stock}$$

$$\text{Maximum stock level} = \text{Re-order level} + \text{EOQ} - (\text{Minimum consumption} \times \text{Minimum re-order period})$$

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 detained between re-order level and minimum level. In the second case (danger level being between reorder level and minimum level), the firm can only take steps to ensure that materials ordered will arrive in time.

Average stock level- Average stock level is computed in the following manner:

$$= \frac{\text{Minimum Stock} + \text{Maximum stock}}{2}$$

(80)

$$= \frac{\text{Minimum level} + \text{Re-order quantity}}{2}$$

The following example further illustrates, the different stock levels.

Maximum usage (units)	650 per day
Minimum usages (units)	300 per day
Normal usage (units)	500 per day
Economic order quantity (units)	75000
Recorder period - lead time	23 to 30 days
Minimum level (units)	5000
(10 days at normal usage)	

The different stock levels will be follows :

$$\begin{aligned} \text{Re-order level} &= (\text{Normal usage} \times \text{Normal lead time}) + \text{Minimum level} \\ &= (500 \times 30) + 5000 = 20000 \text{ units} \\ &= 20000 \text{ units} \end{aligned}$$

Maximum level = Re-order level + EOQ – Minimum quantity used in re-order period

$$\begin{aligned} &= 20,000 + 75000 (300 \times 25) \\ &= 87500 \text{ units} \end{aligned}$$

$$\begin{aligned} \text{Average level} &= \frac{\text{Maximum} + \text{Minimum}}{2} \\ &= \frac{87500 + 5000}{2} \\ &= 46250 \text{ units} \end{aligned}$$

(81)

ABC Analysis : ABC analysis is basic analytical management tool which enables top management to place the effort where the results will be greatest. The technique tries to analyse the distribution of any characteristics by stock values of importance in order to determine its priority. This technique can be applied in all facts organisation. Many organisations are applying this technique in materials management and spare parts management to identify the contribution made by the materials/spares in the total inventory value. On the basis of stock value materials procurement strategy and consumption strategy is decided.

Under this technique, the items in inventory are classified according to value of usage. The higher value items have lower safety stocks, because the cost of production is very high in respect higher value items. The lower value items carry higher safety stocks. This method divides inventory into three classes: A, B and C. Items in class 'A' constitute the most important class of inventories so far as the proportion (or percentage) in the total values of inventory is concerned. Items in class 'B' constitute an intermediate position while those in item 'C' are quite negligible.

It is seen a very small percentage of the Items say 15-20% accounts for 75-80% of the total items accounting 1 ?-20% of the monetary value. ABC analysis divides the total inventory list into three classes using the rupee volume. The A items consist of approximately to 15% of the total items, B item the next 35% and C consist the remaining 50% items. The numbers are just indicative and actual breakup will vary from situation to situation. The above categorization is represented in the Table 3.2 given below :

Category	% of items	% of value
A	15	80
B	35	15
C	50	5
Total	100	100

Note : The students should refer that lesson entitled 'Inventory Management' of the course code BBA-206 for details of various techniques of inventory control.

3.8 IMPORTANT QUESTIONS :

1. Describe the meaning, objectives and the basis principles of material control system.
2. Mention any six methods of pricing the issue of materials.
3. What is Reordering Level ? Explain its relationships with Maximum and Minimum Stock Levels. What are the factors to be considered in fixing reordering level and quantity ? Under what circumstances would you recommend revision of levels ?
4. Distinguish between :
 - (a) Perpetual Inventory System and Continuous Stock-taking.
 - (b) Bill of Materials and Material Requisition Note.
5. In materials management, what do you understand by (i) Maximum Level, (ii) Minimum Level and (iii) Ordering Level?
6. What are the important requirements of a system of material control?
7. Discuss the functions and advantages of a Centralised Purchase Department of a manufacturing concern.
8. What are the various factors which influence the selection of a particular method of pricing the issues of materials from stores?
9. Write short notes on :
 - (a) ABC analysis
 - (b) Economic Order Quantity

- (c) Perpetual Inventory System
- (d) Average Method of Pricing Material Issue
- (e) Purchase requisition
- (f) Reordering level
- (g) Bill of Materials and Stores Requisition Not
- (h) Bin Card
- (i) Materials Requisition Note and Material Transfer Note.

10. The following information is extracted from the Stores Ledger :

Material X

Opening Stock

Purchases :

Jan.1	Jan. 20	100@ Rs. 1 per unit
	Jan. 20	100@ Rs. 2 per unit

Issues :

Jan. 22		60 for Job W 16
Jan. 23		60 for Job W 17

Complete the receipts and issues valuation by adopting the First in first-out, Last-in First-out and the Weighted average method. Tabulate the values allocated to Job W16, Job W17 and the closing stock under the aforesaid methods and discuss from different points of view which method you would prefer.

11. The following information is available in respect of material of No. 30 :

Re-order quantity	=	1,500 units
Re-order period	=	4 to 6 weeks
Maximum consumption	=	400 units per week
Normal consumption	=	300 units per week
Minimum consumption	=	250 units per week

Calculate :

- (a) Re-order levels;
- (b) Minimum level;
- (c) Maximum level; and
- (d) Average Stock level

[Ans. (a) 2,400 units; (b) 900 units; (c) 2,900 units; (d) 1,900 units]

12. In manufacturing its product Z, a company uses two types of raw materials A and B in respect of which the following information is supplied :

One unit of Z requires 10 kg. of A and 4 kg. of B materials. Price per kg. of material is Rs. 10 and that of B is Rs. 20. Reorder quantities of A and B materials are 10,000 kg. and 5,000 kg. Reorder level of A and B materials are 8,000 kg. and 4,750 kg. respectively. Weekly production varies from 175 units to 225 units averaging 200 units. Delivery period of A materials is 1 to 3 weeks and B materials is 3 to 5 weeks.

- Compute:
- (i) Minimum Stock Level of A
 - (ii) Maximum Stock Level of B

13. Medical Aids Co. manufactures a special product "A". The following particulars were collected for the year 1991 :

- (a) Monthly demand of 'A' 1,000 units
- (b) Cost of placing an order Rs. 100
- (c) Annual carrying cost per unit Rs. 15
- (d) Normal usage 50 units per week.
- (e) Minimum usage 25 units per week
- (f) Maximum usage 75 units per week
- (g) Re-order period 4 to 6 weeks

Compute from the above :

(1) Re-order Quantity; (2) Re-order level; (3) Minimum Level; (4) Maximum Level; (5) Average Stock-Level.

14. Pumpkin Pump C. uses about 75,000 values per year and the usage is fairly constant at 6,250 values per month. The values cost Rs. 1.50 per unit when bought in quantities and the carrying cost is estimated to be 20% of average inventory investment on the annual basis. The cost to place an order and process the delivery is Rs. 18. It takes 45 days to receive delivery from the date of an order and a safety stock of 3,200 values is desired.

You are required to determine:

- (i) the most economical order quantity and frequency of orders;
- (ii) the order point; and
- (iii) discuss the problems that most firms would have in attempting to apply the economic order quantity (EOQ) formula to their inventory problems.

15. A manufacturer who has newly set up the factory used cost price as the basis for charging out materials to jobs. The receipts side of the stores ledger account shows the following particularly :

500 articles bought at Rs. 3.00 each

700 articles bought at Rs. 3.10 each

400 articles bought at Rs. 3.20 each

800 articles bought at Rs. 3.10 each

Successive issues were made of 300, 1,000 and 200 articles.

- (a) At what price per article should each of these issues be charged under FIFO Method.
- (b) Discuss briefly the different methods of charging out the materials issued to job.

[**Ans.** (a) Stock 900 units of Rs. 2,800].

16. The following are the transactions in respect of purchase and issue of components forming part of an assembly of a product manufactured by a firm which requires to update its cost of production, very often for bidding tenders and finalizing cost plus contracts.

LESSON : 4

LABOUR COST

The second Major element of cost in most of the manufacturing undertakings is labour cost. Proper accounting and control of labour cost, therefore, constitutes one of the most important problems of management. In controlling labour cost, the problem is complicated by the human element. This is so because labour consists of a lot of different individuals, each with a different mental and physical capacity and each with a different personality.

Proper control over labour cost involves the following :

1. Appropriate systems for recruitment and selection, training and placement of workers.
2. Satisfactory methods of labour remuneration.
3. Healthy working conditions consistent with legal requirements and competitive undertaking.
4. Method of assuring efficient labour performance.

Direct and Indirect Labour Costs : For the purpose of accounting, labour costs are classified into (i) Direct Labour cost and (ii) Indirect Labour cost.

Direct Labour Cost : The labour cost incurred on the employees who are engaged directly in making the product, their work can be identified clearly in the process of converting the raw materials into finished product is called direct labour cost. For example, wages paid to the workers engaged in machining department, fabrication department, assembling department etc.

Indirect Labour Cost : The indirect employees are not directly associated

with the conversion process but assist in the process by way of supervision, maintenance, transportation of materials, material handling etc. Their work benefits all the items being produced and cannot be specifically identified with the individual products. Hence, the indirect labour cost should be treated as production overhead. These costs will be accumulated and apportioned to different cost centres on equitable basis and absorbed into product cost by applying the overhead absorption rates.

Items of Labour Cost :

The labour cost can be analysed into the following:

- * Monetary benefits payable immediately
- * Salaries and Wages, Dearness and other allowances, production incentive or bonus.
- * Monetary benefits after some time in the future.
Employer's contribution to P.F., E.S.I., Pension, Gratuity, Profit linked bonus, etc.
- * Non-monetary benefits (Fringe benefits)
Free or subsidised food, free medical or hospital facilities, free 'or subsidised education to the employees children, free or subsidised housing etc.

Organisation for Accounting and Control of Labour Cost

The following departments/functions contribute to the efficient utilisation of labour and adequate control over labour costs.

1. Personnel Department
2. Engineering Department

3. Time-keeping Department
4. Payroll Department
5. Cost Accounting Department

Personnel Department : The main function of the personnel department is to provide an efficient labour force. The personnel manager/director with the help of department Heads is responsible for the execution of the policies formulated by board of directors regarding employment, discharge; classification of employees, wages and wage systems. Hire of employees may be for replacement or for expansion. Replacement hiring starts when a departmental or a foreman sends an employee requisition to the personnel department.

The hiring of employees for expansion requires authorisation by top management. The personnel department in cooperation with department heads concerned, plans the expansion requirements and agrees upon promotions and Promotional transfers to be made, upon the number and kind of workers to be hired, and upon the dates at which new recruits will report for work. Recruitment, interviewing, testing, physical examination, induction procedures, and assignment to jobs are carried out by the personnel department.

The hiring of employees for expansion requires authorisation by top Management. The personnel department, in cooperation with department heads concerned, plans the expansion requirements and agrees upon promotions and promotional transfers to be made, upon the number and kind of workers to be hired, and upon the dates at which new recruits will report for work.

Recruitment, interviewing, testing, physical examination, induction procedures, and assignment to jobs are carried out by the personnel department.

The personnel department prepares an Employee's Record Card on engaging a new worker. This will show full personal details of the employees, particulars of previous employment, medical category and wage rate normally, spaces are also provided for subsequent recording of transfers and promotions wage rate revisions, details of attendance, merit and conduct reports, sickness and accidents and the date and reason for leaving.

Engineering Department : This .department prepares plans and specifications of jobs, makes jobs analysis, conducts time and motion studies, makes provision for safe working conditions and supervises production activities.

Work Study : Work study is the study of job, methods and equipment to ensure that the best way to do the job has been followed by a worker. The successful operation of incentive wage schemes depends on .making proper work study. Work study consists of two complementary techniques or methods : (i) methods study, and (ii) work measurement.

Method Study :

Method study ensures efficient and maximum use of resources like material, labour, plant facilities, it improve the production methods by reducing/ eliminating the work content and unnecessary methods; and it attains the maximum production which is good for the firm as well as the workers. The following stages are involved in methods study:

1. First of all, work for the purpose of methods study should be selected. Generally, methods study is done in jobs which involve complex and costly operations.
2. After selecting a particular job or work, details about the work should be gathered, such as purpose, location, sequence, relationship with the other work, methods of working, operators and facilities, etc.
3. After studying the relevant details of a work, an improved method should be developed for effectiveness, efficiency and operational simplicity. Unnecessary operations, activities should be avoided. An improved

method might change the location and sequence of work, production methods and layout.

4. The method so developed should be used for the job or work for which it has been designed.
5. Follow-up is necessary to enquire as to whether the improved method is being implemented in practice and to find out deviations, if any.

Work Measurement : Work measurement aims at determining the effective time required to perform the work. 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 purposes such as :

- * incentive wage schemes which require time taken for completing a work;
- * improving utilisation of men, machines and materials;
- * setting labour standards; and
- * achieving the objectives of cost control and cost reduction.

The following stages are involved in work measurement :

1. Selection of the work.
2. Measuring the actual time taken in the work done.
3. The total time so established for a job should be adjusted for fatigue, time taken in setting the tools, idleness involved in the work itself, etc.

Job Evaluation : Job evaluation is the technique of analysis and assessment of jobs to determine their relative value within the firm so that a fair wage and salary structure can be established for the various job positions. In other words, job evaluation aims at providing a rational and equitable basis for differential salaries and wages for different classes of workers. Following are the objectives (or benefits) of job evaluation:

1. It aims at developing a systematic and rational wage structure as well as job structure.
2. It aims at establishing consistency between the wage and salary adopted with the firm and that of other firms with in the industry or geographical area.
3. Controversies and disputes relating to salary between the employers and employees can be settled by designing job evaluation techniques within the firm which can satisfy employers and employees both.
4. Stability and fairness in the wages and salary structure are very useful for the administration which can formulate business policies and plans as workers cooperation is fully ensured.

Methods of Job Evaluation :

Point Ranking Method : This method analyses each job in terms of job factors. Job factors may consist of elements like skill, effort, working conditions, hazards, responsibility. However, different job factors may emerge in different jobs. After specifying job factors, each of them is assigned weightage or points depending its value for the job. For example, in a particular job, education may be given the higher point as compared to supervision, if the job requires a high degree of education. Finally, the jobs are ranked in the order of points or weights secured by them. Grades are further developed for these different weightages so-that wages rates or wage structure can be suitably designed for them. For example, the following wage scales can be worked out depending on the weights grade. This method is theoretically sound and objective, but it is difficult to operate.

Weights	Grade	Salary scale (Rs.)
201-250	I	4000-5000
251-300	II	5000-6000
301-350	III	6000-7000

351-400	IV	7000-8000
401-500	V	10000-12000

Ranking Method : Under this method different jobs in an organisation are rearranged in an order which can be done either from the lowest to the highest or in the reverse. Before doing ordering of jobs, all jobs should be properly studied in terms of job requirements, worker's qualification, responsibilities, working conditions, etc. Finally, wage scales are determined in terms of ranks.

This method is very simple to operate, less costly and easy to understand. However, this method may be useful for small organisations Only, where are few and well defined: But in a large organisation where jobs are complex and highly involved, this method cannot be beneficial.

Grading Method : Under this method, a hypothetical scale or standard of job values is determined and each job after being analysed in terms of a predetermined grade, is given a grade or class. Predetermined grades or yardsticks are formulated after examining existing jobs in the enterprise. The grades or the class should be established after making an investigation of job factors, such as complexity in the job, supervision, responsibility, education, etc.

This method is simple, less costly and administratively feasible. It attempts at applying a rational basis for grading jobs. .

Merit Rating :

Merit rating is the comparative evaluation and analysis of the individual merits of the employees. It analyses the differences in performance between employees who are working on similar jobs and would therefore earn the same wages. In this task, merit rating accomplishes more than job evaluation. Merit rating has the following objectives:

- a) To evaluate the merit of an employee for the purpose of promotion, increment, reward and other benefits.
- b) To establish and develop a wage system and incentive scheme.

- c) To analyse the merits (or demerits) of a worker and help him in developing his capability and competence for the job.

The characteristics and factors that are considered in merit appraisal of the workers includes : cooperation, quality of work done, attendance and regularity, education skill, experience, and character and integrity.

Merit rating has the following drawbacks :

1. The rating of employees may be subjective and this creates dissatisfaction among them.
2. Evaluators or raters tend to give much premium to past ratings of an employee who might have improved himself in the course of time.
3. Rates may be influenced by raters own attitudes and self-made rating factors which are not consistent with the merit rating process.

Job Evaluation Versus Merit Rating :

Job evaluation and merit rating differ on the following counts :

1. Job evaluation is the assessment of the relative worth of jobs within a business enterprise and merit rating is the assessment of the relative worth of an employee with respect to a job. Another words, job evaluation rates the jobs, but merit rating rates employees on their jobs.
2. Job evaluation helps in establishing a rational wage and salary structure. But merit rating helps in, fixing fair wages for each worker in terms of his competence and performance.
3. Job evaluation brings uniformity in wage and salary rates. But merit rating aims at providing a fair rate, of pay for different workers on the basis of their performances.

Time and Motion Study : Time study determines the time spent on each element of job. The total time taken by all elements (stages) of a job is called the standard time. This standard time is the time which should be taken by an average employe to complete a job under standard (normal) working conditions.

Motion study implies dividing the work into fundamental elements or basis operations of a job or a process for the purpose of eliminating necessary (defective) elements or operations in job. After investigating all movements in a job, process, or operation, it finds out the most scientific and systematic methods of performing the operation or completing the job. Thus, time study fixes the standard time for a job or process, and Motion study eliminates wasteful motions or the movement of a worker on the job. Both are complementary to each other.

Objectives :

- a) To eliminate unnecessary motions, fatigue and improve human efforts.
- b) To improve method, procedure, techniques, process relating to a job.
- c) To utilise effectively materials, machines, human resources and other facilities.
- d) To improve working environment, layout and design of plant and equipment.

Benefits : Followings are the benefits of time and motion study :

1. Helps in full utilisation of materials, plant, labour and other resources.
2. Helps in setting of labour cost standards and control of the labour cost.
3. Useful in determination of fair wage rates and effective wage incentive schemes and preparation of labour budgets.
4. Aids in standardizing jobs, equipments, methods, by determining the best method of operating in the time, set.

Time-Keeping Department : The first step in accounting for labour cost is to prepare an accurate record of the time spent by each employee. Time keeping in labour costing and control is important because of the following reasons:

1. It accumulates the total number of hours worked by each employee so that his earnings can be calculated.

2. Absence of a time-keeping arrangement will create frustration among those employees who are punctual or bound by the attendance rules.
3. Certain benefits like pension and gratuity, leave with pay, provident fund, salary, promotion are linked with continuity of service of employees. Attendance records, in this regard, can be helpful and useful to employees.
4. Overhead costs being indirect costs are apportioned to different products on some equitable basis. Time keeping is necessary if apportionment is to be done on the basis of Labour hours.

Methods of Recording Attendance time

The most common form of attendance record is the clock card on which the employee punches the time at which he comes in and leaves the factory. Each week, a new card is prepared for each employee on the payroll. At the end of the week, the cards are collected and transferred to the payroll department for calculation of gross earnings.

DAILY TIME REPORT

No. _____

Name _____

Nature of work _____

Job No.	Time On		Time Off		Time Worked	
	Hours	Minutes	Hours	Minutes	Hours	Minutes
561	8	30	12	30	4	00
357	01	00	2	00	1	00
816	1	30	2	15	0	45
548	2	15	3	00	0	45
751	3	00	4	30	1	30

Foreman _____

Fig. 4.1 Daily Time Report

Clock cards provide a record of the total hours, employees were available on jobs. However, this card does not reveal as to how employees spend their time which is an important question to be solved before entries can be made in the cost records. This information is supplied by time tickets or daily labour summaries (see Fig. 4.1) on which time keepers record the daily activities of direct labour: time spent on specific orders, time spent on indirect labour operations such as machine maintenance, or idle time waiting for reassignment or machine set-up.

Attendance Records :

The simplest form of attendance records is a manual register which each employee signs into on arrival and departure, noting his times in and out. This type of time-keeping record is subject to limitations and many abuses by employees. In a Business firm where a large number of workers are employed, and if the worker records his own time, it provides very little check upon late arrivals.. The disadvantages of manual registers and time registers are the holdups that occur when each worker has to sign his name in turn, and the amount of clerical work involved in the posting of entries to individual attendance records.

Time-booking : Time-booking like time-keeping is equally important. Time booking means recording the time spent by a worker on each job, process or operation. Time-booking fulfils the following purposes:

1. To determine the cost of the product or job, the amount of labour cost time-booking is required.
2. To determine the quantity and value of work done.
3. To determine earnings like wages, bonus which depend on the time taken by a worker in performing job or jobs in a factory.

Recording work time can be done by anyone of the following methods:

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 has been completed. After completing one job, the worker is given another job ticket for the next job to be completed by him.

Job Card : A job card or job ticket is maintained for every job. When a worker takes up a job, a job card (with or without details of the work to be done) bearing number of the job is given to him. He shall record in it the time of taking up and finishing the job. In most cases this is done by mechanical aids. As soon as a job is completed the worker is given job card of another job to be done by him. In case the job is suspended or the worker does not get another job soon after the completion of a job, he should contact the time-keeper so that appropriate booking of waiting time may be made on the 'Idle time card'.

A job card, thus, performs two functions.

- (a) It authorises a worker to carry out the operations detailed thereon.
- (b) It enables the correct allocation of wages to jobs, operations or processes.

A proforma of Job Card is given below :

JOB CARD						
Work Order No.....			Job No.....			
Worker's Name.....			Date			
Worker's No.....			Time Started.....			
Description of Job	Time		Total Hrs.		Rate Rs.*	Amount Rs.
	on	off	ord.	overtime		
Workman.....			Foreman.....			
Cost Clerk.....						

Fig. 4.2

Labour Cost Card : This card is meant a job which involves many 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 discloses the aggregate labour cost of the job or the product.

Weekly Time Sheets : A sheet is given to each worker to record time on a weekly basis. However, weekly time sheets should be filled up without much delay or on each day failing which some inaccuracies are bound to occur on the time sheets.

Daily Time Sheets : Each worker records the time spent by him on the work during the day for which sheet is provided to each worker. Since time is recorded on a daily basis, accuracy is built upon the time sheets. However, daily time sheets are generally not used. This could be used for maintenance and repairmen who have to do different jobs in different departments.

Time and Job Card : This card records the attendance time of workers and work time of worker on a single sheet.

Payroll Department : Preparation of the payroll from clock cards, job or time tickets, or time sheets is done by the pay roll department. The payroll department (tabulation) is an intermediate function between the time-keeping (accumulation) and the cost accounting (analysis) department. The following are the functions of the payroll department:

1. To compute employee wages.
2. To prepare departmental payroll summaries.
3. To maintain individual employee payroll records.
4. To calculate payroll taxes, deductions and other related payroll liabilities.
5. Compilation of labour statistics for management.

The responsibilities of the payroll department regarding labour costs are:

1. To maintain a record of the job classification, department and wage rate for each employee.
2. To verify and to summarise the time of each worker as shown on the daily time cards.
3. To compute the wages earned by each worker.
4. To compute the payroll deductions under the Acts.

Remuneration Methods : The important labour remuneration methods are discussed below:

Flat Time rate method : Under this system the worker is paid on hourly, daily or weekly wage rate and his remuneration is based on the time spent for production and wages are calculated as follows.

$$\text{Wages} = \text{Hours worked} \times \text{Hourly wage rate}$$

For example, if the hourly rate is Rs. 12 and worker has worked 42 hours in a week, his weekly wages are:

$$40 \text{ hours} \times \text{Rs. } 12 \text{ per hour} = \text{Rs. } 480$$

In an organisation where quality is given priority or if it is difficult to measure the production on time basis, this method is more appropriate. But this will not give consideration to hard, sincere and skilful work.

High day rate system : Under this method, employees are paid a high hourly wage rate than the rate paid at different organisations in the industry or region expecting that the workers will work more efficiently. To implement this method, the efficient, skilled and, experienced workers are selected expecting an efficient and hard work from them in expectation of that the organisation will pay wages at higher rates than prevailing in the industry.

For example, the normal wage rate prevailing in the other similar companies is Rs. 12 per hour, X Ltd. has adopted high day rate of Rs. 15 per hour. A worker who worked for 40 hours in a week will be paid as under:

$$\text{Wages} = 40 \text{ hours} \times \text{Rs. } 15 = \text{Rs. } 600$$

The supervision cost will reduce under this method and there will be reduction in overall labour cost per unit. The main draw back is that there is no guarantee that high day rate system will act as an incentive. The high wages may become the accepted level of pay for normal working and supervision may be necessary to ensure increased productivity and units cost would rise. Another disadvantage is that the workers will get only fixed hourly rate for their effort and it will not act as an individual incentive for extracting efficient and more output from him.

Sometimes, this wage plan is used as an incentive to achieve present targets and problem arises if the anticipated production targets are not achieved.

Measured Day work (Guaranteed) : Under this method, the employee is assured of agreed level of wages for the specified level of performance. The wage rates consists of two components. The first component is of fixed nature depending on the time spent the wages are paid and the other part is variable in nature linked to merit rating and cost of living. The main disadvantage in this method is that it is more complicated in computation of wages and it is not popular.

Different Time rates : Under this method, different time rates are fixed for different efficiencies and skills. Normal wages are paid upto the level of standard efficiency and increase in efficiency, will be paid at graduated scale of payment. This method of wage payment is also not popular due to its complication in calculations.

Straight piece rate method : Under this method, a fixed wage rate is paid for each unit of production, job completed or number of operations completed

irrespective of the time spent on it. The wages are calculated as follows :

$$\text{Wages} = \text{No. of pieces produced} \times \text{Rate per piece}$$

This method is used where the production is repetitive in nature and it cannot be applied to the work which require skill and artistic work. The workers' pay depends upon his output and not upon the time he spends in the factory. The supervision cost is reduced as workers are paid depending on their actual units produced. This method will act as an incentive to efficient workers and act as disincentive to inefficient workers.

The main disadvantage is that the productions may need to be thoroughly inspected for its quality. The stoppage of work due to abnormal causes like machine break down, power failure, shortage of power etc., may cause the workers to loose their wages and they feel insecure under this method of wage payment. The spoilage, defectives and wastage of materials is more, if this wage plan is adopted, due to reckless use to achieve higher output.

Different piece rate method : Under this method, an incentive is offered to workers to increase their output by paying higher rates for increased levels of production.

For example:

Production Units	Rate Per Unit (Rs.)
Upto 40	2.00
41 to 60	2.50
61 to 80	3.00
above 80	3.50

Under the straight piece rate system, the time factor is not taken into consideration but under differential piece rate plan, a series of production targets will be established and as each target is reached a new piece work rate will apply.

In this plan the fast doing skilled workers can able to reach higher levels of targets and will be compensated at higher Piece rates. The extra rates of pay can act as an inducement to the employee to aim for higher productivity to increase their earnings by putting more efforts. Differential piece work plan is normally accompanied by the guaranteed day rates.

Halsey Premium Bonus Plan : Under this method, for each unit or Job a standard time is calculated and 50% of the time saved is allowed as bonus. The time rate paid for the time taken plus 50% of the time saved, if the job is completed in less than the standard time, and time rate is guaranteed. The total wages of a 'Yorker is calculated as follows:

Total Wages:

$$(\text{Time taken} \times \text{Hourly rate}) + [\text{Time saved} \times \text{Hourly rate}]$$

Illustration 4.1 :

A worker X is allowed 60 hours time for completion of the job and the hourly rate is Rs. 4 The actual time taken by the worker is 40 hours. Calculate the wages of worker A. Under Halsey Plan.

$$\begin{aligned} \text{Time saved} &= \text{Time allowed} - \text{Time taken} \\ &= 60 \text{ hours} - 40 \text{ hours} = 20 \text{ hours} \end{aligned}$$

Total Wages

$$\begin{aligned} &= (40\text{hrs} \times \text{Rs. } 4) + [50/100 (20\text{hrs} \times \text{Rs. } 4)] \\ &= \text{Rs. } 160 + \text{Rs. } 40 = \text{Rs. } 200 \end{aligned}$$

Rowan Premium Bonus Plan : Under this method, a standard time is calculated for every job or process and a bonus is paid upon the time saved calculated as a proportion of the time taken in which the time saved bears to the time allowed. In contrast of Halsey Plan, instead of fixed percentage of time saved, bonus is paid in the proportion of time saved to time allowed.

The total wages calculated under Rowan plan are as follows :

$$= (\text{Time taken} \times \text{Hourly rate}) + \left[\frac{\text{Time saved}}{\text{Standard time}} \times \text{Time taken} \times \text{Hourly rate} \right]$$

Illustration 4.2 :

In continuation of the illustration given under Halsey Plan, calculate the total wages of Worker X under Rowan Plan.

Total wages

$$\begin{aligned} &= (40 \text{ hrs} \times \text{Rs. } 4) + \left[\frac{20 \text{ hrs.}}{60 \text{ hrs.}} \times 40 \text{ hrs} \times \text{Rs. } 4 \right] \\ &= \text{Rs. } 160 + \text{Rs. } 53.33 \\ &= \text{Rs. } 213.33 \end{aligned}$$

Comparison of Halsey and Rowan Plan :

- * Where the worker completes his work within half the time allowed; the bonus under both the plans will be same.
- * If time saved is less than 50% of standard time, the Rowan plan is beneficial for the worker.
- * If time saved is more than 50% of the standard time, the Halsey Plan is advantageous to the worker.

Group Incentives Schemes : Group Incentive schemes are designed to provide payment by results collectively to a group of workers as opposed to the payment of bonus under individual premium plans. These schemes are implemented where individual efforts cannot be measured and, the work will be considered as a team work. The production of the group of workers as a whole must first be measured and a total bonus calculated and it is distributed among the group of workers on some agreed proportion or equally.

The group incentive schemes generates the spirit among workers and the administration of the plan simple. Since it needs only few details about the work and clerical work is reduced.

The major drawback is that it is less direct than individual schemes and is less successful with the larger groups. No distinction is made between efficient and inefficient workers. It may be difficult to apportion the amount of bonus between different grades of workers and it may cause friction. The hard working employees will reduce his effort to that of the majority of employees in the group. Wherever possible only individual bonus schemes should be implemented instead of group incentive plans.

Profit Sharing : It refers to the payment of. bonus to employees based on profits of the company. Generally, the companies have profit sharing schemes in which employees will receive a bonus related to the profits of the firm. The main objective of this scheme is to provide an incentive for the workforce as a whole to work collectively to improve the overall results of the organisation

Disadvantages : The disadvantages of the schemes are as follows :

- * The reward is not linked to immediate effort and workers have to wait long period for getting their share of bonus.
- * The bonus is declared only when the profits are available. But in bad years, even though workers might be worked hardly may not get bonus.
- * In profit sharing plan, number of employees are participating in a single scheme and it is doubtful whether it motivates the employees in their work.
- * Profits are more influenced by external factors than by the employees in spite of their efficient and hard work.

Co-partnership : Co-partnership schemes also known as co-ownership involve the issue of shares to employees so that they may feel identified with the business.

The employees being shareholders also, will take more care of machines and materials as it will increase the sense of belonging and will work towards the progress of the organisation along with that their share value also increases. The improved productivity means low cost of production and higher profits, and improved standard of living of the workers.

Requisites of good wage incentive Plan : For design and introduction of good wage incentive plan the following points are considered:

- It should be simple to Understand by the workers and should enable themselves to calculate their earnings.
- It should be simple to administer and reduce clerical work.
- It should be capable of using computers for increase in speed of calculations.
- It should be introduced only after full consultation and agreement with the workers and unions.
- It should act as a motivational scheme.
- It should guarantee the minimum day wages.
- It should cover as many employees as possible.
- The incentive should be paid as quickly as possible after the completion of the work.
- The incentives should relate to the efforts and efficiency of the workers.
- The standards of work should be set after scientific study of work and the performance levels should be fair to reach.
- It should conform to labour laws and regulations of the land.
- It should minimise labour turnover and absenteeism.

- It should be at least equivalent to the incentive schemes prevailing in other units or industries in the region.

Illustration 4.3 :

The three workers Govind, Ram and Shyam produced 80, 100 and 120 pieces of a product 'X' on a particular day in June 2000 in a factory. The time allowed for 10 units of product X is 1 hour and their hourly rate is Rs. 4. Calculate for each of these three workers the following:

1. Earnings for the day, and
2. Effective Rate Earnings per hour Under (a) Straight piece-rate (b) Halsey Premium Bonus (50% sharing) and (c) Rowan Premium Bonus-methods of Labour Remuneration.

Working Notes:

Particulars	Govind	Ram	Shyam
Production (Units)	80	100	120
Time allowed (Hours) (@ 10 pieces per hour)	8	10	12
Time taken (1 day = 8Hrs) (Hours)	8	8	8
Time saved (Hours)	0	2	4
Piece Rate (Rs. 4/10) (Rs.)	0.40	0.40	0.40

Computation of earnings per day

(a) Straight Piece rate

No. of Pieces produced × Piece rate

$$\text{Govind} = 80 \text{ pieces} \times \text{Re. } 0.40 = \text{Rs. } 32$$

$$\text{Ram} = 100 \text{ pieces} \times \text{Re. } 0.40 = \text{Rs. } 40$$

$$\text{Shyam} = 120 \text{ pieces} \times \text{Re. } 0.40 = \text{Rs. } 48$$

(b) Halsey Premium Bonus

$$\text{Std. Rate (Time taken} + \frac{50}{100} \times \text{Time saved)}$$

$$\text{Govind} = \text{Rs. } 4 \left(8 \text{ hours} + \frac{50}{100} \times 0 \right) = \text{Rs. } 32$$

$$\text{Ram} = \text{Rs. } 4 \left(8 \text{ hours} + \frac{50}{100} \times 2 \right) = \text{Rs. } 36$$

$$\text{Shyam} = \text{Rs. } 4 \left(8 \text{ hours} + \frac{50}{100} \times 4 \right) = \text{Rs. } 40$$

(c) Rowan Premium Bonus

$$\text{Std. Rate} \left[\text{Time taken} + \frac{\text{Time saved}}{\text{Time allowed}} \times \text{Time taken} \right]$$

$$\text{Govind} = \text{Rs. } 4 \left[8 \text{ hrs.} + \frac{0 \text{ hrs}}{8 \text{ hrs}} \times 8 \text{ hrs.} \right] = \text{Rs. } 32$$

$$\text{Ram} = \text{Rs. } 4 \left[8 \text{ hrs.} + \frac{2 \text{ hrs}}{10 \text{ hrs}} \times 8 \text{ hrs.} \right] = \text{Rs. } 38.40$$

$$\text{Shyam} = \text{Rs. } 4 \left[8 \text{ hrs.} + \frac{4 \text{ hrs}}{12 \text{ hrs}} \times 8 \text{ hrs.} \right] = \text{Rs. } 42.68$$

2. Computation of effective rate of earnings per hour (i.e., Earnings/Hours)

Particulars	Govind	Ram	Shyam
Straight Piece rate	4.00	5.00	6.00
Halsey Premium Bonus	4.00	4.50	5.00
Rowan Premium Bonus	4.00	4.80	5.33

Labour Turnover : In all business organisations, it is a common feature that some workers leave the employment and new work. is join in place of those

leaving. This change in work force is known as labour turnover. Labour turnover is thus defined as the rate of change in the composition of the labour force in the organisation. Labour turnover varies greatly between different trade and industries. For example, where part time and seasonal labour is employed, the rate will be higher.

Measurement of Labour Turnover : To facilitate comparisons between different periods and different undertakings, labour turnover may be expressed in a rate. There are three alternative methods by which this rate is computed. Once a particular method is used it should be consistently followed for comparative analysis. The methods are:

1. Separation method : This method takes into account only those workers who have left during a particular period. The formula is :

$$\text{Labour Turnover Rate} = \frac{\text{No. of workers left during a period}}{\text{Average No. of workers during the period}} \times 100$$

$$\text{Average Number} = \frac{\text{No. of workers in the beginning} + \text{No. of workers at the end of the period}}{2}$$

Multiplication by 100 in the above formula indicates rate in percentage.

2. Replacement method : This method takes into account only those new workers who have joined in place of those who have left. Its formula is :

$$\text{Labour Turnover Rate} = \frac{\text{No. of workers replaced during the period}}{\text{Average No. of workers during the period}} \times 100$$

If new workers are engaged for expansion programme or any other such purpose, they are not considered for this computation.

3. Flux method : This shows the total change in the composition of labour force due to separations and additions of workers. The formula is :

$$\text{Labour Turnover Rate} = \frac{\text{No. of workers left} + \text{No. of workers replaced}}{\text{Average No. of workers}} \times 100$$

Illustration 4.4 : S.S.B. Co. supplies you the following information

No. of workers on 1 April 1990	400
No. of workers on 30 April 1990	500
No. of worker resigned	35
No. of workers discharged	10
No. of replacements (New workers joined)	40

Calculate labour turnover rate

Solution :

$$\text{Average No. of workers} = \frac{400 + 500}{2} = 450$$

$$\text{No. of workers left} = 35 + 10 = 45$$

$$1. \text{ Separation Rate} = \frac{40}{450} \times 100 = 10\%$$

$$2. \text{ Replacement Rate} = \frac{40}{450} \times 100 = 8.8\%$$

$$3. \text{ Flux Rate} = \frac{45+40}{450} \times 100 = 18.8\%$$

Causes of labour Turnover : Labour turnover reports should be prepared regularly to be placed before the management, giving a breakdown of the causes as to why the workers left. The causes may be classified in two broad categories: (i) Avoidable causes; (ii) Unavoidable causes.

Avoided causes. These include:

1. Low wages and allowances.
2. Unhappy relations with co-workers and supervisors.
3. Unsatisfactory working conditions.
4. Lack of medical facilities, transport facilities etc.

Unavoidable causes. These include :

1. Personal dislike for job or environments.

2. Death or retirement.
3. Illness or accident.
4. Discharge on disciplinary grounds.

Effect of Labour Turnover : A certain amount of labour turnover will always take place. To a limited extent this may be welcome particularly at the lower management level that it creates vacancies for internal promotions and maintains the morals high for the young and the ambitious. Moreover, new workers bring new ideas and methods of doing work from other concerns.

Labour turnover is expensive. It should, therefore, be minimised because it results in increased cost of production for reasons stated below.

Reduction and Control of Labour Turnover : The following steps may be taken in this regard :

1. Devising a suitable and satisfactory wage policy.
2. Providing working conditions conducive to health and efficiency.
3. Impartial and sympathetic attitude of personnel management.
4. Encouraging labour participation in management.
5. Introducing an effective grievance procedure.
6. Strengthening the welfare measures.

Overtime Premium : Overtime premium is paid to workers for the extra time worked than the normal working hours specified in the Factories Act, 1948 or work agreement with the union. The extra time is paid at a higher rate than the normal time rate, for example, if a worker works beyond 8 hours in a day or 48 hours in a week, he is paid with double the wages for the extra time worked. The overtime wages consists of two elements (i) Normal wages for extra time and (ii) Additional wages paid for the overtime worked, the accounting treatment of overtime premium is given below :

- * Overtime hours at the normal rate are treated as direct labour cost and charged to production on the same basis as time worked during normal hours but the premium paid during the overtime period is not a direct charge against production but is recovered as production overhead through overhead recovery rate.
- * Where the overtime is worked on a specific job to meet the time schedules or to carry out specific rush orders for which extra price is recovered, then the entire labour cost can be charged as direct labour to that job.
- * If overtime wages paid due to negligence or delay of worker of a particular department, it may be charged to the concerned department.
- * If the overtime premium is paid due to abnormal causes, it should be charged to Costing Profit and Loss account.

1. How to Control Overtime Working : To control the overtime premium the following may be given due consideration :

Careful production planning and scheduling

Analysis of reasons for overtime working

Frequency of overtime working in each department

If it is due to shortage of labour, steps may be taken to recruit more workers.

If overtime working is due to limiting machine hours available in the production departments, purchase extra machines, working extra shift, sub-contracting etc., may be considered.

Illustration 4.5 : In a factory Ram and Sham produce the same product using the same input of same material and at the same normal wage rate.

Bonus is paid to both of them in the form of normal time wage rate adjusted by the proportion which time-saved bears to the standard time for the completion of the product. The time allotted to the product is fifty hours. Ram takes thirty

hours and Sham takes forth hours to produce the product. The Factory Cost of the product for Ram is Rs. 3,100 and for Sham Rs. 3,280. The Factory Overhead Rate is Rs. 12 per man hour.

Calculate (i) Normal Wage Rate; (ii) Cost of material used for the product; and (iii) the input of material if the unit material cost is Rs. 16.

Solution:

Let x be the cost of material and y be the normal rate of wages per hour

FACTORY COST OF WORKMAN RAM

	Rs.
Material	x
Wages	30y
Bonus (30y × 20/50)	12y
Overheads	360
Factory Cost	x + 42 y + Rs. 360

FACTORY COST OF WORKMAN SHAM

	Rs.
Material	x
Wages	40 y
Bonus (40y × 10/50)	8 y
Overheads	480
Factory Cost	x + 48 y + 480

The following two equations can be made

$$x + 42y + 360 = \text{Rs. } 3,100 \quad \dots \text{ (i)}$$

$$x + 48y + 480 = \text{Rs. } 3,280 \quad \dots \text{ (ii)}$$

On subtracting equation (i) from equation (ii)

$$6y + 120 = 180$$

$$\text{or } 6y = 180 - 120$$

$$y = 60/6 = 10$$

On substituting the value of y in equation (i)

$$x + 420 + 360 = 3,100$$

$$\text{or } x = 3,100 - 780$$

$$\text{or } x = 2,320$$

Thus :

- (i) Normal Wage Rate is Rs. 10 per hour
- (ii) Cost of material used for the product is Rs. 2,320
- (iii) Input of material is $2,320/16 = 145$ units.

Illustration 4.6 : In a unit, 10 men work as a group. When the production of the group exceeds the standard output of 200 pieces per hour, each man is paid an incentive for the excess production in addition to his wages at hourly rates. The incentive is at half the percentage, the excess production over standard bears to the standard production. Each man is paid an incentive at the rate of this percentage of a wage rate of Rs. 2 per hour. There is no relation between the individual workman's hourly rate and the bonus rate.

In a week, the hours worked are 500 and the total production is 1,20,000 pieces.

- (a) Compute the total amount of bonus for the week.
- (b) Calculate the total earnings of two workers A and B of the group:

A worked 44 hours and his basic rate per hour was Rs. 2.20

B worked 48 hours and his basic rate per hour was Rs. 1.90

Solution :

Actual production during the week	1,20,000 pieces
Standard production during the week	
(200 pieces per hour)	1,00,000 pieces
Production in excess of standard	<u>20,000 pieces</u>

Excess production percentage

$$\frac{20,000}{1,00,000} \times 100 = 20\%$$

$$\text{Incentive} = 1/2 \times 20\% = 10\%$$

∴ Bonus rate = 10% of Rs. 2 = Re. 0.20 per hour.

Total amount of bonus for the week = 500 hrs. @ 0.20 per hour = Rs. 100

(b) Total earnings of workers A and B of the group for the week

Worker A

	Rs.
44 hours @ Rs. 2.20 per hour	96.80
Bonus 44 hours @ 0.20 per hour	8.80
	<u>Rs. 105.60</u>

Worker B

	Rs.
48 hours @ Rs. 1.90 per hour	91.20
Bonus 48 hours @ 0.20 per hour	9.60
	<u>Rs. 100.80</u>

Examination Questions :

1. (a) Describe briefly Direct and indirect labour
(b) Describe the various methods of recording time.
2. Define Job Evaluation and distinguish it from Merit Rating. Explain the methods and objectives of Job Evaluation.
3. 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.
4. How would you measure Labour Turnover ? What are the avoidable causes and its effects ?
5. (a) What are the objectives and characteristics of Incentive Wage Scheme ?
(b) 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 useful.
6. Discuss any four of the following :
(i) Time Rates at ordinary level, (ii) Time Rates at high level, (iii) Graduated Time Rates, (iv) Straight Piece Rates, (v) Piece Rates with guarantee day rates, (vi) Differential Piece Rates.
7. What are the basic considerations which govern remuneration of workers? Name the various factors that are taken into account for determining wages level as well as individual workers remuneration.
8. Explain the purpose of time keeping and time booking and state what are the detailed records normally maintained under each? Do you feel any need for reconciliation of these two? What is the benefit you expect, if such reconciliation is arrived out?

9. Describe in brief “Pay Roll Accounting” function in a Manufacturing enterprise.
10. A factory having the latest sophisticated machines wants to introduce an incentive scheme for its workers, keeping in view the following :
- (i) The entire gains of improved production should not go to the workers.
 - (ii) The rate setting department being newly established are liable to commit mistakes.

You are required to advise a suitable incentive scheme and demonstrate by an illustrative numerical example how your scheme answer to all the requirements of the management.

Hint. Suggest Rowan Plan

11. A worker under the Halsey method of remuneration has a day rate of Rs. 12 per week of 48 hours, plus a cost of living bonus of 10 paise per hour worked. He is given an 8 hour task to perform, which he accomplishes in 6 hours. He allowed 30% of the time saved as premium bonus. What would be his total hourly rate of earnings, and what difference would it make if he was paid under the Rowan method?
12. In an assembly shop of a motor cycle factory, women A, B, C and D work together as a team and are paid on group piece rate. They also work individually on day rate jobs. In a 44 hour week, the-following hours have been spent by A, B, C and D on group piece work : A-40 hours; B-40 hours; C-30 hours; and D-20 hours. The balance of time has been booked by each worker on day work jobs. Their hourly rates are: A-50 paise; B-75 paise; C Re 1 and D-Re 1. The group piece-rate is Re 1 per unit and the team has produced 150 units. Calculate the gross weekly earnings of each worker, taking into consideration that each individual is entitled to dearness allowance of Rs. 20 per week.

13. From the following particulars you are required to work out the earnings of a worker for a week under (a) Straight piece-rate, (b) Differential piece-rate, (c) Halsey premium scheme (50% sharing), and (d) Rowan premium scheme.

Weekly working hours	48	Normal output per week
		120 pieces
Hourly wage rate	Rs. 7.50	Actual output for the week 150 pieces
Piece rate per unit	Rs. 3.00	
Normal time taken per piece	20 minutes	
Differential piece rate	80% of piece-rate when output below normal and 120% of piece-rate when output above normal	

14. In a unit, 10 men work as a group. When the production of the group exceeds the standards output of 200 pieces per hour each man is paid an incentive for the excess production in addition to his wages at hourly rates. The incentive is at half the percentage, the excess production over standards bears to the standards production. Each man is paid an incentive, at the rate of this percentage of wage rate of Rs. 2 per hour. There is no relation between the individual workman's hourly-rate and the bonus rate. In a week, the hours worked are 500 and total production is 1,20,000 pieces.

- (a) Compute the total amount of bonus for the week.
- (b) Calculate the total earnings of two workers A and B of the group:
A worked 44 hours and his basic rate per hours was Rs. 2.20
B worked 48 hours and his basic rate per hours was Rs. 1.90.

LESSON : 5

OVERHEADS : CLASSIFICATION, ALLOCATION AND ABSORPTION

5.0 INTRODUCTION TO OVERHEADS :

Overheads are the indirect costs which cannot be allocated to any specific job or process because they are not capable of being identified with any specific job or process. Overheads include cost of indirect material, indirect labour, indirect expenses which cannot be conveniently charged to any Job, Process, Cost unit etc. For example, costs like rent, rates, administration and supervision, depreciation, maintenance, selling and distribution expenses, cleaning materials etc. cannot be directly attributed to cost units produced. The costing treatment of overheads deals with methods whereby these indirect expenses can be related to cost units.

CIMA defines Overheads Cost as “the total cost of indirect materials, indirect labour and indirect expenses”.

Overheads is the cost of materials, labour and expenses which cannot be economically unidentified with specific saleable cost unit.

The direct expenses refers to expenses that are specifically incurred and charged for specific or particular job, process, service, cost unit or cost centre. These expenses are also called chargeable expenses. The sum of direct material, direct labour and direct expenses is called prime cost. Sometimes, if the direct expenses are negligible or small amount, it will be treated as overhead.

Distinction between Direct Expenses and Overhead : Direct expenses are directly allocable to a job, process, service, cost unit or cost centre. It is not possible to allocate the overheads to jobs etc. and only through apportionment and absorption, it can be charged to different jobs, process, services, cost units or cost centres.

An expense is whether a direct expense or overhead depend on the extent of departmentalisation and specific circumstances of a particular expense.

For example, a machine is hired for general purpose, the hire charges are treated as overhead. But if that machine is hired or used for specific job, then the hire charges will be direct charge to that particular job.

Another example is that, power consumption is normally treated as direct expense if it is consumed for single plant or machinery. But if number of machines consume the power, then power will be treated as overhead and will be apportioned to the different machine centres on some equitable basis, which have used power.

5.2 CLASSIFICATIONS OF OVERHEAD COSTS :

Overhead costs may be classified according to :

- (a) Functions,
- (b) Element and
- (c) Behaviour.

5.2.1 Classification According to Functions : The main groups of overheads on the basis of this classification are :

- (a) Production overhead,
- (b) Administration overhead,
- (c) Selling overheads,
- (d) Distribution overhead.

Production Overhead : Also termed as factory overhead, works overhead or manufacturing overhead, it means indirect expenditure incurred in connection with production operations. It is the aggregate of factory indirect material cost, indirect wages and indirect expenses. Unlike direct materials and direct labour, production overhead is an invisible part of the finished product. Examples of these costs are: lubricants, consumable stores, indirect wages, factory power and light, depreciation of plant and machinery.

Administration overhead : This consists of all expenses incurred in the direction, control and administration (including secretarial, accounting and financial control) of an undertaking which is not related directly to production, selling and distribution function. Examples are : general management salaries, audit fees, legal charges, Postage and telephone, stationary and printing, office rent and rates, office lighting, and salaries of office staff etc.

Selling overhead : These are the cost of seeking to create and simulate demand or of scoring orders. Examples are advertising, salaries and commission of sales personnel, showroom expenses, travelling expenses, bad debts, catalogues and price lists etc.

Distribution overhead : It comprises all expenditure incurred from the time product is completed in the factory until it reaches its destination or customer. It includes packing cost, carriage outward, delivery van costs, warehousing costs, etc.

Both selling and distribution costs are incurred after the production work is over and thus taken together, these are known as 'After Production Costs'.

5.2.2 Classification According to Elements : The main classes under this head are : indirect materials, indirect wages, and indirect expenses. The readers should refer to lesson two for meaning and examples of these classes of overhead.

5.2.3 Classification According to Behaviour : Different overhead costs behave in different ways when volume of production changes. On the basis of behaviour, overheads may be classified into: (a) Fixed overhead, (b) Variable overhead, and (c) Semi-fixed or semi variable overhead.

Fixed overhead : These overheads remain unaffected or fixed in total amount by fluctuations in volume of output. Examples are rent and rates, managerial salaries, building depreciation, postage, stationery, legal expenses etc.

Variable overhead : This is the cost which, in aggregate, tends to vary in direct proportion to changes in the volume of output. Variable overhead per unit remain fixed. Examples are indirect materials, indirect labour, 'salesmen's commission, power, light, fuel, etc.

Semi - variable overhead : This overhead is partly fixed and partly variable. In other words, such costs vary in part with the volume of production and in part they are constant, whatever be the volume of production. Examples: supervisory salaries, depreciation, repairs and maintenance, etc.

5.2.4 Importance of Classifying Costs into Fixed and Variable : The fixed-variable cost classification is of great importance in planning, decision making and control as discussed below:

1. Preparation of budgets : This classification helps in the preparation of budgets. For instance, when flexible budgets are prepared for different levels of activity, the fixed cost remains constant at all levels of activity, whereas variable cost varies according to the actual level of output.

2. Decision-making : As most problems of decision-making relate to changes in volume, this classification acquires a special importance in managerial decision-making. This is so because fixed and variable costs behave in different ways when volume of output changes.

3. Control of costs : From control point of view, cost may be controllable or uncontrollable. The fixed costs are mostly uncontrollable and if, at all, any control can be exercised, it can be done by the top management. Variable costs,

on the other hand, are mostly controllable. For example, rent of building (fixed) is not easily controllable but cost of materials (variable) may be controlled by purchasing in economic lots, seasonal purchasing, etc. Classifying costs into fixed and variable, therefore, helps in the effective control of costs by pointing out where management should concentrate to control costs.

4. Marginal costing and break-even analysis : This technique is totally depend on segregation of cost into fixed and variable.

5. Absorption of overhead : By classifying cost into fixed and variable, separate rates of absorption of overhead may be used for fixed and variable overheads. The under-over absorption arising out of two types of overheads are different in nature and need different managerial action. For example, under-absorption of fixed overhead means the existence of surplus or idle capacity so that suitable steps may be taken to effectively utilise idle capacity.

6. Other uses : In addition to points stated above, fixed-variable cost classification is useful in many other areas. For example, while planning capital expenditure, effect of the proposed project on total fixed and variable costs should be studied. Moreover, differential and comparative cost analysis are based on this classification.

5.3 ALLOCATION AND APPORTIONMENT OF FACTORY OVERHEADS :

Departmentalisation of Overhead : Generally, in big business houses, several departments are involved in the manufacture of the product or in rendering a service. In such cases, factory overhead costs should be accumulated department-wise. Departmentalisation of factory overhead means dividing the company into segments called departments or cost centres where expenses are incurred. In a manufacturing concern, there are mainly two types of cost centres-producing departments and service departments. A production department represents a submit of the company where manufacturing activity takes place. Some typical examples of producing departments include assembly, finishing, blending, painting and grinding departments. Service departments represent cost centres

which provide support for the producing departments. Materials handling, personnel, plant maintenance, imposition, storage, purchasing, receiving, shipping material and other similar activities which are not directly involved in production are considered to be service activities.

No definite rules can be suggested which can be applicable to all concerns for departmentalisation. Most commonly, the factory is divided on the basis of functional activities within each department which performs a single activity or group of activities. Dividing the factory into separate, inter-related and independently governed units is important for the proper control of factory overhead and the accurate costing of jobs and products. The following factors must be considered while deciding the kind of departments or cost centres to be created for factory overheads collections and cost control purposes.

1. Similarity of operations, processes and machinery.
2. Location of operations, process and machinery.
3. Responsibilities for production and costs incurrence.
4. Number, of departments or cost centres.

Advantages : Departmentalisation serves two purposes: (i) closer control of factory overhead costs, and (ii) more accurate costing of jobs and products. Closer control is possible because departmentalisation makes the incurrence of costs in department or cost centre, the responsibility of someone who heads the department or the cost centre.

More accurate costing of jobs and products is possible, if products are passed through more than one department. A job or product going through a department is charged with factory overhead for work done on that product in that department. Therefore, jobs or products are charged with different amounts of factory overhead depending on the number of departments through which they pass. This process results in accurate and reliable cost figures for the products or job.

Primary Distribution : Some factory overheads can be directly identified with a particular department or cost centre as having been incurred for that cost centre. Examples of such factory overheads are repairs and maintenance expenses incurred in specific departments, supervision, indirect labour, overtime, indirect materials and factory supplies, equipment depreciation.

Expenses such as power, light, rent, depreciating of factory building, expenses shared by all departments, cannot be charged directly to a department, be it producing or service. These expenses do not originate in any specific department. They are incurred for all and must, therefore, be apportioned or prorated to any or all departments using such items. Cost apportionment is the process of charging expenses in an equitable proportion to the various cost centres or departments. The Institute of Cost and Management Accountant (UK) defines cost apportionment, “as the allotment of proportions of items of cost to cost centres or cost units”. The apportionment should be done on some rational and equitable tasks. In cost accounting this is known as primary distribution of factory overhead.

It would be difficult to give a comprehensive list of the bases of apportionment, but the following bases are in common use :

1. Floor area occupied - overheads such as lighting and heating, rent and rates, depreciation of building, building repairs, caretaking, watching and patrolling.
2. Capital values - Depreciation on plant and machinery, insurance on building, and plant and machinery, maintenance of plant and machinery.
3. Direct labour hours and/or machine hours - Insurance on jigs, tools and fixtures, power, works management remuneration, repairs and maintenance cost.
4. Number of workers employed - Canteen, accident insurance, medical, dental and first aid, pensions, personnel department expenses, profit sharing payments, recreation, supervision, time office, wages department.

5. Technical estimate - Fire prevention, oil and grease, steam, water without meter.

Illustration 5.1

Hisar Ltd. has gen sets and produces its own power. Data for power costs are as follows :

Horse Power Hours	Production deptts.		Service deptts.	
	A	B	C	D
Needed capacity production	10,000	20,000	12,000	8,000
Used during the month of May	8,000	13,000	7,000	6,000

During the month of May, costs for generating power amounted to Rs.9,300; of this Rs.2,500 was considered to be fixed cost. Service Deptt. C renders service to A, B and

D in the ratio 13:6:1, while D renders services to A and B in the ratio 31:3. Given that the direct labour hours in Deptt. A and B are 1,650 hours and 2,175 hours respectively, find the power cost per labour hour in each of these two Deptts.

Solution :

Hisar Ltd.

Overheads Distribution Summary Statement

(Amount in Rs.)						
Particulars	Basis of charge	Total	Production deptts		Service deptts	
			A	B	C	D
Fixed Cost	H.P. Hours needed at capacity production (5: 10:64)	2,500	500	1,000	600	400

Variable Cost	H.P. hours used (8:13:7:6)	6,800	1,600	2,600	1,400	1,200
Total overheads		9,300	2,100	3,600	2,000	1,600
Service Deptt.			1,300	600	-2,000	100
C overheads apportioned to A, Band D (13:6:1)						
Service Deptt.			1,550	150		-1,700
D overheads Apportioned to A and B (31:3)						
Total overheads of production Deptts.			4.950	4,350	-	-
Labour hours Worked			1,650	2,175		
Power cost per labour hour			3.00	2.00		

5.4 APPORTIONMENT OF SERVICE DEPARTMENTS OVERHEADS TO PRODUCING DEPARTMENTS :

5.4.1 Secondary Distribution : It is necessary that overhead cost of service departments (accumulated through direct allocation or primary distribution)

should be further assigned to producing departments. This is due to the reason that service departments do not themselves manufacture anything and it is the production department or cost centres which are involved in manufacturing activities. The reassignment or reapportionment of service departments overhead to producing departments or centres is termed as secondary distribution.

Secondary distribution helps in determining the cost of products or jobs sold and value of inventory. It is useful in determining the effect of various managerial decisions and actions on the total cost of the business firm. For example, decisions as to add or to drop a product line require information about its cost effect, which can be estimated after secondary distribution has been made. Secondary distribution also helps subsequently in determining the price of the product or job. In case of contracts based on cost in place of market price, secondary distribution helps in fixing a selling price which is advantageous to the parties concerned.

5.4.2 Bases of Secondary Distribution : The general basis for apportioning service departments overheads to producing departments are the following:

1. Services rendered - This is perhaps the most popular method of apportioning service department. The services rendered to different departments, i.e., benefits obtained by them can be a suitable basis. If a producing department has received large benefits, it must be charged for a share of overheads costs incurred to provide that quantity of benefits. This method is simple and economical.
2. Ability to pay - This method suggests that a large share of servicing departments overhead costs should be assigned to those producing departments whose product contributes the most to the income of a business enterprise.
3. Surveyor analysis - This method is applied 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.

4. Efficiency or incentives - This method uses standards and budgets and apportions the overhead costs on the basis of a present budget or standard.

In selecting a suitable base for apportioning service department overheads, considerations should be given to practicability, simplicity, economy, theoretical soundness and assistance in accurate costing and cost control.

5.4.3 Inter-departmental Services : While depreciation service departments overheads, one may notice two situations : (i) The entire amount of a servicing department is to be distributed to only the producing departments. This does not involve any practical difficulty and provides the simplest and quickest method for apportioning costs of the servicing department (ii) Services provided by some servicing departments are used partly by other servicing department. That is, many service department serve each other. For example, the payroll department in a firm prepares payroll for the entire organisation, but it depends on the building maintenance department for repair and maintenance services.

Illustration 5.2 :

The overhead of a manufacturing company has been analysed to the point of primary distribution :

		Rs.
Production departments :	Machine	10,000
	Assembly	4,000
Service departments	Canteen	2,000
	Powerhouse	3,000

The canteen is to be apportioned on the basis employees :

	Employees	%
Machine	240	60
Assembly	140	35
Powerhouse	20	5
	400	100

The powerhouse is to be apportioned on the basis of electricity used :

	Thousand Kilowatts	%
Machine	270	75
Assembly	36	10
Canteen	54	15
	<u>360</u>	<u>100</u>

Solution :

The apportionment would be done in the following manner :

	Machine	Assembly	Canteen	Powerhouse
Primary apportionment	10,000	4,000	2,000	3,000
Apportion : Canteen	1,200	700	-2,000	100
Powerhouse	2,325	310	465	- 3,100
Canteen	279	163	-465	23
Powerhouse	18	2	3	-23
Canteen	2	1	-3	
Total Service Deptts.	4	1176		
Total Production Overhead	13824	5176		

B. Algebraic method or simultaneous equation :

This method helps in finding out the amount of overheads of each servicing department by solving simultaneous equations. The total expenses of service departments can be directly transferred to production departments.

Illustration 5.3 :

A company has three production departments, A, B and C and two service

departments, P and Q. The following figures are available as per departmental distribution summary :

Production departments.	Rs.
A	3,150
B	3,700
C	1,400
P	2,250
Q	1,000

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

		A	B	C	P	Q
Service deptt.	P	40%	30%	20%	-	10%
Service deptt.	Q	30%	30%	20%	20%	-

Solution :

Let X = total overhead of deptt. P

Y = total overhead of deptt. Q

$$\text{Therefore } X = 2,250 + \frac{20}{100} X \quad (1)$$

$$Y = 1,000 + \frac{20}{100} X \quad (2)$$

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

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

Multiplying equation (3) by 5

$$50X - 10Y = 1,12,500 \quad (5)$$

$$-X + 10Y = 10,000 \quad (6)$$

$$\text{Adding } 49X = 1,22,500$$

$$X = 2,500$$

$$\text{and } Y = 1,250$$

Secondary Distribution Summary				(Amt. in Rs.)		
	Total	<u>Production Department</u>			<u>Servicing Dept.</u>	
	Rs.	A	B	C	P	Q
As per summary	11,500	3,150	3,700	1,400	2,250	1,000
Service deptt. P		1,000	750	500	-2,250	250
	11,500	4,150	4,450	1900	-250	1,250
Service deptt. Q		375	375	250	250	-1,250
	11,500	4,525	4,825	2,150	-250	

Service departments overheads present the sum of the service department cost plus the costs apportioned from other service departments. After obtaining total overhead cost of service departments, the total of each service department is apportioned to producing departments on the basis of percentage or proportion (for the services rendered) of the specific producing department.

5.5 Absorption of factory overheads:

Absorption of factory overheads refers to charging of the factory overheads of a particular production department to various products manufactured, or jobs completed, or orders executed in that department. The methods for absorption of these overheads may be put into two categories:

- (i) Percentage methods
- (ii) Hourly rate methods.

Choice of a particular method depends on the circumstances of each individual case. As such the method of absorption may differ from industry to industry, and from company to company also. As far as possible, the method applied should be equitable so that the absorbed overheads are not in much difference with the actual overheads. Otherwise it will lead to excessive under or over absorption, simply because of the adoption of a particular method.

5.5.1 Percentage methods :

1. Direct material cost method: In this method the cost of direct materials used in the manufacture of a product is used as the basis for allocation of factory overheads. The overhead rate is therefore, calculated on the basis of the following formula :

$$\text{Factory Overhead Rate} = \frac{\text{Amount of factory overheads}}{\text{Cost of direct materials used}} \times 100$$

This method may give satisfactory results in the following circumstances :

- (i) Where the amount of overheads is insignificant in relation to cost of materials and wages and, therefore, a simple method of allocation is desired.
- (ii) Where output is uniform, i.e., one kind of article is produced.
- (iii) Where the prices of materials do not fluctuate quite widely and frequently.

The method will not give satisfactory results except In the above cases on account of the following reasons :

- (i) Except a few items, factory overheads do not vary with variations in the value of material. Normal wastage of materials or coal or other sundry small stores used in manufacture naturally varies with the value of materials used, otherwise other important items such as works manager's salary, factory rent, rates, insurance, lighting etc. do not vary with every change in the value of materials. Consider the following example :

The following were the constituents of cost of Product X in 1999

	Rs.
Direct Material	25 000
Direct Labour	10,000
Factory Rent & Rates	5,000
Factory Manager's Salary	15,000
Other Factory Expenses	1,000
Office Overheads	2,500
	<hr style="width: 100%; border: 0.5px solid black; margin-bottom: 0.5px;"/> <u>45,500</u>

The factory overhead rate based on materials comes to:- $\frac{7500}{25000} \times 100 = 30\%$

Suppose in 2000 the value of materials used in doubled on account of doubling of the price level. If the factory overheads are charged @ 30% on materials, it will result in excessive over-absorption of works overheads, because most of the factory overheads are fixed.

(ii) This method will result in greater recovery of factory overheads from those cost units which use superior quality of materials in comparison to those which use materials of inferior quality. This seems very illogical because actually reverse should have been the case.

(iii) This method does not make any distinction between jobs done by skilled and unskilled workers, because works overheads not only depend upon materials used but also on the type of workers employed. Similarly it does not distinguish between manual and machine work.

2. Direct labour cost method : The cost of direct labour incurred in the manufacture of the product is used as a base for allocation of factory overheads in this method. The formula for calculating the factory overhead rate based on labour can be put as follows:

$$\text{Factory Overhead Rate} = \frac{\text{Amount of factory overheads}}{\text{Cost of direct labour}} \times 100$$

Merits : This method has the following advantages :

1. Factory overheads to a great extent depend upon the number of workers employed and the rate of direct wages. This method, therefore, gives satisfactory results in most cases.
2. The method is widely adopted on account of its simplicity and of accuracy.
3. Direct wages normally do not fluctuate much. Therefore, this method gives stable results.

Demerits : It has the following disadvantages :

1. The method is not suitable where both skilled and unskilled workers are employed. As a matter of fact the amount of works overheads is less for skilled

workers in comparison to the unskilled workers and, therefore, jobs done by the unskilled workers should be charged with greater amount of factory overheads, but reverse happens in case of this method.

2. Works overheads also depend upon time. The method, therefore, does not give satisfactory results where the workers are remunerated on piece wage system.

3. Prime cost method: The method considers both direct materials and direct labour for allocation of overheads. The formula for calculating the factory overhead rate, therefore, can be put as follows :

$$\text{Factory Overhead Rate} = \frac{\text{Amount of factory overheads}}{\text{Prime cost}} \times 100$$

The method has the advantage of simplicity. However, it suffers from the same drawbacks from which the first two methods suffer and, therefore, is rarely used.

The method can give satisfactory results where a standard article is produced, requiring a constant quantity of materials and number of hours engaged upto its manufacture.

5.5.2 Hourly rate methods :

(i) **Machine hour rate method :** The machine hour rate method of allocation of factory overheads is used in those cases where the processes of manufacture are carried out by machines and there is very little or practically no manual labour. It is determined by dividing the overhead cost to be apportioned or absorbed by the number of machine hours expended or to be expended. The formula for calculating the overhead rate may be put as follows :

$$\text{Overhead Rate} = \frac{\text{Amount of factory overheads}}{\text{Machine hours}}$$

The method thus estimates the cost of running a- machine for one hour and a job is debited with an amount of overheads equal to the number of hours for which the machine was used on that job multiplied by the hourly rate. The steps for computing the machine hour rate may be put as follows :

1. All factory overheads are departmentalised as discussed before. The overheads of the Service Department are also apportioned among all Production Departments.
2. Each Production Department is divided into suitable cost centres comprising groups of similar machines, and the total factory overheads are apportioned among the different cost centres suitably as discussed before.
3. Machine hour rate is to be calculated for each machine separately and, therefore, overheads of one machine cost centre will be apportioned among the different machines to find out the amount of overheads per machine.
4. The overheads thus calculated will be divided between (i) Fixed or Standing charges, (ii) Variable or Machine expenses. Fixed charges are those which remain constant irrespective of the use of the machine, e.g., rent, insurance charges etc. Variable expenses such as power, depreciation etc. vary with the use of machine.
5. An hourly rate of fixed charges will be calculated by totalling them and dividing by the number of normal hours worked by the machine.
6. The total of the fixed charges rate and the machine expenses rate will give the Machine Hour Rate.

BASIS FOR APPORTIONMENT OF DIFFERENT EXPENSES

Expenses	Basis
Standing Charges	
1. Rent and Rates	According to the floor area occupied by each machine including the surrounding space.
2. Heating and Lighting	The number of points used plus cost of special lighting or heating for any individual

	machine, alternatively according to floor area occupied by each machine.
3. Supervision	Estimated time devoted by the supervisory staff to each machine.
4. Lubricating Oil and Consumable Stores	Capital values, machine hours, or past experience.
5. Insurance	Insured value of each machine.
6. Miscellaneous expenses	Equitable basis depending upon facts.

Illustration 5.4 :

Compute the machine hours rate from the following data :	(Rs.)
Cost of Machine	1,00,000
Installation charges	10,000
Estimated scrap value after the expiry of its life (15 years)	5,000
Rent and rates for the shop per month	200
General lighting for the shop per month.	300
Insurance premium for the machine p.a.	960
Power consumption-10 units per hour, rate of power for 100 units	20
Estimated working hours p.a. 2,200 (this includes setting up time of 200 hours)	
Shop supervisor's salary per month	600

The machine occupies one-fourth of the total area of the shop. The supervisor is expected to devote one-fifth of his time for supervising the machine.

Solution :

Computation of Machine Hours Rate

Standing charges :	Rs.	Rs.
Rent and rates $(200 \times 12) \times \frac{1}{4}$	600	
General lighting $(300 \times 12) \times \frac{1}{4}$	900	
Insurance premium	960	
Shop supervisors salary $(600 \times 12) \times \frac{1}{5}$	<u>1,440</u>	
	<u>3,900</u>	
	<u>3,900</u>	1.95
Hourly rate for standing charges	<u>2,000</u>	
	3,000	
Machine expenses		
Depreciation = $\frac{1,10,000 - 5,000}{30,000}$		3.50
Repair and maintenance = $\frac{1,000}{30,000}$		0.50
Power 10 units per hour @ Rs. 0.20 per unit,		2.00
Machine hour rate		<u>7.95</u>

Note : Setting-up time being productive has been deducted from total working hours. Machine hours rate is always calculated for effective machine hours which have been used for production.

Illustration 5.5 :

A machine cost Rs. 90,000 and is deemed to have a scrap value 5% at the end of its effective life (19 years). Ordinarily the machine is expected to run for 2,400 hours per annum but it is estimated that 150 hours will be lost for normal repairs and maintenance and further 750 hours will be lost due to staggering.

The other details in respect of the machine shop are :

- (a) Wages, bonus and provident fund contribution of Rs. 6,000 per year each of two operators (each operator is in charge of two machines)
- (b) Rent and rates of the shop 3,000 per year
- (c) General lighting of the shop 250 per month
- (d) Insurance per annum for the machine 200 per month
- (e) Cost of repairs and maintenance per machine 250 per month
Shop supervisor's salary 500 per month
- (g) Power consumption of machine per hour 20 units, rate of power per 100 units Rs. 10
- (h) Other factory overheads attributable to the shop, Rs. 4,000 per annum.

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

Solution :

Computation of machine hour rate	Rs.	Per hour
Standing charges per annum		
Rent and rates	750	
General lighting	750	
Insurance	800	
Supervisor's salary	1,200	
Allocated overhead	1,000	
	4,500	

Standing charges per hour, 4500 >> 1500	3.00
Machine expenses per hour wages, etc	2.00
Power	2.00
Repairs and maintenance Depreciation	2.00
Machine hour rate	<u>12.00</u>

Note : Effective machine hours are 1,500 (2,400-150-750).

Illustration 5.6 :

A machine was purchased on January 1, 1990 for Rs. 5 lakhs. The total cost of all machinery inclusive of the new machine was Rs. 75 lakhs. The following particulars are further available :

Expected life of machine 10 years

Scrap value at the end of 10 years Rs. 5,000

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

Expected number of working hours of machines per year 4,000 hours

Insurance premium annually for all the machines Rs. 4,500.

Electricity consumption for the machine per hour (@ 75 paise per unit)
25 units

Area occupied by the machine 1 00 sq. ft.

Area occupied by other machine 1,500 sq. ft.

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 machine Rs. 120 per month.

Compute the machine-hour rate for the new machine on the basis of the data given above.

Solution :

Computation of Machine Hour Rate

Standing Charges	Rs.	Rs.
	(p.a.)	(per hour)
Insurance Premium, (WN:2)	300	
Repair and Maintenance	2,000	
Rent (WN:3)	600	
Light Charges (WN:4)	216	
Total Standing Charges	3,116	
Hourly Rate for Standing Charges (Rs. 3,116/4,000 hours)		0.779
Machine Expenses		12.375
Depreciation (WN:1)*		
Electricity Consumption 25 units per hour @ 0.75 p. per unit		18.750
Machine Hour Rate		31.904

* Depreciation may also be taken as a standing charge.

Working Notes :

1. Depreciation of Machine :

	Rs.
Cost of new machine	5,00,000
Less : Scrap Value	5,000
	4,95,000
Net cost of the machine	

Life of the machine 10 years

$$\text{Depreciation per hour} = \frac{\text{Rs. } 4,95,000}{10 \text{ years} \times 4,000} = 12.375$$

2. Insurance for the Machine :

Total cost of all the machines 75,00,000

Total insurance premium paid for all the machines 4,500

Total annual insurance premium of the new machine

$$= \frac{\text{Rs. } 4,500 \times \text{Rs. } 5,00,000}{\text{Rs. } 75,00,000} = \text{Rs. } 300$$

3. Rent for the Machine :

Rent paid per annum Rs.9,600

Total area occupied 1,600 sq. ft.

Rent for the area occupied by the new machine

$$= \frac{\text{Rs. } 96000 \times 100 \text{ sq. ft.}}{1,6000 \text{ sq. ft.}} = \text{Rs. } 600$$

4. Lighting Charges for the Machine :

Total annual light charges of 20 points for the whole department Is Rs. 1,400.

Light charges for the machine p.a.

$$= \frac{\text{Rs. } 1,440 \times 3 \text{ points}}{20 \text{ points}} = \text{Rs. } 216$$

2. Labour hour rate method : According to this method, the overheads are charged to production on the basis of number of labour hours of work put forth on every job. The overhead rate is calculated by dividing the total works overheads for the shop or department for a given period by the total estimated direct labour hours for the same period. The formula for calculating the overhead rate may be put as follows :

$$\text{Overhead Rate} = \frac{\text{Amount of overheads}}{\text{Total Number of Direct Labour Hours}}$$

This method of allocating overheads is adopted for those departments where hand labour is a predominating factor in production. It gives very satisfactory results because incidence of most overheads is proportional to time and this method give due consideration to the time factor.

Illustration 5.7 : The following information relates to the activities of a production department for a certain period in a factory :

	Rs.
Materials used	72,000
Direct wages	60,000
Hours of Machine operation	20,000
Labour hours worked	24,000
Overheads chargeable to the department	48,000

On once order carried out in the department during the period, the relevant data were :

	Rs.
Materials used	4,000
Labour Hours	1,650
Direct wages	3,300
Machines Hours	1,200

Prepare a comparative statement of cost of this order by using the following three methods of recovery of overheads :

- (i) Direct Labour Hour Rate Method;
- (ii) Direct Labour cost Rate Method;
- (iii) Machine Hour Rate Method.

Solution :

(i) Direct Labour Hour Rate Method :

$$\begin{aligned} \text{Direct Labour Hour Rate} &= \frac{\text{Overheads chargeable to the department}}{\text{Labour hours worked}} \\ &= \frac{48,000}{24,000} = \text{Rs. } 2 \end{aligned}$$

(ii) Direct Labour Cost Method :

$$\begin{aligned} \text{Percentage of Direct Labour Cost} &= \frac{\text{Overheads chargeable to the department}}{\text{Labour hours worked}} \times 100 \\ &= \frac{48,000}{60,000} \times 100 = 80\% \end{aligned}$$

(iii) Machine Hour Rate Method :

$$\begin{aligned} \text{Machine Hour Rate} &= \frac{\text{Overheads for the department}}{\text{Hours of machine operation}} \\ &= \frac{48,000}{20,000} = \text{Rs. } 2.4 \end{aligned}$$

COMPARATIVE STATEMENT OF COST OF ORDER

Particulars	Direct Labour Hour Rate	Direct Labour Cost Rate	Machine Hour Rate
	Rs.	Rs.	Rs.
Material used	4,000	4,000	4,000
Direct wages	3,300	3,300	3,300
Prime Cost	7,300	7,300	7,300
Factory Overheads :			
At Rs. per hr. for 1,650 labour hrs.	3,300	—	—
At 80% of Rs. 3,300 (direct labour cost	—	2,640	—
At Rs. 2.4 per hr. for 1,200			

machine hours	—	—	2,880
Works Cost	10,600	9,940	10,180

3. Dual hour rate method : Where in a shop both manual labour and machines play an equally important role overheads are classified into two categories :

- (i) those which relate to manual work, such as proportionate charge for lighting and foreman's salary, employee's insurance premium etc.;
- (ii) those which relate to machines as depreciation, power, repairs, operator's wages etc.

The former (i.e.i) when divided by the number of direct labour hours will give the direct labour hour rate, and the latter (i.e.ii) on being divided by the number of machine hours will give the machine-hour rate. A job will be debited with the amount of overheads calculated on the basis of these two rates. For example, if the direct labour-hour rate is Rs. 1 and machine-hour rate is 50 paise, a job requiring 10 direct labour hours and 15 machine hours should be debited with Rs. 17.50 (i.e. $10 \times 1 + 15 \times 0.50$) as overheads.

Illustration 5.8 :

The following information for the month of April is extracted from the cost records of Ram & Shyam Ltd. which specialises in the manufacture of automobile spares. The parts are manufactured in Department R and assembled in Department S.

	Total	Deptt. R	Deptt. S
	Rs.	Rs.	Rs.
Direct Material	65,000	50,000	15,000
Direct Labour	90,000	40,000	50,000
Factory Rent	15,000		
Supervision	6,000	2,500	3,500

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Depreciation, on Machines	5,000		
Power	4,000		
Repairs to Machines	2,000	1,600	400
Indirect Labour	4,000	2,000	2,000
Direct Labour Hours worked	80,000	30,000	50,000
Machine Hours worked	30,000	25,000	5,000
Machine Hours power (H.P.)	400	353	47
Book Value of Machines (Rs.)	50,000	40,000	10,000
Floor Space (sq. ft.)	20,000	10,000	10,000

The Prime Cost of Batch B 401 has been booked as under

	Total	Deptt. A	Deptt.B
	Rs.	Rs.	Rs.
Materials	3,200	2,700	500
Labour	7,500	3,000	4,500

Direct Labour Hours worked on batch S 401 were 2,500 in Department Rand 5,000 in Department S. Machine Hours worked in this batch were 1,250 in Deptt. Rand 600 in Deptt. S. Allocate overhead expenditure and calculate in cost of each unit in batch S 401 which consists of 1,000 units.

Solution :

It seems both men and machines are playing equally important roles in production, hence it will be appropriate to charge overheads according to Dual Hour Rate Method. Consequently machine costs have been absorbed on the basis of machine hour rate and other overhead costs on the basis of direct labour hour rate.

Ram & Shyam Ltd.
Departmentalisation of Overhead Costs

Machine Costs :	Basis	Total	Deptt. R	Deptt. S
		Rs.	Rs.	Rs.
Depreciation	Plant Value	5,000	4,000	1,000

	(4:1)			
Power	Hoursepower	4,000	3,530	470
	(353:47)			
Repairs of Machines	Actual	2,000	1,600	400
Total Machine Cost		11,000	9,130	1,870
Other Overhead Costs:				
Factory Rent	Floor Space			
	(1:1)	15,000	7,500	7,500
Supervision	Actual	6,000	2,500	3,500
Indirect Labour	Actual	4,000	2,000	2,000
Total: Other Overhead Costs		25,000	12,000	13,000

	Deptt. R	Deptt. S
Machine Hour Rate =	$\frac{\text{Rs. } 9,130}{25,000}$	$\frac{\text{Rs. } 1,870}{5,000}$
	= Rs. 0.3652	= Rs.0.374
Labour Hour Rate =	$\frac{\text{Rs. } 12,000}{30,000}$	$\frac{\text{Rs. } 13,000}{50,000}$
	= Rs. 0.40	= Rs.0.26

Cost Sheet of Batch S 401 (consisting of 1,000 units)

	Total	Deptt.A.	Deptt. B
	Rs.	Rs.	Rs.
Materials	3,200	2,700	500
Labour	7,500	3,000	4,500
Overhead Costs	2,981	1,457	1,524
	13,681	7,157	6,524

Cost of each unit: $\frac{\text{Rs. } 13.681}{1,000} = \text{Rs. } 13.68$

Working Notes:

Overhead Costs Allocation to Batch S 401

	Rs.
(i) Deptt. R	
Machine Cost ($1,250 \times 0.3652$)	456.50
Other Overhead Costs ($2,500 \times 0.40$)	1,000.00
	<u>1,456.50</u>
(ii) Deptt. S	
Machine Costs (600×0.374)	224.40
Other Overhead costs ($5,000 \times 0.26$)	1,300.00
	<u>1,524.40</u>

5.6 DEPRECIATION :

Depreciation is provided in cost accounts before working out the profitability of a Job or cost unit. Depreciation is a gradual diminution loss, or shrinkage in the utility of value of an asset due to wear and tear in use, affluxion of time or obsolescence. Depreciation is the allocation of the depreciable amount of an asset over its estimated useful life.

The cost of a product consists of not only normal expenses like direct material, direct labour, factory cost etc. Which involve in cash outgo but also non-cash like depreciation which does not involve in cash outgo.

CIMA defines depreciation as “the measure of wearing out, consumption or other loss of value of fixed asset whether arising from use; fluxion of time or obsolescence through technology and market changes.”

Depreciation does not mean set money aside for the future replacement of assets. It is provided to match the use of asset, its deterioration and obsolescence with the income it generates.

5.6.1 Depreciation and Cash Flow : Depreciation is neither a source nor a use of funds. The use of funds obviously began when the fixed asset was purchased. It would be double counting to regard each year's depreciation as a further use of funds. The relevant figure for profit from operation is profit before charging depreciation. The quantum of operational funds flow cannot be influenced by the method of depreciation charged.

5.6.2 Depreciation and inflation : Depreciation should be provided irrespective of the increase in value of asset due to inflation. It is not appropriate to omit charging depreciation of a fixed asset on the grounds that its market value is greater than its net book value. If account is taken of such increased value by writing up the net book value of a fixed asset, then, an increased charge for depreciation will become necessary.

5.6.3 Methods of Depreciation :

The following are the methods of depreciation

1. Straight line method : This method provides for depreciation by means of equal periodic charges over the life of the asset. For example, suppose the cost of a plant is Rs. 1,00,000 and its life is 10 years. Then the charge of depreciation per annum will be Rs. 10,000.

2. Diminishing balance method : This method tends to write off higher amounts in the beginning and comparatively lower amounts in subsequent parts of the life of an asset. The amount of depreciation is calculated at a constant rate at the balance of the value of the asset after deducting the amounts of depreciation previously provided. For example, taking the above illustration, the amounts of depreciation at the rate of 10% p.a. would be Rs. 10,000 for the first year, Rs. 9,000 for the second year, Rs. 8,100 for the third year, and so on.

3. Production unit method : This method charges the amount of depreciation by means of fixed rate per unit of production calculated by dividing the value of the asset by the estimated number of units to be produced during

its life. The formula for calculating depreciation under this method is as follows:

$$\text{Depreciation (per unit)} = \frac{\text{Original cost-residual value}}{\text{Estimated output during its life}}$$

4. Annuity Method : This method assumes that the capital used in the purchase of plant should have earned interest if invested somewhere else. The amount of depreciation in this method is calculated by dividing the aggregate of the cost of the asset depreciated and interest at a given “rate, at a constant rate, on the written down value of the asset.

5. Sinking fund method : Under the annuity method, expected interest of the investment (equivalent to the cost of the asset) is assumed. However, no actual investment is made. But under the sinking fund method, the amount of depreciation written off every year is invested in some securities, which would accumulate at compound interest to provide, at the end of the life of the asset, a sum equal to its costs. This method provides for depreciation of fixed periodic charges.

6. Endowment policy method : This method is similar to the sinking fund method. It provides for depreciation by means of fixed periodic charges equivalent to the premium on an endowment policy for the amount required to provide, at the end of the life of the asset, a sum equal to its cost. The amount of depreciation is equivalent to the premium payable on the policy.

7. Production hour method : This method provides for depreciation by means of a fixed rate per hour of production by using the following formula :

$$\text{Depreciation (per unit)} = \frac{\text{Cost of the asset}}{\text{Estimated number of working hours of its life}}$$

8. Sum of digits method : Under this method depreciation is calculated by means of differing periodic rates computed according to the following formula: If it is the estimated life of the asset, the rate is calculated each period as a fraction in which the denominator is always the sum of the series 1,2,3,.....n and the numerator for the first period is n, for the second n-1, and so on. In this method, depreciation is highest in the year of purchase and

go on reducing in the subsequent accounting periods. This method is mainly used in assets like, furniture, electronic goods, automobile vehicles etc. In this method differing periodic rate are used.

5.7 PLANT REGISTER AND OTHER FIXED ASSETS REGISTER

A plant register is maintained keeping all details about the plant and machinery. It generally contain the following details :

- * Description of each individual machine, identification number, original cost of the machine, name of supplier, date of installation and commercial run etc.
Technical details like speed, fuel consumption, capacity, grade and quality of output etc.
- * Details of the asset located in the factory.
- * Details of estimated economic life, estimated output or production run hours during the economic life time, method of depreciation, estimated residual or scrap value etc.
- * Details of capital allowances, balancing charges or other allowance.
- * Details of major break-downs and maintenance.
- * Details of additions and alterations.
- * Details of disposal of asset.

A register is also maintained for other fixed assets like buildings, vehicles, furniture and fixtures etc. similar to that of plant register.

These registers will enable calculation of depreciation, book values etc. of each item and it will enable to allocate and apportion depreciation charges and other overhead costs like, repairs and maintenance, insurance etc.

5.8 USING ASSET AFTER FULLY DEPRECIATED :

Some time it will happen to continue in use of an asset after it is fully depreciated. The main reason for early recovery of depreciation is due to under

estimation of economic life of the asset. In such situations it is usual to continue to charge depreciation so as to maintain cost comparability with previous accounting periods and current cost of the product will reflect the cost of using the asset. The excess depreciation so charged will either be kept in reserve against obsolescence or credited to Costing Profit and Loss Account. If before the asset is fully depreciated, its economic life is estimated to be further extended, then the balance depreciation will spread over to such enhanced period, and the problem of using asset after it is fully depreciated will not arise.

5.9 RESEARCH AND DEVELOPMENT COSTS AND ITS TREATMENT

The Research and Development expenditure is a deferred charge which is in the nature of non-recurring expenditures which are expected to be of financial benefit to several accounting periods of indeterminate total length. It is the expenditure incurred for searching a new product or improved product or new methods of production and improved technologies.

Research Costs are incurred for carrying basic research or applied research. But the development costs start with decision taken to produce new product or improved product and when the decision is taken to adopt new technologies and new production methods.

The objective in carrying basic research is to improve the existing scientific and/or technical knowledge. But the applied research is carried for a purpose directed towards a specific practical aim or objective.

5.9.1 Treatment of Research Costs : The treatment of research costs is studied under two heads :

- (1) Basic research costs
- (2) Applied research costs.

1. Basis Research Costs : These costs relate to all existing product, methods of operation, techniques of production and therefore, the basic research costs should be treated as production overhead for the period during which it has been incurred and has to be absorbed into product costs.

2. Applied Research Costs : The applied research costs classified into two for absorption purpose.

(i) If applied research costs relate to improvement of existing product and methods, of production, it should be treated as manufacturing overhead for the period and has to be absorbed to the product cost.

(ii) In case, applied research costs are incurred for searching new products or methods of production etc., then such costs are amortised to the product that is newly invented or new method of production adopted. The whole of such expenditure should not be absorbed in the year in which expenditure has been incurred but a part it should be carried over. The expenditure which, though of revenue nature is spread over a number of years because its benefit is derived during those years.

When the applied research aimed at improvement of existing product or to invent a new product or development of new technology, and if the research works appears failure in getting the desired results, then such applied research expenditure is charged against profit in the Costing Profit and Loss Account of one or more years depending upon the size of expenditure incurred.

5.10 TREATMENT OF DEVELOPMENT COSTS :

Development costs begin with the implementation of the decision to produce a new or improved product or to employ a new or improved method. The treatment of development costs is similar to that of treatment of applied research costs.

5.11 TREATMENT OF SPECIAL ITEMS OF OVERHEADS IN COST ACCOUNTS :

5.11.1 Material handling expenses : These expenses are incurred while unloading the raw materials received from supplier, storing the raw materials handling the raw materials to work place, handling of work- in-progress, storage of finished goods etc. It also includes costs incurred for weighing salaries of personnel involved in material handling, wear and tear of weighing equipment.

These costs are apportioned on the basis of physical quantities of different materials and goods handled in the factory. The stores overhead costs are apportioned to raw materials and finished goods as a percentage of issue rates. Other handling expenses are recovered through overhead recovery rates.

5.11.2 Market research expenses : Market research cost is an item of selling overhead, incurred for market intelligence to ascertain the tastes and habits, market penetration of product, increase, in demand of existing products, competitive situation, trading practices, distribution channels, customers requirements, existing and potential market for the product etc. If the market research expenses are incurred for a single product it is absorbed into that ,particular product cost. If it is incurred for the product range for the enterprise as a whole, then the market research expenses are to be apportioned to different products in the proportion of sales value and absorbed into respective product cost. If the market research cost is substantial, it will be deferred revenue expense and is taken into future period and absorbed when sales or production takes place.

Some times market research expenses are incurred for raw material availability, such expenses will be allocated or apportioned to purchase department and it is recovered through overhead rate of purchase department.

5.11.3 Subscriptions and donations :

- * If these expenses are incurred for the benefit of or welfare of workers, it is treated as production overhead.
- * If subscriptions and donations for any technical and research institutions for obtaining data relating to technical, production scientific nature, it is considered as production overhead.
- * If subscriptions to journals etc., for obtaining market data which help in increase of sales, it is considered as selling overhead.
- * If the subscriptions and donations not incurred for the benefit of employees or the organisation, it should be excluded from the cost accounts.

5.11.4 After Sales Service Costs : The costs are incurred for providing service to the customers after the sales took place during the warranty period. If the costs are incurred during the period of guarantee given to the customer, it is to be borne by the company, and hence it is treated as production overhead absorbed into product cost by applying predetermined absorption rates.

If the after sales services cost are incurred after the guarantee period for which the organisation will charge for the services rendered, then costs are treated as selling overhead.

5.11.5 Royalties and patent fees : The royalties and patent fees are payable for the use of technology, skills, brand, intellectual property rights etc. made in the form of periodical rent or based on the number of units produced or sold. If it is based on sales, the expenditure is charged to selling overhead. If it is fixed periodical rent, it is treated as production overhead. If it is payable on number of units produced, the expenditure is treated as a direct expenses or chargeable expenses and is forming part of the prime cost of the product.

5.11.6 Training Costs : The training costs are incurred for training the workers, apprentices, office, administrative and selling staff. The training expenditure incurred for training the workers, apprentices and other production staff is treated as production overhead

The expenses incurred for training the sales staff is treated as selling overhead.

If there is any in house training college or centre, cost of running the centre or college is apportioned to the cost centres based on the number of personnel trained on the basis of wages and salaries paid etc.

5.11.7 Taxation : Taxation is an appropriation of profit earned by the organisation and any payment of taxes is excluded from the cost accounts. But the taxes will also be considered for planning and decision making exercises wherever it is necessary and appropriate for special purposes.

5.11.8 Financing charges for acquisition of fixed assets and Inventories:

The finance charges like interest on working capital-facilities from banks, interest on term loan for acquisition of fixed assets, interest on debentures etc. is payable by the company.

Where financing charges are payable to outsiders on borrowings for acquisition of fixed assets, these charges are included in cost of fixed assets.

If the financing charges are payable for financing working capital then these charges are included in cost of inventories. Interest on capital provided by the owners is excluded from cost accounts except for comparing or evaluating profitability of alternative investments.

If the charges are payable for storing the materials like timber, wine etc. The charges are included in the cost of materials stored.

5.11.9 Major repairs to equipment to prolong its useful life : The major repairs, if it prolong the useful life of an asset, the costs incurred on it is to be added to the existing value of assets and periodical depreciation is charged on the overall cost the asset.

If the repair charges are occurred for upkeep and maintenance of the machinery and if it does not prolong the life of the asset, these expenses are treated as production overhead and is charged to the respective cost centre as repairs and maintenance and recovered from the current period product.

If the amount incurred is substantial, it is treated as deferred revenue expenditure carried forward to the subsequent accounting periods for write off.

5.11.10 Costs of Tools : Tools are classified into 1. Large tools and 2. Small tools. The cost of large tools are capitalised like any other machine and depreciation is provided on it in each accounting period over its useful economic life.

The cost of small tools are treated in any of the following three method in cost accounts:

* **Capitaliation method** : Under this method the cost of small tools is capitalized and depreciation is recovered as production overhead. If the life of small tools is relatively small, this method is not suitable.

Revaluation method : Under this method, the small tools are revalued at the end of each accounting year and the difference between original cost and the revalued cost is charged as production overhead.

Write off method : Under this Method, the cost centre drawing such tools is debited with the value thereof. Alternatively, the total cost of tools is accumulated and apportioned to various cost centres on suitable basis.

5.11.11 Bad Debts : When the company allow credit to its customers as part of its selling policy, some credit sale may turn bad due to default by the customers internationally or otherwise. As a safe guard, a part of such default amount is treated as bad debt is recovered as a selling overhead and absorbed in product cost.

If the bad debt is abnormal in nature, the abnormal portion in excess of the standard normal portion should be excluded nom cost accounts and transferred to Costing Profit and Loss Account.

5.11.12 Notional Rent : Notional rent is a cost included in the cost accounts so as to represent a benefit enjoyed by the organisation even though no actual cost is incurred for rent. The company owned premises does pay rent, but it is considered as notional charge in the cost of accounts for comparability of cost with different accounting period and with other organisations. This would reflect the accurate cost of cost centre or cost unit. It is a reasonable or norminal charge included in the cost accounts for the owned premises as if it is a rented premises.

5.11.13 Packing expenses : The packing is classified into (i) Primary Packing and (ii) Secondary packing.

The primary packing is done when the material is packed in tines, bottles, jars, etc., without which a product cannot be sold. For example, jam is packed

in bottles baby food packed in tin, beverages in bottles etc. The costs incurred on primary packing materials is treated as part of direct material cost.

If the packing is made to facilitate the transportation and distribution of the finished product, it is called secondary packing and the cost incurred for this is treated as distribution overhead.

Sometimes, cost is incurred on packing the product to make it more attractive to the customers to increase sales. This cost is treated as advertisement cost and is included in selling overhead.

5.11.14 Data Processing Cost : In the environment of processing information with the help of computers, the data processing cost represents the cost incurred for processing data relating to accounts, secretarial, personnel, finance, marketing, sales etc. This may be done either utilising in house facilities or hiring outside facilities. The costs incurred is accumulated for separate service centre if in house facilities are made available.

Where the cost of data processing centre or hiring charges are identifiable to a particular department or activity it should be charged with its portion of cost.

In case of common costs incurred for service of all departments, the data processing cost should be apportioned to different departments on equitable basis.

5.11.15 Stores Overhead : The stores department in an organisation perform the function like receipt of material and stores items purchased, storing and issue of materials and stores items to different departments. The stores is considered as a separate cost centre and the store expenditure like rent of store, salaries and wages of stores personnel, freight, carriage inwards, insurance etc., are collected separately for the stores and will be apportioned to other cost centres. The following bases are used in apportionment of stores overhead.

- Number of stores requisitions
- Value of material requisitioned
- Standard predetermined stores overhead absorption rate

5.11.16 Erection and dismantling of Plant and Machinery : The cost incurred on erection of Plant and Machinery is capitalised and treated forming part of capital cost and depreciation is recovered on the total cost.

If the plant and machinery is required to be shifted to different locations, the costs incurred in layout and shifting is treated as precaution overhead. When such costs are substantial, it may spread over a period of time as different revenue expenditures.

If the asset is replaced, before its useful economic life, with a new machine, the written down value of the asset less the scrap value plus the cost on dismantling is treated as capital loss and charged to Profit and Loss Account. However, the erection cost of new machine is capitalised.

If expenses of dismantling and re-erection are incurred due to faulty planning or due to abnormal factors, then such expenses are charged to Costing Profit and Loss Account.

5.11.17 Transport Cost : The classification of transport costs and their treatment in cost accounts is given below :

- * The costs incurred to bring the materials to the production site is included in cost of materials.
- * The costs incurred for bringing the plant and machinery, equipment etc., is added to the capital cost of respective asset and depreciation is recovered.
- * The cost of despatch of finished goods is treated as distribution overhead.
- * The costs incurred for internal movements within work are initially charged to specific cost centres and thereafter apportioned to different production and service centres on the basis of services rendered.

5.11.18 Insurance Cost : The treatment of insurances cost is categorised into the following:

- Insurance premium on storage-cum erection and commissioning is capitalised to the asset value.
- Premium on transit of materials is included in cost of materials.
- Premium on transit of finished products is treated as distribution overhead.
- Premium on loss of profit policy due to fire and break down of machinery is treated as production overhead.
- Premium on miscellaneous policies like vehicles, burglary, accident etc. are treated as administration overhead.
- Premium on raw materials and stores is treated as production overhead.
- Premium on warehouse and finished stock is treated as distribution overhead.

5.12 INTEREST ON CAPITAL

There is a difference of opinion as to whether interest on capital employed in manufacture should be treated as an item of cost.

The following arguments are given in support of treating interest as an item of cost :

1. Interest is the reward of capital just as wages are the reward of labour. Profit, in the true sense, cannot be computed without considering interest.
2. The comparison of operations, different processes, etc. without due consideration of the interest factor may lead to unreliable conclusions.
3. Interest considers time factors as it is computed on the basis of time and time is regarded as an important factor in production.
4. The inclusion of interest is of particular importance where articles of different values are produced and the capital invested in each product line differs considerably.

5. The cost of carrying inventory cannot be determined without giving due recognition to the interest on capital employed in it.

The following arguments are against including interest in the cost accounts:

1. Cost accounting considers only actual expenditures and can include only interest paid.
2. The interest factor is in no way connected with cost of manufacture. Whatever may be the method of raising finances - owned capital loans, debentures, etc. does not affect manufacturing cost. It only affects the profits of the period.
3. Inclusion of interest in product costing will inflate the values of inventory and work-in-progress and therefore will tend to increase the profit unreasonably.
4. Interest is calculated on capital and the term "capital" has many concepts such as total capital employed in business, equity capital and borrowed capital both.
5. A reliable and correct rate of interest is difficult to determine and is likely to be influenced by naked fluctuations.
6. The cost accounting and product costing systems get complicated unnecessarily by inclusion of interest on capital and financial statements also become misleading.

There is one point upon which opinion is not divided. If interest is to be considered at all, it must not be confined merely to such interest as may actually have been paid by the business: Therefore, if it is decided to exclude interest from the cost accounts, interest which has been paid, must also be ignored.

Of late, cost accounts in India tend to agree that interest on capital or funds borrowed from outside and paid or to be paid in cash should be included in product cost. This has been supported on the grounds that it implies cash outflow and affects the operating results of a business firm. The Bureau of

Industrial Cost and Price in India includes actual interest on borrowed funds as an element of cost in cost price studies. However, the Bureau does not consider the notional type of interest on owned capital as an element of cost.

5.13 SELLING AND DISTRIBUTION OVERHEADS:

Selling and distribution costs are usually incurred after the production of products or services is completed, and therefore, such costs are sometimes known as 'After-Production Costs'.

Selling cost is "the cost of seeking to create and stimulate demand (sometimes termed marketing) and of securing order". These costs are thus incurred for increasing sales to the existing and potential customers. Examples advertisement, samples and free gifts, show-room expenses etc.

Distribution cost is "the cost of sequence of operations which begins with making the packed product available for despatch and ends with making there-conditioned returned empty packages, if any, available for re-use". Thus distribution costs are incurred in placing the articles in the possession of the customers. Examples are carriage outwards, insurance of goods-in-transit, maintenance of delivery, vans, warehousing etc.

For costing purposes, selling costs and distribution costs are generally considered together although in some circumstances, it is desirable to deal with them separately.

Difference between selling overhead and distribution overhead : Selling overhead and distribution overhead differ in their nature and purpose. Selling overheads are incurred for promoting sales and securing orders while distribution overheads are mainly incurred in moving the goods from the company's godown to customers' place. The object of selling overhead is to solicit orders and to make efforts to find and retain customers. The object of distribution overhead is the safe delivery of the goods to the customers.

Special Features :

Selling distribution overhead costs have certain peculiar features which have a bearing on the accounting and control of these costs. These features are:

- (a) Unlike production costs, most of the selling and distribution costs cannot be identified with the units of products.
- (b) Selling costs are incurred as a matter of policy of management.
- (c) Selling costs are not always related to the volume of sales.
- (d) The characteristics and attitude of the customers also affect the selling costs.
- (e) The same product may be sold in near or distant market. This will affect cost of packing and transportation.
- (f) Selling costs vary widely depending upon the degree of competition.

Accounting Treatment :

The accounting procedure of selling and distribution cost is comprised of

1. Classification, collection and analysis of these expenses.
2. Apportionment and allocation to cost centres.
3. Absorption by products or product groups.

These three stages are discussed below :

1. Classification, collection and analysis : This is first step and is similar to classification and collection of production of overheads. Selling and distribution overheads may be classified on the basis of products, sales territories, channels of distribution, salesmen etc.

When classification of expenses is complete, expenses are collected under standing order numbers provided for this purpose.

2. Apportionment and allocation to cost centres : In this step selling and distribution overheads are allocated or apportioned to various products, sales territories or other cost centres. Some of the common basis used for distribution of selling and distribution overheads are :

	Expenses	Basis for distribution
1.	Remuneration of salesmen	Direct allocation
2.	Advertising	Direct allocation or Value of sales or space used
3.	Catalogues	Direct allocation or space used
4.	Showroom expenses	Direct allocation or space used
5.	Packing	Direct allocation
6.	Collection of overdue accounts	No. of orders or sales value
7.	Insurance	Value of stocks
8.	Transport-outside carrier	Direct allocation
9.	Own transport	Drive allocation or Weight of product carried
10.	Warehousing	Cubic ft. of product stores X times (days)

3. Absorption of selling and distribution overhead : Absorption of selling and distribution overheads means charging of these overheads to various products, jobs or orders.

Various methods for absorption of selling and distribution overhead are as follows :

1. A rate per unit : This method is employed when the company is selling one uniform type of product. The total selling and distribution overheads to be absorbed are divided by the number of units sold to arrive at a rate per unit.

For example, a company is manufacturing only one type of TV picture tube. During the month of May , its selling and distribution overhead amounted to Rs. 75,000 and during this period, the number of picture tubes sold is 1,000

the rate per unit for the absorption of selling and distribution overhead will be Rs. 75,000 ÷ 1,000 = Rs. 75.

2. A percentage of selling price : This method is recommended when the concern is selling more than one type of product. A percentage of selling and distribution overheads of selling price is ascertained from an analysis of past records. Overhead rate is calculated by the following formula :

$$\text{Overhead Rate} = \frac{\text{Selling and Dist. overhead}}{\text{Sales}} \times 100$$

Example : Selling and distribution overhead = Rs. 5,000

Total Sales = Rs. 1,00,000

$$\begin{aligned} \text{Overhead Rate} &= \frac{5000}{1,00,000} \times 100 \\ &= 5\% \text{ of selling price} \end{aligned}$$

3. A percentage of works cost : In this method, a percentage of selling overheads to works cost is ascertained. This percentage rate is applied for the absorption of selling and distribution overheads.

Overhead rate is calculated as follows :

$$\text{Overhead Rate} = \frac{\text{Selling and Dist. overhead}}{\text{Total works cost}} \times 100$$

Selling and distribution overhead = Rs. 5,000

Total works cost = Rs. 40,000

$$\text{Overhead Rate} = \frac{5,000}{40,000} \times 100 = 12.5 \%$$

Illustration 5.9 :

The works cost of certain article is Rs. 400 and the selling price is Rs. 800. The following direct selling and distribution expenses were incurred:

	Rs.
Freight and Carriage	40
Insurance	10

Commission	60
Packing Cases	10

The estimated fixed selling and distribution expenses for the year were Rs. 30,000 and the estimated value of sales for the year was Rs. 1,50,000.

You are required to set out the final cost of the article using the method of percentage of sales to recoup fixed selling and distribution expenses.

Solution :

The percentage of fixed selling and distribution expenses to the estimated value of Sales is - $\frac{30,000}{1,50,000} \times 100 = 20\%$.

FINAL COST OF THE ARTICLE

	Rs.	Rs.
Work Cost		400
Selling and Distribution Expenses:		
Variable:		
Freight and Carriage	40	
Insurance	10	
Commission	60	
Packing Cases	10	
	120	
Fixed 20% of Selling Price	160	280
Total cost		680
Profit		120
Selling Price		800

Illustration 5.10 :

A company is producing three types of products A, B and C. The sales territory of the company is divided into three areas X, Y, Z. The estimated sales for the year 1995 are as under :

Territory			
Product	X	Y	Z
	Rs.	Rs.	Rs.
A	50,000	20,000	-
B	30,000	-	80,000
C	-	70,000	40,000

The budgeted advertising cost is under –

	X	Y	Z	Total
	Rs.	Rs.	Rs.	Rs.
Local Cost	3,200	4,500	4,200	11,900
General	-	-	-	5,800

You are required to find the percentage of advertising cost on sales for each area and product showing how you will present the statement to management.

Solution :

Apportionment and Allocation of Advertising Cost Areawise

Item	Total Rs.	Area			Total
		X Rs.	Y Rs.	Z Rs.	
Local cost	11,900	3,200	4,500	4,200	
General cost. (2% on estimated sales)	5,800	1,600	1,800	2,400	

Total cost	17,700	4,800	6,300	6,600
Sales	2,90,000	80,000	90,000	1,20,000
Advertising cost as a percentage of sales	-	6%	7%	5.5%

Apportionment of Advertisement Cost Productwise

Item	Total	Product		
		A	B	C
Area X (@ 6% of sales)	4,800	3,000	1,800	-
Area Y (@7% of sales)	6,300	1,400	-	4,900
Area Z (@ 5.5% of sales)	6,600	-	4,400	2,200
Total costs	17,700	4,400	6,200	7,100
Sales	2,90,000	70,000	1,10,000	1,10,000
Advertising cost as a percentage of sales	-	6.34%	5.64%	6.45%

5.14 EXAMINATION QUESTIONS

1. What is the meaning of the term. “overhead” ? Explain fixed, variable and semivariable overhead.
2. What is meant by overhead expenses? Describe the steps that are necessary for the computation of the direct labour hour rate. In what

respect is the direct labour hour rate method of absorbing overhead different from the percentage of direct wages method ?

3. What are the requisites of a good method of absorption of factory overhead?
4. Describe the different bases on which factory expenses can be apportioned.

Describe the merits and suitability, each of them.

5. Write a detailed critical note and on the direct labour cost method of absorption of factory overheads.
6. What information is necessary to calculate a machine hour rate for overhead absorption? State the conditions in which the method is most effective.
7. Discuss the importance of machine hours as a basis for the absorption of factory overheads.
8. What do you understand by classification, allocation and apportionment in relation to overhead expenses? Explain fully.
9. What is meant by absorption of overhead? Discuss briefly the different methods for absorption of factory overheads?
10. Describe the “prime cost” ‘method of absorption of factory overheads. Explain fully and illustrate the basic conditions necessary for its application.
11. Explain what is meant by cost apportionment and cost absorption. Illustrate each with two examples. Discuss the methods of cost absorption and state which method you consider to be the best and why?
12. What are the peculiar features of selling and distribution overheads as compared to manufacturing overheads.

13. Why do you consider departmentalisation of overheads necessary ?
14. Discuss the methods of absorption of selling and distribution overheads.
15. How do you deal with the following in cost accounts :
- (a) Advertising
 - (b) Research and development cost
 - (c) Bad debts
 - (d) Rent of factory buildings
16. “Interest is a factory which cannot be disregarded by management”
Comment on this statement.
17. The budget of a machine shop for 1984 -85 is as follows :
- | | |
|-------------------------------------------------------|---------------------------|
| Normal working week | 42 hours |
| Number of machines | 15 |
| Hours spent on maintenance in
a week (Normal loss) | 5 hours per machine |
| Estimated annual overhead | Rs. 5,55,000 |
| Estimated direct wages rate | Rs. 3 per machine
hour |
| Number of working weeks in 1984-85 | 50 |
- The actuals in respect of a 4 week
period in 1984-85 are :
- | | |
|------------------------|------------|
| Overhead incurred | Rs. 49,000 |
| Wages paid | Rs. 7,500 |
| Machine hours operated | 2,400 |

Calculate (i) the overhead rate per machine hour for 1984-85 and (ii) the amount of under or over-absorption of overhead and wages in respect of the 4 week period.

18. The following particulars relate to an electrical appliances machine:

- (a) The original cost of the machine used (purchased in June 1982) was Rs. 10,000. Its estimated life is 10 years, the estimated scrap value at the end of its life is Rs. 1000, and the estimated working time per year (50 weeks of 44 hours) is 2,200 hours of which machine maintenances etc., is estimated to take up 200 hours.

No other loss of working time is expected, setting up time estimated at 5% of total productive time is regarded as unproductive time. (Bank holidays are to be ignored).

- (b) Electricity used by the machine during production is 10 units per hour at a cost of 10 P. per unit. No current is taken during maintenance or setting up.
- (c) The machine requires chemical solution which is replaced at the end of each week at a cost of Rs. 20 each time.
- (d) The estimated cost of maintenance per year is Rs. 1,200
- (e) Two attendants control the operation of the machine together with five other identical machines. Their combined weekly wages, insurance and the employer's contributions to holiday pay amount to Rs. 120.
- (f) Departmental and general works overheads allocated to this machine for the year 1982-83 amount to Rs. 2,000.

You are required to calculate the machine hour rate necessary to provide for recoupment of the cost of operating the machine.

[Ans. Rs.4.21]

19. What is machine hour rate ? Calculate the machine hour rate for machine A from the following data :

Cost of machine	Rs. 16,000
Estimated scrap value	Rs. 1,000
Effective working life	10,000 hours
Running time for every 4-weekly period	160 hours
Average cost of repairs and maintenances changed per four-week period	Rs.40
Power used by machine	4 units per hour at a cost of 5 paise per hour

[Ans. : Rs. 2.55]

20. From the following information relating to the machine “Shylack” installed in a factory, work out the machine hour rate.

Purchase price of the-machine with scrap value of zero	Rs. 90,000
Installation and incidental charges incurred on the machine	Rs. 10,000
Life of machine is 10 years of 2,000 working hours each year	
Repair charges 50% of depreciation. Machine consumers 10 units of electric power per hour @ 10 paise per unit. Oil expenses @ Rs. 2 per day of eight hours; consumable stores @ Rs. 10 per day eight hours. Two workers are engaged on the machine @ Rs. 4 per day of eight hours.	

[Ans.: Rs. 11]

LESSON : 6

SINGLE COSTING

Cost ascertainment is the basic function of cost accounting. Cost is ascertained on total as well as per unit basis. The management needs complete and reliable information- about the cost of production for a number of purposes. This information is used for production planning, fixation of selling prices, making decisions about product mix and a host of other important managerial decisions. Cost ascertainment requires collection and analysis of data relating to expenses, measurement of the production of different products at different stages of manufacture and linking UP of production with expenses. A number of methods have emerged for the ascertainment of the cost of production due to the use of varying procedures for the measurement of production, collection of costs and linking up of costs with production. Important methods used for the calculation of the cost of production are as follows :

- i) Single costing;
- ii) Job costing;
- iii) Contract costing; and
- iv) Process costing.

The method to be used for the ascertainment of the cost of production differs from industry to industry and even from one firm to another within the same industry. The method for cost ascertainment is selected by giving due consideration to the nature of product, collection of costs, measurement of production and the nature of the manufacturing process.

SINGLE COSTING

Single costing method of the ascertainment of the cost of production is suitable for those industries in which manufacturing is continuous and units of output are identical. According to J.R. Batliboi, “Single or output cost system

is used in businesses where a standard product is turned out and it is desired to find out the cost of a basic unit of production.” Thus single costing is adopted for cost ascertainment in those manufacturing organisations which are engaged in producing only one type of product or two or more products of the same kind but of varying grades or qualities. This method is used in industries like mines, quarries, oil drilling; breweries, cement works, brick works, .sugar mills, steel manufacture and aluminium products etc. In all those industries where single costing is used, there is a standard or natural unit of cost e.g. a tonne of coal in collieries, one thousand bricks in brick works, a quintal of sugar in sugar industry, a tonne of cement in cement industry etc. In single costing, cost of production is usually ascertained by preparing a cost sheet or a cost statement.

Characteristic Features of Industries Which Use Single Costing

The following are the characteristic features of the industries where the single costing method is used :

1. Production is on a large scale and is continuous.
2. The units of production are identical and homogeneous.
3. The cost units are physical and natural and -capable of being expressed in a convenient unit of measurement.
4. In most cases, the unit of measure is also the cost unit, viz., one unit (in the case of T.V., radio, camera), 1,000 units (in the case of bricks), one gross (in the case of pencils, slates, bolts and nuts), one litre (in the case of paints), one tonne (in the case of coal, cement and steel), one bale (in the case of cotton), etc.

Objectives of Single Costing

Single costing is a very simple method of costing. Its principal objectives are as follows :

- i) To determine the total cost of production during a particular period.

- ii) To ascertain the per unit cost of production by dividing the total cost of production by the number of units produced.
- iii) To estimate per unit cost of production for the future and facilitate production planning.
- iv) To help in the preparation of tenders and fixation of selling prices.
- v) To facilitate comparison of the cost of production of two accounting period.

COST ACCUMULATION UNDER SINGLE COSTING

Under this method, costs are accumulated and analysed under various elements, viz., material, labour and overhead. The total of each element is divided by the total number of units/quantity produced to arrive at the per unit cost. Since only one product is generally produced, the method does not require detailed cost records.

Cost of Material Consumed

The cost of materials consumed is accumulated from stores records. The following formula can help in the determination of cost of material consumed :

$$\text{Cost of materials consumed} = \text{Value of opening stock of raw material} + \text{Purchase value of raw material} - \text{Value of closing stock of raw material}$$

The cost of direct material is included in prime cost and cost of indirect material in works overhead. If certain expenses have been incurred while purchasing material, they will be added to the cost of material.

Normal stores procedures are adopted to maintain smooth and continuous supply of materials and to prevent under or overstocking of materials.

Labour Cost

The cost of direct labour is ascertained from the wage bill. For proper control and accounting of labour cost, the arrival and departure time of workers is recorded and the pay roll is prepared on the basis of such records.

Overhead cost

All overhead costs are analysed under the heads of manufacturing, administrative, selling and distribution overheads. Manufacturing overheads are added to prime cost to ascertain works cost or production cost. Administration, selling and distribution overheads are added to production cost to determine the total cost. These overhead costs are generally charged on the basis of pre-determined overhead rates based on estimates.

Cost Presentation

All costs incurred or expected to be incurred during a given period are presented in the following forms :

1. Cost Sheet
2. Production Account.

In both these forms, the basic principles of costing are the same. Further their objective is also the same i.e. the determination of the per unit cost of production.

COST SHEET

Cost Sheet is a statement which is prepared to show the total as well as per unit cost of production for a specific period. The cost sheet is a periodical statement of cost designed to show in detail the various elements of cost of goods produced like prime cost, factory cost, cost of production and total cost. Comparative figures of the previous period may also be shown in the cost sheet so that assessment can be made about the progress of the business. Cost sheet serves the following purposes :

- (a) It reveals the total cost and unit cost of production.
- (b) It provides the breakup of total cost i.e. different element of cost.
- (c) It shows a comparative study of the cost of current period with that of the corresponding previous period.

- (d) It acts as a guide to management in fixation of selling prices and quotation of tenders.

Cost Sheet for the period.....

No. of Units produced.....

Previous Period		Particulars	Current Period	
Total Cost	Cost Per Unit		Total cost	Cost per unit
Rs.	Rs.	Direct Materials	Rs.	Rs.
		Direct Labour		
		Direct (or Chargeable) Expenses		
		Prime Cost		
		Works Overheads		
		Works Cost		
		Office and Administrative Overheads		
		Cost of Production		
		Selling and Distribution Overhead		
		Total Cost or Cost of Sales		
		Profit or Loss		
		Sales		

Treatment of Stocks in the Cost Sheet

Special care has to be given to the treatment of opening and closing stocks in the cost sheet. Stocks may be of the following three types :

- (a) Stocks of raw materials
- (b) Stocks of work- in-progress
- (c) Stocks of finished goods.

Stocks of raw material

In order to calculate the cost of raw materials consumed during the period, the cost of the opening stocks of raw materials is added to the cost

of raw materials purchased and the cost of the closing stock of raw materials is subtracted. For example, the cost of raw-materials purchased during a particular period is Rs. 20,000 and the opening and closing stocks of raw materials appear at Rs. 10,000 and Rs. 8,000 respectively, the cost of raw materials consumed will be Rs. 22,000 as computed below :

	Rs.
Opening stocks of materials	10,000
<i>Add</i> Purchases	20,000
	<hr/>
	30,000
<i>Less</i> Closing stocks of raw materials	8,000
	<hr/>
	<u>22,000</u>

Stocks of work-in-progress

Stock of work-in-progress or semi-finished goods consist of those goods which require further processing before they can be sold. In the cost sheet, opening stocks of work- in-progress is added in prime cost along with factory overhead and closing stock of work- in-progress is subtracted there from. In this way, the costs of the opening and closing stocks of work-in-progress are adjusted to compute the factory cost. Suppose, the prime cost, factory overheads, opening work-in-progress and closing work-in-progress of a work order are Rs. 1,24,000, Rs. 40,000, Rs.20,000 and Rs. 25,000 respectively. The factory cost of the work order will be computed as follows :

	Rs.
Prime Cost	1,24,000
<i>Add</i> Factory overheads	40,000
<i>Add</i> Opening stock work-in-progress	20,000
	<hr/>
	1,84,000

<i>Less</i> Closing stock of work- in-progress	25,000
Works or Factory cost	<u>1,59,000</u>

The valuation of work- in-progress should be done on a uniform basis from time to time. Some accountants value work-in-progress at prime cost and some other value it at factory cost. The stage of adjustment of the value of work- in-progress under the above two methods will be as shown in-Illustrations 1 and 2 below :

Illustration-1

When work-in-progress is valued at prime cost

	Rs.
Direct material	10,000
Direct labour	7,500
Direct expenses	<u>1,000</u>
	18,500
<i>Add:</i> Opening work-in-progress	<u>2,500</u>
	21,000
<i>Less:</i> Closing work-in-progress	<u>1,500</u>
Prime cost	<u>19,500</u>

Illustration 2

When work-in-progress is valued at factory cost :

	Rs.
Direct material	10,000
Direct labour	7,500
Direct expenses	<u>1,000</u>
Prime cost	18,500
Factory overheads	<u>9,250</u>
	27,750
<i>Add:</i> Opening work-in-progress	<u>2,500</u>
	30,250
<i>Less:</i> Closing work-in-progress	<u>1,500</u>
Factory cost	<u>28,750</u>

It may be noted that administration cost is not included in the cost of work-in-progress.

Stocks of Finished Goods

The stocks of finished goods are adjusted for computing the cost of goods sold in the cost sheet. The opening stock of finished goods is added to the cost of production and the closing stock of finished goods is subtracted therefrom. The resultant figure is known as the cost of goods sold. Suppose, the cost of production, opening stock of finished goods and closing stock of finished goods for a particular period are Rs. 200,000. Rs. 50,000, and Rs. 40,000 respectively. The cost of goods sold for the period will be computed as follows :

	Rs.
Cost of production	2,00,000
<i>Add</i> Opening stock	50,000
	2,50,000
<i>Less</i> Closing stock	40,000
Cost of goods sold	2,10,000

The treatment of the above three types of stocks is illustrated in the following specimen cost sheet :

Cost Sheet for the Period.....

Production.....Units

Particulars	Total Cost Rs.	Cost Per Unit Rs.
Opening stock of Raw Materials <u>XXX</u>		
<i>Add:</i> Purchases <u>XXX</u>		
<i>Add:</i> Expenses on purchase <u>XXX</u>		

	XXX		
<i>Less:</i>	Closing stock of Raw Materials	XXX	
	Cost of material consumed		
	Direct wages		
	Direct expenses		
	Prime Cost		
<i>Add:</i>	Factory overhead		
<i>Add:</i>	Opening stock of work- in-progress		
<i>Less</i>	Closing stock of work-in-progress		
	Factory or Works Cost		
<i>Add:</i>	Administrative over head		
	Cost of production		
<i>Add:</i>	Opening stock of finished goods		
<i>Less:</i>	Closing stock of finished goods		
	Cost of Goods Sold		
<i>Add:</i>	Selling and distribution overhead		
	Cost of Sales		
	Profit (or Loss)		
	Sales		

Illustration. 3

Nikhil Manufacturing Company submits the following information on March 31, 2000 :

	Rs.
Sales for the year	2,75,000
Inventories at the beginning of the year :	
Finished goods	Rs. 7,000
Work-in-progress	Rs. 4,000
Purchase of materials for the year	1,10,000
Materials inventory at the beginning of the year was Rs. 3,000 and at the end of the year Rs. 4,000	

Direct labour 65,000

Factory overhead was 60% of the direct labour cost

Inventories at the end of the year :

Work -in-progress Rs. 6,000

Finished goods Rs. 8,000

Other expenses for the year:

Selling expenses 10% of sales

Administrative expenses 5% of sales

Required

Prepare cost sheet.

Solution :

Nikhil Manufacturing Company
Cost Sheet
For the year ending March 31, 2000

	Rs.	Rs.
Raw materials consumed:		
Opening stock	3,000	
<i>Add:</i> Purchases during the year	<u>1,10,000</u>	
	1,13,000	
<i>Less:</i> Closing stock at the end	4,000	1,09,000
Direct labour		<u>65,000</u>
Prime cost		1,74,000
Factory overhead @ 60% of direct labour cost		<u>39,000</u>
		2,13,000
Adjustment of work- in-progress		
<i>Add:</i> Opening work-in-progress	4,000	
<i>Less:</i> Closing work-in-progress	<u>6,000</u>	<u>(2,000)</u>
Works cost or production cost		2,11,000
Adjustment for finished goods inventory :		
<i>Add:</i> Opening inventory of finished goods		7,000

Less: Closing inventory of finished goods	8,000	<u>(1,000)</u>
Cost of goods sold		2,10,000
Administrative expenses @ 5% of sales		13,750
Selling expenses @ 10% of sales		27,500
Cost of sales		<u>2,51,250</u>
Profit (balancing figure)		23,750
Sales		<u>2,75,000</u>

Treatment of Scrap

Scrap is the incidental residual from certain types of manufacturing process usually of small amount and low value, recoverable without further processing. Examples of scrap are trimmings, turnings or boring from metals or timber on which operations are performed. Any amount realised from the sale of scrap is deducted from the factory overheads or factory cost.

Treatment of By-Products

Some by-products arise from manufacturing process. The realisable value of by-products is deducted from the factory overheads or factory costs.

Treatment of Defective Products

Defective product can be rectified at an extra expense. If it is caused by normal reasons, it can be included in factory costs. If it is caused by abnormal reasons, it can be transferred to costing profit and loss account or to a separate Defective Account.

Illustration 4 :

The following figures are collected from the books of an iron foundry after the close of the year.

Raw Materials :	Rs.
Opening stock at the beginning of the year	7,000

Purchase during the year	50,000
Closing stock at the end of the year	5,000
Direct Wages	10,000

Works overhead: 50% on the direct wages.

Stores overhead on materials: 10% on the cost of materials.

10% of the casting were rejected, being not up to the specifications, and a sum of Rs. 400 was realised on sale as scrap.

10% of the finished castings were found to be defective in manufacture and were rectified by expenditure of additional works overhead charges to extent of 20% on proportionate direct wages.

The total gross output during the year was 1,000 tonnes.

Solution :

Cost Sheet for the year ended.....

Rs.	Rs.
Opening stock of raw materials	7,000
<i>Add:</i> Purchases	<u>50,000</u>
	57,000
<i>Less:</i> Closing stock	<u>5,000</u>
Raw materials consumed	52,000
Direct wages	<u>10,000</u>
Prime Cost	62,000
Works overhead (50% of direct wages)	5,000
Stores overhead (10% on cost of materials)	<u>5,200</u>
	72,200
<i>Less:</i> Sale of scrap (100 tonnes castings)	<u>400</u>
Cost of finished Castings : 900 tonnes :	71,800
Additional works overhead:	
On 10% of finished castings = 90 tonnes	
$90 \times \frac{10,000}{1,000} \times \frac{20}{100} =$	<u>180</u>
Total cost of saleable castings	<u>71,980</u>

Illustration 5 :

Ramesh Limited submits the following information:

	Rs.
Opening stock of finished goods	9,750
Closing stock of finished goods	11,100
Raw materials purchased	35,250
Direct wages	18,450
Factory expenses	2,750
Selling expenses	2,450
Office overhead	1,850
Sales	7,50,000
Sale of scrap	250
Carriage on materials purchased	850

Prepare a statement of cost showing (a) Prime cost, (b) Works cost, (c) Cost of production, (d) Cost of sales, and (e) also show by what percentage the average selling price should be increased in order to double the net profit.

Solution**Statement of Cost**

	Rs.	Rs.
Raw materials purchased	35,250	
<i>Add:</i> Carriage on materials	<u>850</u>	36,100
Direct wages		<u>18,450</u>
Prime cost		<u>54,550</u>
Factory overhead		<u>2,750</u>
		<u>57,300</u>
Less : Sale of scrap		<u>250</u>
Works Cost		<u>57,050</u>
Office overhead		<u>1,850</u>
Cost of Production		<u>58,900</u>
<i>Add:</i> Opening stock of finished goods		<u>9,750</u>

	68,650
<i>Less:</i> Closing stock of finished goods	11,100
Cost of Goods Sold	<u>57,550</u>
Selling Overhead	2,450
Cost of Sales	<u>60,000</u>
Profit	15,000
Sales	<u>75,000</u>

Present profit Rs. 15,000

Desired profit $15000 \times 2 =$ Rs. 30,000

Additional profit as a % of selling price $\frac{15,000}{75000} \times 100$ 20%

Thus the selling price should be increased by 20% to double the net Profit.

Price and Quotations and Estimated Cost Sheet

Quite often the management has to quote prices of its goods in advance or has to submit tenders for goods to be supplied. For this purpose, an estimated cost sheet has to be prepared. In this cost sheet, cost of direct materials, direct wages and various types of overhead are predetermined on the basis of past costs taking into account the present conditions and also the anticipated changes in the future price level. Direct material cost is generally estimated per unit taking into account the estimated prices likely to prevail in future. Direct wages can be known from the previous year's records after making due allowance for any increase in the wage rates. Similarly overheads are estimated on the basis of cost incurred in the past and likely changes in the future.

In drawing tenders or quotations, the estimation of the cost of production is an essential point. Estimation is different from costing. Costing means ascertainment of actual cost of an article which has already been produced, whereas estimation means guess calculations, in advance, of the probable cost of unit to be manufactured in future. The estimation of the job is prepared in the form of a cost sheet. When drawing the tender, the expected changes in the element of cost may be looked upon. Overestimation will invite losses.

Therefore, it needs great care in drawing an estimated cost sheet.

Illustration 6 :

A company manufactured and sold 1,000 radios during a year. Prepare a statement of cost showing different elements of cost per unit from the summarised Trading and Profit and Loss Account set out below :

Trading and Profit and Loss Account

Particulars	Rs.	Particulars	Rs.
To Materials	80,000	By Sales	4,00,000
To Direct wages	1,20,000		
To Works on cost	50,000		
To Gross Profit	1,50,00		
	400,000		4,00,000
To Salaries	60,000	By Gross profit	1,50,000
To Rent and rates	10,000		
To Selling expenses	30,000		
To General expenses	20,000		
To Net profit	30,000		
	1,50,000		1,50,000

Using the above information, prepare a statement of estimate for the next year, if :

- (a) Output and sales will be 1,200 radios.
- (b) Price of materials will rise by 20% and wage rate by 5%.
- (c) Works on cost will rise in proportion to the combined cost of materials and wages.
- (d) A profit of 10% on the selling price is expected.
- (e) Selling cost per unit and others expenses will remain unchanged.

Solution :

Cost Sheet

(1,000 radios)

	Total	Per Unit
	Rs.	Rs.
Materials	80,000	80.00
Direct Wages	1,20,000	1,20,000
Prime Cost	2,00,000	200.00
Works on cost	50,000	50.00
Works Cost	2,50,000	250.00
Office administration :		
Salaries	60,000	
Rent and rates	10,000	
Gen. expenses	20,000	90.00
Cost of Production	3,40,000	340.00
Selling expenses	30,000	30.00
Total Cost	3,70,000	370.00
Profit	30,000	30.00
Sales	4,00,000	400.00

Cost Estimation for 1,200 Radios

	Per Unit	Total	
	Rs.	Rs.	Rs.
Materials	80.00		
<i>Add 20% increase</i>	<u>16.00</u>	96.00	1,15,200
Direct wages	120.00		
<i>Add 5% increase</i>	<u>6.00</u>	126.00	1,51,200
Prime Cost		222.00	2,66,400
Works on cost 25% on Prime cost		55.50	66,600
Works Cost		277.50	3,33,000
Salaries, tent & Gen. expenses		75.00	90,000

Cost of Production	352.50	4,23,000
Selling expenses	30.00	36,000
Total Cost	382.50	4,59,000
Profit 10% on selling price	42.50	51,000
Selling Price	425.00	5,10,000

PRODUCTION ACCOUNT

For the purpose of ascertainment of costs, cost information can also be presented in the form of a production account. It is usually prepared to ascertain the cost of production and sales. Production account is prepared in the form of a ledger account so as to show the cost of production, loss of output, sale of scrap etc. There is no definite form of production account. It can be prepared according to the specific requirements of the firm. However, in majority of the cases, production account consists of four distinct parts : the first part gives the prime cost, the second part shows the cost of production, the third part gives gross profit and the fourth part shows net profit.

Illustration 7 :

Pardeep Engineering Works Ltd. is engaged in the manufacture of automobile spare parts. The particulars about its costs and sales for the year ended 31st December, 1999 are as follows :

	Rs.
Raw materials purchased	1,05,600
Direct wages	84,000
Direct expenses	2,400
Indirect wages	4,400
Factory expenses	40,000
Depreciation of plant and machinery	5,600
Salesmen's salaries	10,400
Advertising	5,600
Carriage outward	4,000

Office rent, rates ,etc.	4,000
Sundry office expenses	10,400
Sales	3,37,600

The position of stocks at the beginning and at the end of the year was as follows :

	1-1-1999	31-12-1999
	Rs.	Rs.
Raw materials	1,20,000	1,46,400
Work-in-progress	44,800	56,000
Finished goods	86,400	49,600

From the above information, you are required to prepare a production account showing all the details of costs and their break up and the amount of gross profit and net profit.

Solution :

Production Account for the year ended 31st Dec. 1999

Particulars	Rs.	Particulars	Rs.
To Materials consumed			
Opening stock	1,20,000		
<i>Add</i> Purchases	1,05,600		
	2,25,600		
<i>Less</i> Closing stock	1,46,400	79,200	
To Direct wages		84,000	
To Direct expenses		2,400	
		1,65,600	1,65,600
To Prime cost bid		1,65,600	By Closing stock WIP 56,000
To Work-in-progress (opening)		44,800	By Cost of goods manufactured (Balancing figure)
To Factory overheads			2,04,400

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Indirect wages	4,400		
Factory expenses	40,000		
Depreciation on plant	5,600	50,000	
		2,60,400	2,60,400
To Cost of goods manufactured		2,04,400	By Closing stock
To Opening stock of finished goods		86,400	of finished goods
To Gross profit c/d		96,400	By Sales
		3,87,200	3,87,200
To Sundry office expenses		10,400	By Gross profit bid
To Office Rent rates etc.		4,000	
To Salesmen's salaries		10,400	
To Advertising		5,600	
To Carriage outward		4,000	
To Net profit		62,000	
		96,400	96,400

Illustration 8 :

The following are the balances of the Impersonal Ledger of a colliery relating to revenue at the end of the year :

	Rs.
Wages paid for coal production	5,80,000
Coal for colliery consumption	45,000
Timber used in coal production	64,000
Ropes used in coal production	12,000
Stores used in coal production	76,000
Royalties paid	42,000
General charges	70,000
Salaries	36,000
Coal Sold (including colliery) 1,12,000 tonnes	8,84,000
Wages paid for coke making	50,000
Stores used for coke making	37,000
Salaries for coke making	8,000
Coke sold (43,500 tonnes)	5,40,000

The stock of coal at the beginning of the year amounted to 7,000 tonnes valued at Rs. 5 per tonne and at the end of the year 15,000 tonnes valued at the same rate. The stock of coke at the beginning of the year amounted to 2,000 tonnes valued at Rs. 10 per tonne and at the end of the year 500 tonnes valued at the same rate.

The total production of the colliery was 1,85,000 tonnes of coal and 42,000 tonnes of coke; 65,000 tonnes of coal being used for coke-making.

Prepare Separate Production Accounts for coal and coke .showing the cost of each item of expense per tonne of coal and coke respectively, taking coal used for coke making at cost price.

Solution :

Coal Production Account

Output 1,85,000 tonnes

Particulars	Per Tonne Rs.	Total Rs.	Particulars	Per Tonne Rs.	Total Rs.
To Wages paid	3.14	5,80,000	By Cost of Production of 1,85,000 tonnes c/d	5.00	9,25,000
To Coal for colliery consumption	0.24	45,000			
To Timber used	0.35	64,000			
To Ropes used	0.06	12,000			
To Stores used	0.41	76,000			
To Royalties paid	0.23	42,000			
To General charges	0.38	70,000			
To Salaries	0.19	36,000			
	5.00	9,25,000			
To Opening Stock (7000 tonnes)	5.00	35,000			
To Cost of Production			By Coke Production A/c		

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of 1,85,000 tonnes			(65,000 tonnes)	5.00	3,25,000
during the year	5.00	9,25,000	By Closing Stock		
To Profit on Coal			(15,000 tonnes)	5.00	75,000
Production		3,24,000			
		12,84,000			12,84,000

Coke Production Account

Output : 42,000 tonnes

Particulars	Per Tonne Rs.	Total Rs.	Particulars	Per Tonne Rs.	Total Rs.
To Coal used (65,000 tonnes at Rs. 5 per tonne)	7.14	3,25,000	By Cost of Production of 42,000 tonnes of Coke c/d	10.00	4,20,000
To Wages paid	1.19	50,000			
To Stores used	0.88	37,000			
To Salaries	0.19	8,000			
	10.00	4,20,000		10.00	4,20,000
To Opening stock (2,000 tonnes)	10.00	20,000	By Sales of 43,500 tonnes		5,40,000
To Cost of production of 42,000 tonnes of coke b/d	10.00	4,20,000	By Closing Stock 500 tonnes	10.00	5,000
To Profit on coke Production		1,05,000			
		5,45,000			5,45,000

Do Yourself :

1. What is single costing? In what industries is it used?
2. Describe the role of the cost accountant in determining the quotation price for a tender.
3. Define the objects of cost sheet. Give a specimen of cost sheet indicating clearly the headings and important items supplying imaginary figures.
4. Write short notes on :
 - (a) Tender price
 - (b) Work-in-progress
 - (c) Production Account.
5. The following data relating to the working of a factory in 1999 are available

	Rs.
Materials consumed	2,00,000
Direct Wages	1,50,000
Factory Expenses	90,000
Administration Expenses	88,000

Based on the above data, find out the cost of a job to be done in 2000:

Materials required	Rs. 2,000
Wages for the job	Rs. 2,000

What will be the quotation price for the job if a profit at 20% on selling price is required?

6. Following is a schedule of expenses incurred during three months ending on 31st March in a Chemical factory :

	Rs.
Direct Materials	18,900
Labour Cost	19,000
Direct Expenses	5,100
Overheads :	
Fixed	Rs. 6,200
Variable	
@ Rs. 4 per unit	4800
Units produced:	12,000 Units
Sales @ Rs. 5 per unit	60,000

Find out (i) Total cost of production (ii) Percentage of profit on Sale and (iii) Estimated price if 2,000 units were produced during the next quarter.

7. From the following particulars prepare a Production Account showing details of cost and their break up and also calculate gross profit and net profit.

	1.1.1999	31.12.1999
	Rs.	Rs.
Stock of Raw Materials	75,000	91,500
Stock of work- in-progress	28,000	91,500
Stock of Finished goods	54,000	31,000
Direct expenses	Rs. 1,500	
Purchase of raw materials	66,000	
Direct Wages	2,750	
Factory Expenses	25,000	

Depreciation on Plant	3,500
Sales	2,11,000
Salesmen salaries and commission	6,500
Office Rent, Rates etc.	2,500
Advertising	3,500
Carriage Outwards	2,500

8. The cost structure of an article the selling price of which is Rs. 45,000 is as follows :

Direct Materials	50%
Direct Labour	20%
Overheads	30%

An increase of 15% in the cost of materials and 25% in the cost of labour is anticipated. These increased costs in relation to the present selling price would cause a 25% decrease in the amount of present profit per article.

Prepare : (a) A statement of profit per article at present and (b) the revised selling price to produce the same percentage of profit to sales as before.

LESSON : 7

JOB, BATCH AND CONTRACT COSTING

All types of manufacturing concerns can broadly be classified into two categories: (a) Mass production concerns and (b) Special order concerns. In mass production, firms manufacture uniform types of products. Since production is of standard products, it is on a mass scale and on a continuous basis. No customer orders or specifications are required for production. Examples of mass production concerns are textile mills, chemical plants, paper manufacturing, tyre rubber companies etc. On the other hand, special order concerns manufacture products in clearly distinguishable lots in accordance with special orders and individual specifications. Examples of specific order concerns are printing press, construction of buildings, bridges, roads, ship building etc.

JOB COSTING

Job costing or job order costing also called specific order costing is a method of costing which is used when work is undertaken as per the customer's special requirement (tailor-made). It is distinct from contract costing in the sense that each job is of a comparatively short duration. The job may be carried out within the factory/workshop or on the premises of the customer, depending on the nature of job.

The main features of job order costing are that in this method of cost ascertainment, costs of materials, labour and overhead are accumulated for each job and profit of loss on it is determined. When an enquiry is received from the customer, costs expected to be incurred on the job are estimated, and on the basis of this estimate, a price is quoted to the customer. When the job has been completed, the actual costs can be compared with the estimated costs (or standard costs is a system of standard costing is in vogue). This serves as a tool of cost control.

Job costing is employed in the following cases :

1. Where the production is against the order of the customer or jobs are executed for different customers according to their specifications.
2. Where each job needs special treatment and no two orders are necessarily alike.
3. Where there is no uniformity in the flow of production from one department to another.
4. Where the work-in-progress differs from period to period on the basis of the number of jobs in hand.

Job costing is applicable to printing, furniture, hardware, ship-building, heavy machinery, foundry general engineering works, machine tools, interior decoration, repairs and other similar work.

Objectives of job costing

Job costing serves the following objectives :

1. It helps in finding out the cost of production of every order and thus helps in ascertaining profit or loss made out on its execution. The management can judge the profitability of each job and decide its future course of action.
2. It helps management in making more accurate estimates about the costs of similar jobs to be executed in future on the basis of past records. The management can conveniently and accurately determine and quote prices for orders of a similar nature which are in prospect.
3. It enables management to control operational inefficiency by comparing actual costs with the estimated ones.

JOB COSTING PROCEDURE

The following is the procedure adopted for costing purposes in a concern using job costing:

1. **Job Number :** When an order has been accepted, an individual work

order number must be assigned to each such job so that separate orders are capable of being identified at all stages of production. Assignment of job numbers also facilitates reference for costing purposes in the ledger and is conveniently short for use on various forms and documents.

2. Production order : The Production Control Department then makes out a production order thereby authorising to start work on the job. Several copies of production order are prepared, the copies often being in different colours to distinguish them more easily. These copies are passed on to the following:

- (i) All departmental foremen concerned with the job;
- (ii) Storekeeper for issuance of materials; and
- (iii) Tool room-an advance notification of tools required.

Exhibit I shows a proforma of production order.

EXHIBIT - I

Production Order			
Name of Customer.....		Job No.....	
Date of Commencement.....		Date.....	
Date of Completion		Bill of Material No.....	
Special instructions.....		Drawing attached yes/No	
<i>Quantity</i>	<i>Description</i>	<i>Machines To be used</i>	<i>Tools required</i>
(Sign).....			
Production Authorised by: Head of Production Control Deptt.			

The columns provided in the production order differ widely, depending largely upon the nature of production.

3. Job Cost Sheet : Job cost sheet is the most important document used in the job costing system. A separate cost sheet or card is maintained for each job in which all expenses regarding materials, labour and overheads are recorded directly from costing records. Job cost sheets are not prepared for specific

EXHIBIT-II

Job Cost Sheet												
Customer.....						Job No.						
Date of Commencement.....						Date of completion.....						
Material Cost			Labour Cost				Factory Overhead (Absorbed)					
Date	Material Req. No.	Amount Rs.	Date	Hours	Rate Rs.	Amt. Rs.	Date	Hours	Rate Rs.	Amt. Rs.		
Total			Total				Total					
Profit/Loss			Cost Summary									
		Rs.								Rs.		
Price Quoted		.....	Material								
Less: Cost		.....	Labour								
		——	Factory Overhead									
		.....	Administrator Overhead								
Profit or Loss		.....	Selling Overhead								
		——	Total Cost									

periods but they are made out for each job regardless of the time taken for

its completion. However, material, labour and overhead costs are posted periodically to the relevant cost sheet.

A proforma Job Cost Sheet is shown at Exhibit-II

Costs for various jobs are collected on the following basis :

- (a) **Cost of materials** : Materials requisition slips, bills of materials or materials issue analysis sheet.
 - (b) **Cost of wages** : Job cards, labour cost cards or wages analysis sheet.
 - (c) **Direct expenses** : Direct expense vouchers.
 - (d) **Overheads** : Overheads may be charged to each job on the basis of any of the methods of overhead absorption.
- 4. Completion Report** : A completion report is sent to the costing department after the completion of job. The actual cost recorded in the job cost sheet is compared with the estimated cost. It will reveal the efficiency or inefficiency in operation. It is a guide to the future course of action.
- 5. Profit or Loss** : Profit or loss on each job can be determined by comparing the actual cost with the price obtained.

Illustration 1 :

The following given below has been taken from the cost records of an engineering works in respect of the Job No. 333.

Material : Rs. 4010

Wages : Department A-60 hours @ Rs. 3 per hour

Department B-40 hours @ Rs. 2 per hour

Department C-20 hours @Rs. 5 per hour.

The overhead expenses are as follows :

Variable : Department A-Rs. 5000 for 5000 hour

Department B-Rs. 3000 for 1500 hour

Department C-Rs. 2000 for 500 hour

Fixed expenses Rs. 20,000 for 10,000 working hours.

Calculate the cost of the job no. 333 and the price for the job to give a profit of 25 per cent on the selling price.

Solution :

Job Cost Sheet (Job No. 333)

Particulars	Rs.	Rs.
Materials	4,010	
Wages: Dept. A (60 × Rs. 3)	180	
Dept. B (40 × Rs. 2)	80	
Dept. C (20 × Rs. 5)	100	360
Over head expenses :		
Variable :		
Deptt. A @ = $\frac{5000}{5000} = \text{Rs. } 1 \times 60 = 60$		
Deptt. B @ = $\frac{3000}{1500} = \text{Rs. } 2 \times 40 = 80$		220
Deptt. C @ = $\frac{2000}{500} = \text{Rs. } 2 \times 40 = 80$		
Fixed expenses :		
$\frac{20,000}{10,000} = 2 \times (60+40+20)$		240
Cost of the job		4,830
Add : Profit 25% on selling price		1,610
Selling Price		6,440

Work in-progress in Job Costing

The cost of an incomplete job, that is, a job on which some manufacturing operation is still due is termed work-in-progress. If a production order has not been duly completed by the end of an accounting period, it is essential that the closing stock of the work-in-progress be determined. Unless this is correctly done, the profits for the period will be distorted. Determination of work-in-progress is frequently essential where periodic Profit and Loss Account is required to be prepared for control purposes without reference to the closure of the accounting period.

The account in respect of such jobs may be maintained in the following ways :

1. A composite work-in-progress account for all the jobs.
2. A work-in-progress account for each job.

In the case of the composite work-in-progress account, it is debited with all costs, direct and indirect, incurred on various jobs and credited with the cost of completed jobs. The balance in the account at any time represents the cost of jobs yet to be completed.

Illustration 2 :

The following information for the last year is obtained from the books and records of a factory :

	Completed Jobs	Work-in progress
Raw materials supplied from stores	9,00,000	3,00,000
Wages	10,00,000	4,00,000
Chargeable expenses	1,00,000	40,000
Materials returned to stores Rs. 10,000		

Factory overheads are 80% of wages and office and selling overheads 25% of the factory cost.

The sale value of completed jobs during the year is Rs. 41,00,000.

You are required to prepare:

- (i) A consolidated work-in-progress account, and
- (ii) A cost of sales account showing profit made or loss incurred on the completed jobs.

Solution :

Consolidated work-in-progress account

Particulars	Rs.	Particulars	Rs.
To Stores (Raw materials supplied)	12,00,000	By Stores (Materials returned)	10,000
To Wages	14,00,000	By Cost of sales-jobs completed (1)	28,00,000
To Chargeable expenses	1,40,000	By Balance c/d	10,50,000
To Factory overheads (80% of wages)	11,20,000		
	38,60,000		38,60,000

Cost of sales account

Particulars	Rs.	Particulars	Rs.
To work-in-progress (completed jobs)	28,00,000	By Sales	41,00,000
To Office and selling overheads (25% of factory cost)	7,00,000		
To Profit	6,00,000		
	41,00,000		41,00,000

Working note :

1. Factory cost of completed jobs :

	Rs.	
Raw materials		9,00,000

Wages	10,00,000
Chargeable expenses	1,00,000
Factory overheads (80% of wages)	8,00,000
	28,00,000

BATCH COSTING

Batch costing is a modification of job costing. It is used where articles are manufactured in definite batches and help in stock for assembly of components to produce finished product or for sales to customers. A batch, in fact, is a cost unit consisting of a group of identical items which maintain their identity throughout one or more stages of production. Batch costing is generally followed in toy making, aircraft manufacturing, bakeries, biscuit factories, radio-sets and watches manufacturing factories, where manufacture of products or components can be done more conveniently in batches of a definite number.

The costing procedure for batch costing is similar to that under job costing except with the difference that a batch becomes the cost unit instead of a job. Separate job cost sheets are maintained for each batch of products. Each batch is allotted a number. Material requisitions are prepared batchwise, the direct labour is engaged batchwise and the overheads are also recovered batchwise. Cost per unit is ascertained by dividing the total cost of a batch by number of items produced in that batch. Ordinary principles of inventory control are used. Production orders are issued only when the stock of finished goods reaches the ordering level. In case the batches are repetitive, the costing work is much simplified.

Determination of Economic Batch Quantity

One very important matter which is considered in batch costing is the determination of the economic batch quantity. Since production is done in batches, and each batch can contain any number of items, the determination of the optimum batch quantity is very significant. To determine economic batch

quantity, the general principles of inventory control with regard to economic order quantity are followed. The determination of the economic (optimum) batch quantity or lot size requires that the following factors be considered:

- (a) The demand for the components in a given period, generally a year.
- (b) The cost of setting up tools on the machines for each batch.
- (c) The cost of manufacturing the components in each batch.
- (d) The cost of capital blocked in the stock of components.
- (e) The cost of storage.

The following formula may be used to determine the economic or optimum batch quantity (EBQ) :

$$EBQ = \sqrt{\frac{2DS}{C}}$$

Where, EBQ = Economic batch quantity
D = Demand of the component in a year
S = Setting up cost per batch
C = Cost of capital and storage (carrying cost) per unit per annum.

Illustration 3 :

A firm requires 12,000 units of component X per annum. The setting up cost per batch amounts to Rs.600. The annual cost of capital and storage comes to 24% per annum and manufacturing cost per unit of the component is estimated at Rs.60.

You are required to determine the economic batch quantity.

Solution :

$$EBQ = \sqrt{\frac{2DS}{C}}$$

Where, D = Demand of the component per annum, i.e. 12,000

- S = Setting up cost per batch, i.e. Rs.600
- C = Cost of capital and storage per unit per annum,
i.e. $\text{Rs.}60 \times 0.24 = \text{Rs.}14.40$

Substituting the values in the above formula, we have

$$\text{EBQ} = \frac{2 \times 12,000 \times 600}{14.4} = 1,000 \text{ units}$$

Sometimes, we may be required to ascertain the number of batches to be processed in a given period. This can be calculated by dividing the total demand in a period by the economic batch quantity. In the above illustration, the firm will make 12 batches. (i.e. $12,000/1,000$) in a year.

Batch Cost Sheet

Having determined the economic batch quantity, the batch cost sheet can be prepared. The batch cost sheet will show the setting up cost as well as production cost under distinct headings. Depending on the availability of data, it may also show the selling price and profit.

Illustration 4 : Following information relates to the manufacturing of a component X-101 in a cost centre :

Cost of materials 6 paise per component

Operator's wages 72 paise an hour

Machine-hour rate Rs. 1.50

Setting uptime of the machine 2 hours and 20 minutes

Manufacturing time 10 minutes per component.

Prepare a cost sheet showing both production and setting up costs total and per unit, when the batch consists of 100 components.

Solution :**Cost Sheet for the Batch of 100 Components**

<i>Setting up costs :</i>	Per unit	Total
Operators wages for 2 hrs. 20 mts. @ 72 paise an hour		Rs. 1.68
Machine overhead for 2 hrs. and 20 mts. @ Rs. 1.50 an hour		3.50
Total Setting up costs	0.05	5.18
<i>Production costs:</i>		
Material cost for 100 units @ paise 6 per unit	0.06	6.00
Wages of the operator for 1,000 mts. 72 paise an hour	0.12	12.00
Machine overheads for 1,000 mts @ Rs. 1.50 an hour	0.25	25.00
Total	0.48	48.18

CONTRACT COSTING

Contract or terminal costing is a variant of job costing and for this reason both contract and job costing methods are based on the same costing principles. The difference between these two is that in job costing a job is relatively small, whereas in contract costing contract is big. It has been well said that “a job is a small contract and contract is a big job”. In contract costing, each contract is a cost unit. As the cost unit in contract costing is relatively large, it takes a considerable length of time to complete and it may continue over more than one year. Moreover, whereas job work is done in factory premises, contract work is done at site, away from the premises of the business. Contract costing is employed in business undertakings engaged in building construction, road construction, bridge construction and other civil engineering works.

The cost unit in contract costing is the contract itself. In contract costing, a separate account is kept for each contract. Since a greater part of the work is carried out at the contract site itself, all the expenditures incurred on the contract including telephone installed at site, power used at site, site vehicles, transportation etc., can be charged directly to the contract. Head Office expenses and the overheads relating to central stores, are, however, apportioned among the various contracts on some equitable basis, such as percentage of materials, wages, prime cost or a percentage of total contract cost depending on the circumstances. In the case of contract costing, direct costs account for a very high proportion of the total cost of contract whereas indirect costs constitute only a small proportion of it. One of the significant features of contract costing IS difficulty in cost control. Because of the scale and the size of the contract and the site, there are frequently major problems of cost control concerning material usage and losses, pilferages, labour supervision and utilization, damage to and loss of plait and tools, etc.

Recording of Contract Costs

The contractor maintains a ledger in which a separate account for each contract is opened. The contract ledger is so ruled as to give maximum information. Certain special aspects of contract costing and treatment of some important items of expenses in contract account is discussed below :

- 1. Materials :** All materials purchased directly for the contract or supplied from the stores are debited to the concerned contract account. Any profit or loss arising from the sale of material, or materials stolen or destroyed by fire, will be transferred to the profit and loss account. Normal waste of materials is charged to the contract by inflating the rates of materials. If any stores items are used for manufacturing tools, the cost of such stores items is charged to the work expenses account. If the contractee has supplied some materials without affecting the contract price, only a note is given about it and no accounting entries are made in the contract account.
- 2. Labour or Wages :** All labour employed at the contract's site should be regarded as direct labour and charged direct to the contract concerned.

Where possible, separate wages sheets should be prepared for each contract. If this is not possible, a Wages Analysis Sheet should be prepared wherein should be entered the particulars of, the daily or weekly time sheet. The total of each column should be posted to the debit of the appropriate contract. Wages accrued or outstanding at the end of the period should appear on the debit side of the contract account.

3. Direct Expenses : All expenses other than material and wages are charged to individual contract as and when they are incurred.

4. Indirect Expenses : There are certain expenses (such as engineers, surveyors, supervisors, etc. engaged on various contracts) which can not be directly charged to contracts. Such expense may be distributed on several contracts on some suitable basis as a percentile of material or labour.

5. Plant and Machinery : When some plant and machinery is used for a contract, the following methods are generally in use for charging the contract :

- (i) The book value of plant and machinery issued is debited to the contract account concerned and the Plant Account is credited. When the plant is returned, the depreciated value is credited to the Contract Account and debited to the Plant Account. This method is generally used when plant and machinery is required for a long period or it is be exhausted upon the contract.
- (ii) Total depreciation during a period in respect of each plant or each group of plants is determined and the contract account concerned is debited with its share of depreciation on the basis of the period for which the plant was in use.
- (iii) When the plant and machinery is used for a short time, say a few hours, an 'Upkeep Account' may be maintained which is debited with the cost of repairs and maintenance, depreciation, obsolescence etc. A hire rate sufficient to cover the upkeep of the plant is then determined and the contract is charged at this rate.

6. Extra Work : Sometimes additional work upon the work originally contracted for is required by the contractee. If the additional work is quite significant, it should be treated as a separate contract and a separate account should be opened for it. If it is not significant, expenses incurred upon extra work should be debited to the contract account as 'Cost of extra work' and the extra amount which the contractee has agreed to pay should be added of the contract price.

7. Sub-Contracts : Many a times, work of a specialised character such as special flooring, grilling etc. is entrusted to other contractors (sub-contractors) by the main contractor. The cost of such sub-contracts is taken as a direct charge against the contract for which the work has been done and is debited to the concerned contract account.

Cost Plus Contact

When it is not possible to estimate the cost of work with a reasonable degree of accuracy at the time of entering into the contract, a cost-plus-contract is generally adopted. Under such a contract, the contractor receives his total costs plus a profit, which may be a fixed amount or it may be a particular percentage of cost or capital employed. These types of contracts are undertaken for production of special articles not usually manufactured e.g. construction work during war production of newly designed ship or component parts of aircraft etc. Generally, in such contract, contractors and contractee have clear agreement about the items of cost to be included, type of material to be used, labour rates for different grades, normal wastages to be permitted and the rate or amount of profit.

Cost plus contracts are advantageous both to the contractor and the contractee. The contractee knows well how much he is paying for elements of cost and how much as profit to the contractor. He can ensure a fair price of the contract by being entitled to verify the books and documents of the contractor. The contractor also receives a reasonable profit in addition to his cost. He is protected from risks of fluctuation in market prices of material,

labour and services. But the main disadvantage of this type of contract is that there is no incentives on the part of the contractor to reduce costs and accordingly, the contractee has to pay more for the inefficiency of the contractor. Thus, the system tends to place a premium on inefficiency of the contractor.

Certification of Work done (Work Certified)

It is generally agreed between the contractor and the contractee that 'on accounts' payment will be made by the contractee at stages of progress in the work. An architect or a surveyor is appointed by the contractee to certify the extent of the work completed. He issues a certificate from time to time to the effect stating how much work has been completed and the amount of money due to the contractor in terms of the contract deed. The contractor credits the 'on account' payment received from the contractee in his account. On completion of the contract, the contractee's account will be debited with the contract price for receiving the final payment.

Retention money

The contractee generally does not make full payment of the work certified by the surveyor. He retains some amount, (say 10% to 20% of the amount due) to be paid within a reasonable period when it is ensured that there is no fault in the work done. The amount held back is called retention money. If any defect or deficiency is noticed in the work, it is to be certified before the release of the retention money. Retention money provides a safeguard against the risk of loss due to faulty workmanship.

Cash Received

Cash received is ascertained by deducting the retention money from the value of work certified, i.e.,

$$\text{Cash received} = \text{Value of work certified} - \text{Retention money.}$$

Cost of work certified

The cost of work certified represents the total expenditure incurred

on the contract to date, less cost of work uncertified, materials in hand, plant at site, etc. Thus

$$\text{Cost of work certified} = \text{Cost of work to date} - \left(\text{Cost of work uncertified} + \text{materials in hand} + \text{Plant at site} \right)$$

Work uncertified

Work uncertified (or work not yet certified) represents the cost of the work which has been carried out by the contractor but has not been certified by the contractee's architect. It is always shown at cost price. The cost of work uncertified may be ascertained as follows :

		Rs.
Total Cost to date	_____	_____
Less: Cost of work certified	_____	_____
Materials in hand	_____	_____
Plant at site	_____	_____
Cost of work uncertified		

Work-in-progress

Incomplete contracts are referred to as work-in-progress. This should be shown on the assets side of the balance sheet under the heading work-in-progress. Work-in progress represents the net expenditure incurred on the contract. The net expenditure on a contract is arrived at by adding the various expenses debited to the contract account, less materials in hand, returned, lost or stolen etc., the value of plant in hand, returned, lost or destroyed, etc. From the viewpoint of the contractor, work-in-progress represents the net expenditure incurred on the contract, irrespective of whether any cash for it has been received or not. While showing the work-in-progress in the balance sheet, any notional profit held back (profit in reserve) and cash received are deducted.

Alternatively, the work-in-progress account can be prepared by debiting to this account, the amount of work certified and work uncertified and crediting it with the profit in reserve i.e. the portion of the profit not transferred to the profit and loss account. The difference between the debit and crediting is work-

in-progress. While showing it in the balance sheet, all cash received on account of such uncompleted contracts is to be shown as a deduction. The value of plant and materials in hand may be shown separately in the balance sheet under the heading plant at site and materials at site, along with work-in-progress.

Notional Profit

Notional profit represents the difference between the value of work certified and cost of work certified. It is determined in the following manner:

Illustration 5 :

The following information is available :

Value of work certified	Rs. 5,00,000
Cost of work to date	Rs. 4,00,000
Cost of work not yet certified	Rs. 1,00,000
Material in hand and plant at site	Nil
Calculate notional profit	

Solution :

		Rs.
Value of work certified		5,00,000
<i>Less</i> : Cost of work certified		
Cost of work to date	4,00,000	
- Cost of work not yet certified	<u>-1,00,00</u>	<u>3,00,000</u>
Notional profit		<u>2,00,000</u>

However, if in any year the cost of work certified exceeds the value of work certified, the resultant figure will represent the notional loss.

Illustration 6 : From the following information, calculate the value of work-in-progress :

	Rs.
Total cost of contract to date	3,83,000
Cost of contract not yet to certified	23,000
Value of work certified	4,20,000
Cash received to date	3,78,00

Solution :

	Rs.
Value of work- in-progress	4,20,000
Work Certified	23,000
Work Uncertified	4,43,000
<i>Less</i> : Reserve for Contingencies	24, 000
	4,19,000
<i>Less</i> : Cash Received	3,78,000
Work-in-progress	<u>41,000</u>

Alternatively

Value of Work-in-Progress	
Total cost of contract to date	3,83,000
<i>Add</i> : Profit taken 'on the contract	36,000
<i>Less</i> : Cash received	4,19,000
Work-in-Progress	<u>3,78,000</u>

Working Note

	Rs.
Work-in-progress	
Work Certified	4,20,000
Work Uncertified	<u>23,000</u>
<i>Less</i> : Cost of Contract to date	4,43,000
Notional Profit	<u>3,83,000</u>
Profit taken to Profit & Loss Account	<u>60,000</u>

$$2/3 \times 60,000 \times \frac{3,78,000}{4,20,000}$$

$$= \text{Rs. } 36,000$$

$$\text{Reserve for Contingencies} = \text{Rs. } 60,000 - 36,000$$

$$= \text{Rs. } 24,000$$

Estimated profit

Estimated profit represents the excess of the contract price over the estimated total cost of the contract. Thus,

Estimated profit = Contract price - Estimated total cost

Estimated total cost is determined by adding the cost to be incurred to complete the contract to the cost incurred to date on a contract. Thus,

Estimated total cost = Cost incurred to date + Cost to be incurred to complete the contract

Profit/loss on incomplete contracts

A contract usually extends over a number of years. If the profit on such contracts is recorded only after their completion, wide fluctuations may be noted in the profit figures from year to year, as there may be a year in which no contract is completed and another year in which a number of contracts are completed. To avoid wide fluctuations in the reported profits and to reflect the revenue in the accounting period during which the activity is undertaken, and also to comply with the matching principle, the profit in respect of each contract in progress is transferred to the profit and loss accounting the year by calculating the notional profit. However, prudence requires that the total notional profit should not be transferred to the profit and loss account but the total notional loss should be written off to the profit and loss account of the year. The withholding of a portion of the notional profit may be regarded as a provision for future unforeseen expenses and contingencies. The portion of notional profit to be transferred to the profit and loss account depends on the stage of completion of the contract. It is always preferable to determine the stage of completion of a contract with reference only to the certified work. For this purpose, as far as possible, uncertified work should not be considered. To determine the profit, all the incomplete contracts are classified into the following four categories :

- (i) Contracts just started or contracts less than 25% complete.
- (ii) Contracts between 25% and 50% complete.
- (iii) Contracts between 50% and 90% complete.
- (iv) Contracts nearing completion, say between 90% and 100% complete.

The transfer of profit to the profit and loss account in each of the above cases is done as under :

(i) **Contract less than 25% complete** : No profit should be taken into account if the contract has just started or is less than 1/4th complete.

(ii) **Contract between 25% and 50% complete (i.e. it is 1/4 or more complete but less than 1/2)** : One-third of the notional profit, reduced in the ratio of cash received to work certified, may be transferred to the profit and loss account. Thus the amount of profit to be transferred to be profit and loss account may be determined by using the following formula : $\frac{1}{3} \times \text{Notional Profit} \times \frac{\text{Cash received}}{\text{Work certified}}$

(iii) **Contract between 50% and 90% complete (i.e. it is 50% or more complete but less than 90%)** : In this case, two-thirds of the notional profit, reduced by the proportion of cash received to work certified may be transferred to the profit and loss account. In this case, the formula will be :

$$\frac{2}{3} \times \text{Notional Profit} \times \frac{\text{Cash received}}{\text{Work certified}}$$

(iv) **Contract nearing completion** : When 90% or more of the work has been done in a contract the contract is considered to be nearing completion. In the case of such contracts, the amount of notional profit to be transferred to the profit and loss account may be determined by taking into account the estimated profit on such contracts. In that case, the estimated profit is ascertained by deducting the aggregate of costs to date and further expenditure to be incurred to complete the contract from the contract price. An amount equivalent to a proportion of this estimated total profit from the notional profit is credited to the profit and loss account and balance is kept in reserve. This proportion is ascertained by anyone of the following formulas :

(a) Estimated profit $\times \frac{\text{Work certified}}{\text{Contract price}}$

- (b) Estimated profit $\times \frac{\text{Work certified}}{\text{Contract price}} \times \frac{\text{Cash received}}{\text{Work certified}}$
or Estimated profit $\times \frac{\text{Work certified}}{\text{Contract price}}$
- (c) Estimated Profit $\times \frac{\text{Work certified}}{\text{Contract price}}$
- (d) Estimated Profit $\times \frac{\text{Cost of work to date}}{\text{Estimated total cost}} \times \frac{\text{Cash received}}{\text{Work certified}}$

In the absence of specific instructions, it is preferable to use formula (b) above. However, if the estimated profit cannot be ascertained, i.e. the estimated further expenditure is not given, the amount of profit to be transferred to the profit and loss account may be ascertained on the basis of notional profit by using the following formula :

(e) Notional profit $\times \frac{\text{Work certified}}{\text{Contract price}}$

Escalation Clause

This clause is often provided in contracts to cover any likely changes in the price of utilisation of materials and labour. Thus a contractor is entitled to suitably enhance the contract price if the cost rise beyond a given percentage. The object of this clause is to safeguard the interest of the contractor against unfavorable changes in cost. The escalation clause is of particular importance where prices of material and labour are anticipated to increase or where quantity of material and labour time cannot be accurately estimated.

Just as an escalation clause safeguards the interest of the contractor by upward revision of the contract price, a de-escalation clause may be inserted to look after the interest of the contractee by providing for down beyond an agreed level.

Preparation of Contract Account

As already stated, all the expenses incurred on the contract are debited to the contract account. At the end of the accounting period, the contract account is credited with the amount of work- in-progress, consisting of value of work certified and cost of work uncertified. If any materials are in hand or there is a plant at site, they are also shown on the credit side of the contract account.

The difference of the totals of the two sides represents the notional profit or notional loss. If the credit side is bigger, the difference represents notional profit, if the total debit side exceeds the total credit side, the difference is the notional loss. Since notional profit is the difference between the, value of work certified and the cost of work certified, it may also be arrived at by deducting the cost of work certified.

The portion of notional profit to be transferred to the profit and loss account may be determined depending on the stage of completion of the work as already explained. The apportionment of the notional profit i.e. the amount to be transferred to the profit and loss account and the amount to be kept in reserve, may be shown by extending the contract account. In other works, the amount of notional profit may be carried to the credit side of the contract account and the amount to be transferred to the profit and loss account may be shown on the debit side. The balance of the notional profit is kept in reserve as an element of work- in-progress. However, if there is a notional loss, the whole of it is transferred to the profit and loss account. At the beginning of the next accounting year, the amount of work-in-progress representing work certified and uncertified, materials in hand-and plant at site etc., are shown on the debit side and the profit kept in reserve as part of work- in-progress is put on the credit side as the opening balance in the contract account.

In the balance sheet, work-in-progress (less profit in reserve), materials in hand, plant at site etc. are shown on the assets side under the appropriate heads. The cash received from the contractee is also shown as deduction from work-in-progress. Accounting. Standard 7 (AS-7) issued by the Institute of Chartered Accountants of India provides that the progress payment received from the contractee may be shown as a liability also in financial statements.

The preparation of the contract account, computation of profit to be taken to the profit and loss account in respect of contracts at different stages of completion and presentation of work- in-progress and other items in the balance sheet are explained through the following illustrations:

Illustration 7 :

The following is the summary of the entries in a contract ledger as on 31st December 1999 in respect of Contract No. 87 which has a contract price of Rs. 5,00,000.

	Rs.
Materials purchased directly	1,75,000
Materials supplied from stores	35,000
Wages	90,000
Direct Expenses	35,000
Establishment Charges	40,000
Plant	1,71,000
Scrap sold	1,00,000

The other information as follows :

- (a) Accruals on 31st December 1999 were; wages Rs. 500 and direct expenses Rs. 6,000.
- (b) The cost of work uncertified was Rs. 25,500.
- (c) Rs. 10,000 worth of plant and Rs. 15,000 worth of materials were destroyed by fire.
- (d) Rs. 20,000 worth of plant was sold for Rs. 15,000 and materials costing Rs 25,000 were sold for Rs. 30,000.
- (e) Depreciation on plant upto 31st December 1999 was Rs. 50,000
- (f) Materials at site Rs. 25,000
- (g) Cash received from contractee was Rs. 3,00,000 being 80% of work certified.

Show the Contract Account and Work-in-Progress Account. Also, show the same in the Balance Sheet.

Solution :

Contract No. 87 A/c

Particulars	Rs.	Particulars	Rs.
To Materials Purchased	1,75,000	By Sales of scrap	1,00,000
To Materials from stores	35,000	By Profit & Loss A/c	
To Wages	90,000	Loss of Plant	10,000
Add outstanding	4,500	Loss of Materials	15,000
To Direct Expenses	35,000	By Cash	
Add outstanding	6,000	Sale of Plant	15,000
To Establishment charges	40,000	Sale of Materials	30,000
To Plant	1,71,000	By Profit & Loss A/c	5,000
To Profits & Loss A/c (Profit on sale of materials)	5,000	(Loss on sale of plant)	
To Notional Profit c/d	39,000	By Materials at Site	25,000
		By work-in-Progress	
		Work Certified	3,75,000
		Work Uncertified	25,500
	6,00,500		4,00,500
To Profit & Loss A/c ($2/3 \times 39,000 \times \text{ĐÓÉÓÓ}$)	20,800	By National Profit bid	39,000
To work-in-Progress A/c	18,200		
	39,000		39,000

Work-in-Progress A/c

To Contract No. 87 A/c		By Contract No. 87 A/c	18,200
Work Certified	3,75,000	By Balance c/d	3,82,300
Work Uncertified	25,500		
	4,00,500		4,00,500

Balance Sheet as on 31st December 1999

	Work in-Progress	
	Work Certified	3,75,000
	Work Uncertified	25,500

		4,00,500	
	Less Reserve	18,200	
		3,82,300	
	Less Cash Received	3,00,000	82,300
	Plant at Site		91,000
	Materials at Site		25,000

Note : Calculation on Written Down Value of Plant

		Rs.
Plant at cost		1,71,000
Less Lost	10,000	
Plant sold	201000	
Depreciation	50,000	80,000
Written Down Value of Plant		<u>91,000</u>

Illustration 8 :

Nikhil Limited undertook a contract for Rs. 5,00,000 on 1st April 1998. On 31st March 1999 when the accounts were closed, the following details about the contract were gathered :

	Rs.
Materials purchased	1,00,000
Wages paid	45,000
General expenses	10,000
Plant purchased	50,000
Materials in hand 31.3.1999	5,000
Wages accrued 31.3.1999	2,00,000
Work certified	1,50,000
Cash received	15,000
Work uncertified	5,000
Depreciation of plant	

The contract contained an escalation clause which read as “In the event of increase(s) of prices of materials and rates of wages by more than 5% the contract price would be increased accordingly by 25% of the rise of the cost

Working notes:

(i) Ascertainment of effect of escalation clause:

	Total increase 25% Rs.	Increase upto 5% Rs.	Increase beyond 5% Rs.
Materials :			
Effect of increased price (Rs.1,00,000 - Rs.25,000) × 25%	15,000	3,000	12,000
Wages :			
Effect of increased wage rates : Rs. 50,000 × 25%	10,000	2,000	8,000
Total	25,000	5,000	20,000

Increase in value of work done (certified & uncertified)
to date : 25% of Rs. 20,000 = Rs. 5,000

(ii) Profit to be transferred to the profit and loss account :

Since the contract is between 1/4 and 1/2 complete, one-third of the notional profit, reduced by the proportion of cash received to work certified, is to be transferred as below :

$$\begin{aligned} &= \frac{1}{3} \times \text{National profit} \times \frac{\text{Cash received}}{\text{Work certified}} \\ &= \frac{1}{3} \times \text{Rs. } 80,000 \times \frac{\text{Rs. } 1,50,000}{\text{Rs. } 2,00,000} = \text{Rs. } 20,000 \end{aligned}$$

Do Yourself :

1. What do you understand by job costing? What are the main features of this method? Give a proforma cost sheet under such a system.
2. Explain the nature and use of batch costing. Describe the concept of the economical batch with the help of an suitable example.
3. There are two methods of charging the contract cost account for the use of pant. Describe there two methods and state which method is preferable and why.

4. What is cost plus contract? Discuss this from the point of view of (a) the manufacturer and (b) the buyer.
5. Is it necessary to calculate profit on incomplete contracts? If yes, under what circumstances would you recommend calculation of profit on such contracts?
6. A factory uses a job costing system. The following cost data are available from the books for the year ended 31st March :

	Rs.
Direct material	9,00,000
Direct wages	7,50,000
Profit	6,09,000
Selling and distribution overheads	5,25,000
Administrative overheads	4,20,000
Factory overheads	4,50,000

Required :

- (a) Prepare a cost sheet indicating the prime cost, works cost, cost of sales and sales value.
 - (b) In the current year, the factory has received an order for a number of jobs. It is estimated that the direct materials would cost Rs. 12,00,000 and direct labour Rs. 7,50,000. 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 its factory overheads as a percentage of the direct wages and its administrative and selling and distribution overheads as a percentage of works costs, based on the cost rates prevalent in the previous year.
7. R K Ltd. has to quote for a price for job No. 450. The cost estimator has produced the following data :
 Direct materials : 34 units @ Rs. 2 per unit.

Direct : Deptt. A 12 hours @ Rs. 2 per hour

Deptt. B 20 hours @ Rs. 1.80 per hour

The following additional information is extracted from the company's budgets :

Deptt. A Variable overheads Rs.	18,000
Hours to be worked	18,000
Deptt. B. Variable overhead Rs.	18,000
Hours to be worked	10,000
Fixed overhead for the company Rs.	1,00,000
Total hours to be worked	50,000

Profit is taken at 20% of the selling price,

You are required to prepare a job cost sheet.

8. A jobbing factory has undertaken to supply 200 pieces of a component per month for the ensuing six months. Every month a batch order is opened against which materials and labour hours are booked at actual. Overheads are levied at a rate per labour hour. The selling price contracted for is Rs. 8 per piece. From the following data present the cost and profit per piece of each batch order and overall position of the order for 1,200 pieces.

Month	Batch	Material	Direct	Direct
Output	Cost	Wages	Labour hrs.	
Jan.	210	6540	120	240
Feb.	200	640	140	280
March	220	680	150	280
April	180	630	140	270
May	200	700	150	300
June	200	720	160	320

The other details are

Month	Chargeable expenses	Direct labour
Jan.	12,000	4,800
Feb.	10,560	4,400
March	12,000	5,000
April	10,580	4,600
May	13,000	5,000
June	12,000	4,800

9. Component SW-10X is made entirely in machine shop No. ASW-II. Material costs Rs. 20 per component. Each component takes 6 minutes to produce and the machine operator is paid Rs. 15 per hour. Machine hour rate is Rs. 72 per hour.

The setting up of the machine to produce the component takes 3 hours for the operator. You are required to prepare cost sheets showing the setting up costs and the production costs both in total (i.e. for the batch) and per component, assuming a batch size of:

- (a) 100 components
 - (b) 150 components and
 - (c) 200 components
10. M/s Tom Dick obtained a contract to build quarters, the price being Rs. 1,00,000. Work was started on 1st April, 1997 and the following expenses were incurred.

Plant Rs. 5,000; Stores Rs. 18,000; Wages Rs. 16,250; Sundry Expenses; Rs. 1,325; Establishment Charges Rs. 2,925.

A part of the material was unsuitable and was sold for Rs. 3,625 (cost being Rs. 3,000). A portion of plant was scrapped and disposed of for Rs. 575.

The value of plant on 31st March, 1998 was Rs. 1,550 and of stores Rs. 850. Cash received on account was Rs. 35,000 representing 80% of the work certified. The work uncertified was valued at Rs. 5,475 and this was certified later for Rs. 6,250.

M/s Tom Dick decided to estimate what further expenditure would be incurred in completing the contract, compute from the estimate and the expenditure already incurred, the total profit that would be made on the contract and to take to credit of Profit & Loss A/c for the year 1997-98, that portion of the total which corresponded to the work certified on 31-3-1998.

This estimate reveals that contract would be completed after 9 months, till then wages likely to be incurred Rs. 17,875. The cost of stores etc. required in addition to those in stocks on 31.3.1998 would be Rs. 17,150 and that further contract expenses would amount to Rs. 1,500. A further investment of Rs. 6,250 would be required on Plant which would be valued on 3-12-1998 at Rs. 750. The establishment charges would be same on monthly bases, as in preceding year. Lastly 2 % of the total cost of contract should be kept as reserve for contingencies.

Prepare Contract, Stores and Plant Accounts for the year ended 31-3-1998, and also show your calculation of the amount, credited to Profit & Loss A/c for the year.

11. Deluxe Ltd. undertake a contract for Rs. 5,00,000 on 1st July, 1996. On 30th June, 1997 when the accounts are closed, the following details about the contract were gathered :

Materials Purchased Rs. 1,00,000; Wages paid Rs. 45,000; General expenses Rs. 10,000; Plant purchased Rs. 50,000; Materials on hand 30-6-1997 Rs. 25,000; Wages Accrued 30-6-1997 Rs. 5,000; Work certified Rs. 2,00,000; Cash received Rs. 1,50,000; Work uncertified Rs. 15,000; Depreciation of Plant Rs. 5,000.

The above contract an escalation clause which reads as follows:

“In the even of prices of materials and rates of wages increase by more than 5% the contract price would be increase accordingly By 25% of the rise in the cost of material 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 the work certified does not take into account the effect of the above clause.

Prepare the contract amount.

LESSON : 8

PROCESS COSTING

Process Costing is a method of costing used to ascertain the cost of a product at each process or stage of manufacture. In this method, the costs of materials, wages and overheads are accumulated for each process separately, for a given period, and then carried forward cumulatively from one process to the next process till the last process is completed. Records are also maintained to account for process losses. These losses may be normal or abnormal. Separate accounting is done for normal and abnormal losses, opening and closing work-in-progress and inter-process profits, if any. This method of costing is used in those industries where mass production of identical units is undertaken on a continuous basis and finished products are subjected to a number of production stages called processes before completion.

The system of process costing is suitable for industries involving continuous production of the same product or products through the same process or set of processes. It is in use in plant producing paper, rubber products, medicines, chemical products. It is also very much common in flour mill, bottling companies, canning plants, breweries etc.

Features of process Costing

Process costing is that aspect of operation costing which is used to ascertain the cost of the product at each process or stage of manufacture, where processes are carried on having one or more of the following features:

- (i) Production is done having a continuous flow of identical products except where plant and machinery is shut down for repairs, etc.
- (ii) Clearly defined process cost centres and the accumulation of all costs (materials, labour and overheads) by the cost centres.
- (iii) The maintenance of accurate records of units and part units produced and cost incurred by each process.

- (iv) The finished product of one process becomes the raw materials of the next process or operation and so on until the final product is obtained.
- (v) Avoidable and unavoidable losses usually arise at different stages of manufacture for various reasons. Treatment of normal and abnormal losses or gains is to be studied in this method of costing.
- (vi) Sometimes goods are transferred from one process to another process not at cost price but at transfer price just to compare this with the market price and to have a check on the inefficiency and losses occurring in a particular process. Elimination of profit element from stock is to be learnt in this method of costing.
- (vii) In order to obtain accurate average costs, it is necessary to measure the production at various stages of manufacture as all the input units may not be converted into finished goods; some may be in progress. Calculation of effective units is to be learnt in this method of costing.
- (viii) Different products with or without by-products are simultaneously produced at one or more stages or processes of manufacture. The valuation of by-products and apportionment of joint cost before point of separation is an important aspect of this method of costing. In certain industries, by-products may require further processing before they can be sold. A main product of one firm may be a by product of another firm and in certain circumstances, it may be available in the market at prices which are lower than the cost to the first mentioned firm. It is essential, therefore, that this cost be known so that advantages can be taken of these market conditions.
- (ix) Output is uniform and all units are exactly identical during one or more processes.. So the cost per unit of production can be ascertained only by averaging the expenditure incurred during a particular period.

TYPES OF PROCESSING

As stated above, process costing is used in case of industries, which

involve processing of a product through different stages. The various types of processing are as follows :

(i) Continuous sequential processing : In case of this processing a product has to pass through different cost centres or stages of manufacturing continuously and in succession one after the other during a period. The processing being continuous and identical, the costing units for each centre or stage are identical during any period. Examples of this type of processing are cement-making, paper-making, refining of crude petroleum, etc.

(ii) Discontinuous Processing: In case of this processing, a process is independently operated for the individual product as such at frequent intervals. The costing unit in case of this processing, dependent upon the product may vary even for the same cost centre. Examples of this type of processing are dye manufacturing, fruit preservation, vegetable canning, yarn spinning, etc.

(iii) Parallel Processing : In case of this processing, the operations or stages through which the product has to pass run parallel and separately. All these parallel processes ultimately join with the end process. Examples of this type of processing are manufacturing different components which ultimately join in the assembly process to make a product, meat packing etc.

(iv) Selective Processing : In case of this processing, the combination of the processes or stages of operation depend upon the end-product to be commercialised. Examples of this type of processing are cooked meat, chloride compounds like bleaching power of zinc chloride or hydrochloric acid, etc.

Advantages of Process Costing

The advantages of process costing can be summarised as follows :

- 1 The cost of different processes as well as finished product can be computed conveniently at short intervals, say, daily or weekly.
2. Control cost and production can be advantageously effected as predetermined and actual data are available for each department or process.

3. It involves less clerical work because of the simplicity of cost records.
4. The average costs of homogeneous products can easily be computed
- 5 Expenses can be allocated to different processes on rational basis and accurate cost, thus, can be ascertained.
6. It enables the correct valuation of closing inventories.

Disadvantage of process costing

1. The cost ascertained at the end of the process is called historical cost which is of very small use for managerial control. Since it is based on historical costs, it has all the weaknesses of historical costing.
2. The system of costing conceals weakness and inefficiencies in processing.
3. It does not evaluate the efforts of individual workers or supervisors.
4. The valuation of Work-in-progress on the basis of degree of completion is merely a guess work.
5. If production is not homogeneous, as in the case of foundries making castings of different sizes and shapes, the average cost may give an incorrect picture of cost.

Costing Procedure

The factory or concern is divided into distinct processes or operations and a separate account is opened for each process (cost centre). The account is debited with the value of material, labour and overheads relating to the process. The value of by products and scrap, if any, is credited to the account and the balance of this account, representing the cost of partially worked out product, is passed on to the next process becomes the raw material of the next process. In some industries, depending upon the plant arrangement, the partially worked out product of a process may be transferred to a process stock account from which it may be issued to the next process as and when required. The finished out of the last process (i.e. finished product) is transferred to the Finished Goods Account.

All expenditure of materials, labour, direct expenses and overheads are charged to the process concerned. In brief :

(i) **Materials** : Materials required for each process are drawn from store against Materials Requisitions or Bill of Materials and debited to cost. When the materials are issued in bulk, the person-in-charge of the department has to keep the account of materials consumed. When the finished product of one process becomes the raw material of the next process, the account of the receiving process should be debited with the cost of transfer, in addition to the cost of additional materials, if any.

(ii) **Labour** : Wages paid to labourers and workmen who are engaged in particular processes are directly allocated 'to the process. If workers are engaged in a number of processes, the wages paid may be apportioned on the basis of time-booking.

(iii) **Direct Expense** : Direct expenses such as depreciation, insurance, electricity, repairs, etc. are directly allocated to the respective accounts.

(iv) **Overheads** : Rent, telephone, lighting, gas, water, etc. which are some common expenses of one or more processes, may be apportioned to the various processes on suitable basis. Generally, these overheads are recovered at predetermined rates or based on direct wages or prime cost.

From the cost accounting point of view, there could be processes which may or may not have process losses. Similarly, in respect of each process, there may or may not be work-in-progress at the beginning or at the end.

Illustration 1:

A company produces two products - P and R. They undergo two processes, namely Factory and Finishing. Raw materials used in the factory and general expenses incurred are apportioned in the ratio of output of each class. The output for the year ended 1999 was : P-6,000 and R-2,000. Other charges for each process are apportioned in the ratio of finishing wages.

From the following particulars, prepare a statement of costs per unit

of each product in each process showing the cost of production and profit per unit. The selling prices are - P Rs. 100 and R Rs. 120.

	Factory (Rs.)	Finishing (Rs.)
Opening stock of raw materials	92,000	18,000
Purchases of raw materials	2,67,750	84,250
Closing stock of raw materials	1,23,750	19,750
Wages : P	1,06,500	37,500
R	32,500	25,000
Expenses	93,125	41,250

General expenses amounted to Rs. 48,000 in all.

Solution :

Statement of Costs

Particulars	Total Rs.	P (6,000 units)		R (2,000 units)	
		Total Rs.	Per unit Rs.	Total Rs.	Per unit Rs.
Factory Process					
Raw materials consumed (3:1)	2,36,000	1,77,000	29.50	59,000	29.50
Wages (Actual)	1,44,000	1,06,500	17.75	37,500	18.75
Factory expenses (3:2)	93,125	55,875	9.31	37,250	18.62
Cost of factory process	4,73,125	3,39,375	56.56	1,33,750	66.87
Finishing Process					
Raw materials consumed (3:2)	82,500	49,500	8.25	33,000	16.50
Wages (Actual)	62,500	37,500	6.25	25,000	12.50
Finishing expenses (3:2)	41,250	24,750	4.12	16,500	8.25
Cost of finishing process	6,59,375	4,51,125	75.18	2,08,250	104.12

General expenses (3:1)	48,000	36,000	6.00	12,000	6.00
Total cost	7,07,375	4,87,125	81.18	2,20,250	110.12
Profit	1,32,680	1,12,920	18.82	19,760	9.88
Selling price	8,40,055	6,00,045	100.00	2,40,010	120.00

PROCESS LOSSES AND WASTAGES

When materials are processed, they lose or gain in volume or weight as a result of the process. It is common that process loss or scrap or wastage occur in process industries. These process losses may be of two types, viz. controllable and uncontrollable.

(a) Normal or uncontrollable loss : Because of the nature of the raw materials, some loss is inherent and is unavoidable. This is known as normal waste or normal loss. And this type of loss is expected in normal condition for example, stamping process, evaporation, etc. The percentage of such losses is anticipated from past experience by the management. Loss of this type should be absorbed by good units produced, i.e. the cost of units lost is charged to the good units output. Any value realisable on the normal loss will be credited to the process account.

Illustration 2 : (Normal loss without scrap value)

The cost of production of 40 units consisting of materials Rs. 1,500; Labour Rs. 1,300 and Overhead Rs. 164. The normal waste is 5% of input. Show the Process Account.

Solution :

Process Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Materials	40	1,500	By Normal Loss	2	-
Labour	-	1,300	By Final Product	38	2,964
To Overheads	-	164	@ Rs. 78		
	40	2,964		40	2,964

Note : The normal wastage reduces the quantity of output. But the cost of normal loss, regarded as part of the cost of production process, in which it occurs. The amount of loss is borne in the production cost or good units. The cost per unit of output goes up to that extent. The quantity of normal wastage is recorded in the Quantity Column and Nil figure is shown in the amount column.

$$\text{Per Rate} = \frac{\text{Rs. } 2,964}{(40-2)} = \text{Rs. } 78$$

$$(\text{or}) \text{Rs. } 78 \times 38 = \text{Rs. } 2,964$$

Illustration 3 : (Normal loss without scrap value)

The following expenditure is incurred for producing articles, called Nikhil Motors :

Materials (200 Units) Rs. 4,000

Labour Rs. 3,000

Indirect Expenses Rs. 2,000

Normal wastage is 5% of the input. One unit of wastage is sold at Rs. 16.50 each. Prepare Process Account.

Solution :

Process Account

Particulars	Units	Amount	Particulars	Units	Amount
		Rs.			Rs.
To Materials	200	4,000	By Normal		
To Labour		3,000	Wastage	10	165
To Indirect Expenses		2,000	By Next Process	190	8,835
			@ Rs. 46.50		
	200	9,000		200	9,000

Note : The quantity of Normal wastage is shown in the unit column and the amount, i.e. $\text{Rs. } 16.50 \times 10 \text{ units} = \text{Rs. } 165$ is shown in the amount column. When the normal wastage has scrap value, good unit rate is calculated as follows:

$$\text{Rs. } 9,000 - \text{Rs. } 165 = \text{Rs. } 8,835 \gg 190 = 46.50$$

Note that if the normal wastage is not sold for any price, then, the unit rate is calculated as follows :

$$\text{Rs. } 9,000 \gg 190 = \text{Rs. } 47.37$$

(b) Abnormal Loss or Controllable Loss : In certain cases, it can be seen that the loss exceeds the predetermined normal loss. Any loss exceeding the normal is called abnormal loss. Abnormal loss should not affect the normal cost of production. It is caused by accidents, sub-standard materials, carelessness etc. Therefore, abnormal loss is valued just like good units and transferred to a separate account called Abnormal Loss Account.

Value of Abnormal loss

$$= \frac{\text{Normal cost of normal production}}{\text{Normal output}} \times \text{Units of abnormal loss}$$

The loss on account of abnormal loss or wastage is not borne by production, but by Profit and Loss Account. Abnormal Wastage Account is

debited and Process Account is credited with the cost of abnormal wastage. If the wastage is sold in the market, Abnormal Wastage Account is credited with the realised price and the balance is transferred to Profit and Loss Account.

Illustration. 4: (Normal loss and abnormal loss with no scrap value).

Prepare Process Account from the following

Materials issued 1,000 kg. @ Rs. 125

Wages Rs. 28,000

Overheads Rs. 8,000

Normal loss 5% of input.

Output 900 kgs.

Solution :

Process Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Materials	1,000	1,25,000	By Normal Loss	50	-
To Wages	-	28,000	By Abnormal Wastage	50	8,474
To Overheads	-	8,000	By Next Process @ Rs. 169.47	900	1,52,526
	1,000	Rs. 1,61,000	1,000		1,61,000

Note : Normal output = 1,000 kgs. 50 kgs = 950 kgs.

Normal cost of Normal output = Rs. 1,61,000

Cost per unit of normal output = Rs. 1,61,000 >> 950 = 169.47

Abnormal Wastage amount = Rs. 169.47 × 50 = Rs. 8,473.50 or Rs. 8,474

Amount of good units = Rs. 169.47 × 900 = Rs. 1,52,526

$$\text{or } \frac{1,61,000}{950} \times 900 = 1,52,526$$

Illustration 5 : (Normal loss and abnormal loss with scrap value)

In Process A, 100 units of raw materials were introduced at a cost of Rs. 1,000. The other expenditure incurred by the process is Rs. 600. Of the units introduced, 10% are normally scrapped in the course of manufacture and they possess a scrap value of Rs. 7 per unit. The output of Process A was only 75 units. Calculate the value of abnormal loss.

Solution :

Process Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount
To Materials	100	1,000	By Normal Loss	10	70
To Other Expenses		600	By Abnormal Loss	15	255
		-	By Process B A/C @ Rs. 17	75	1,275
	100	1,600		100	1,600

$$\text{Value of abnormal wastage} = \frac{\text{Normal cost of normal output}}{\text{Normal output}} \times \text{Abnormal Loss}$$

$$\text{Normal Cost} = \text{Rs. } 1,600 - \text{Rs. } 70 = \text{Rs. } 1,530$$

$$\text{Amount of abnormal Units} = \frac{\text{Rs. } 1,530}{90} \times 15 = \text{Rs. } 225$$

$$\text{Amount of good units} = \frac{\text{Rs. } 1,530}{90} \times 75 = \text{Rs. } 1,275$$

The unit rate of abnormal loss and the unit rate of good units are the same, i.e. Rs. 17

Note: Abnormal losses are valued as good units. The unit cost which is used

to value good units is also applied for valuation of abnormal loss units. The cost of abnormal loss units computed in this manner is transferred to a separate Account, called, Abnormal Loss Account and credited to the relevant Process Account.

(c) Abnormal Gain or Effectiveness

Some times, the actual loss in a process may be smaller than what so expected on the basis of experience. This represents an exceptional or abnormal gain over what is normally anticipated. The value of abnormal gain is calculated in the same manner as that of abnormal loss and is credited to Abnormal Gain Account. The amount of scrap which would otherwise have been realised, had there been normal and no abnormal gain, is debited to the Abnormal Gain Account and the balance is credited to Costing Profit and Loss Account.

Value of abnormal gain is calculated with the following formula:

$$= \frac{\text{Cost of Normal Output}}{\text{Normal Output}} \times \text{Abnormal Gain (units)}$$

$$= \frac{\text{Total Process Cost - Reliable Value of Normal Wastage}}{\text{Input (units) - Normal Wastage (units)}} \times \text{Abnormal Gain (units)}$$

Illustration 6 :

In process A, 1000 units of raw materials were introduced at a cost of Rs. 15,000. Direct wages amounted to Rs. 7,500 and manufacturing overheads to Rs. 5,000. 10% of the units introduced are normally lost in the course of manufacture and these are sold @ Rs. 5 per unit. The actual output of the process was 940 units.

Prepare Process A Account and Abnormal Gain Account.

Solution:

Process Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Materials	100	15,000	By Normal loss (10%)	100	500
To Direct wages		7,500	By Finished Stock A/c	940	28,200
					(242)

To Manufacturing overheads	5,000				
To Abnormal Gain A/c	40	1,200			
	1,040	28,700		1,040	28,700

Note: Calculation of Value of Abnormal Gain

$$\text{Normal Output} = \text{Units Introduced} - \text{Normal Loss}$$

$$= 100 - 100$$

$$= 900 \text{ units}$$

$$\text{Abnormal Gain} = 940 - 900$$

$$= 40 \text{ units}$$

$$\begin{aligned} \text{Value of Abnormal Gam} &= \frac{\text{Total Cost} - \text{Scrap Realised}}{\text{Normal Output}} \times \text{Units of Abnormal Gain} \\ &= \frac{27,500 - 500}{900} \times 40 \\ &= \text{Rs. } 1,200 \end{aligned}$$

Abnormal Gain A/c

To Normal Loss (Loss of income from scrap)	40	200	By Process A A/c	40	1,200
To Cost Profit & Loss A/c		1,000			
	40	1,200		40	1,200

(d) **Defective :** Finished products that are not up to the aimed standard, are known as defectives. Spoilage cannot be repaired, but defectives can be repaired by additional labour and materials into effective units. It defectives are sold

as seconds the amount received is credited to the concerned process account. If the defective are reprocessed into good units, the extra amount of materials and labour will be treated as factory overheads. If the defectives cannot be identified, the normal cost is charged to factory overheads and abnormal cost will be transferred costing profit and loss account.

Illustration 7 :

The following particulars for the last process are given.

	Units	Rs.
Transfer to the last process at cost of the previous process	4,000	9,000
Transfer to finished stock from the process	3,240	
Direct wages		2,000
Direct materials used		3,000

The factory overhead in process is absorbed @ 400% of the direct materials.

Allowance for normal loss is 20% of units worked.

The scrap value is Rs. 5 per unit.

You are required to prepare

- (a) Last Process Account (b) Normal Wastage Account and
- (c) Abnormal Effective Account

Solution:

Last Process Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Transfer from first process	4,000	9,000	By Normal loss	800	4,000
To Direct Materials		3,000	By Finished stock @ Rs. 6.875*	3,240	22,275
To Direct wages		2,000			
To Factory overhead		12,000			
To Abnormal electives	40	275			
	4,040	26,275		4,040	26,275

$$* \text{ Cost per unit} = \frac{22,000}{3,200} = \text{Rs. } 6.875$$

Normal Wastage Account

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Last Process A/c	800	4,000	By Sales (800-40)	760	3,800
			By Abnormal electives A/c	40	200
	800	4,000		800	4,000

Abnormal Effectives Account

Particulars	Unit	Amount Rs.	Particulars	Units	Amount Rs.
To Normal wastage A/c (Loss of income)	40	200	By Last Process A/c	40	275
To Profit and Loss A/c		75			
		40	275	40	275

Inter Process Profits

Sometimes the output of one process is transferred to a subsequent

process, not at cost, but at a price, showing a profit to the transferer process. Transfer price may be made at a price corresponding to current wholesale market price or at cost plus an agreed percentage. The objects are :

- (i) to whom whether the cost of production competes with the market prices; and
- (ii) to make each process stand on its own efficiency and economies effected, i.e. the transferee process are not given the benefits of economies effected in the earlier process.

This system involves a rather unnecessary complication of the accounts, as the desired comparison could be prepared on separate cost reports for each process or by adopting a standard costing system when standards could be set for each process. The complexity brought into the accounts arises from the fact that the inter-process profits so introduced remain included in the price of process stocks, finished stocks and work-in-progress. For the balance sheet purpose, inter-process profits cannot be included in stock, as a firm cannot make a profit by trading itself. To avoid these complications a provision must be created to reduce the stock to actual cost price. This problem arises only in respect of stocks on hand at the end of the period, because goods sold will have realised the internal profits.

In order to compute the profit element in closing inventories and to obtain the net realised profit for a period, three columns have been shown on each side of process accounts and closing stock have been deducted from the debit side of the process accounts instead of showing it on the credit side. Cost of closing stock can be easily obtained if we compare the accumulated cost and total in any process. The cost of stock can be obtained by the following formula:

$$= \frac{\text{Cost}}{\text{Total}} \times \text{Closing Stock}$$

The profit on closing stock can then be easily obtained by deducting the cost of stock thus arrived at from the value of stock.

Sometimes opening stock and production overheads are given. We should add the opening stock at the beginning along with transfer cost, materials and wages. From the total of these, closing stock should be deducted to calculate prime cost. Then production overheads are added this becomes the total cost of the process to which is added the desired percentage of profit.

Illustration 8 :

A product passes through three processes before it is completed. The output of each process is charged to the next process at a price calculated to give a profit of 20% on transfer price. The output of process III is charged to Finished Stock Account on a similar basis. There was no work-in-progress at the beginning of the year and overheads have been ignored. Stock in each process has been valued at the prime cost of the process. The following data is obtained on 31st December 1999 :

Item	Process I Rs.	Process II Rs.	Process III Rs.	Finished Stock Rs.
Direct Materials	3,000	2,000	4,000	—
Direct Wages	2,000	3,000	1,000	—
Stock on				
31st December	1,000	2,000	3,000	3,000
Sales during the year	—	—	—	17,000

You are required to :

- (a) prepare process cost accounts showing the profit element at each stage;
- (b) show actual profit realised; and

(c) show stock valuation as it would appear in the Balance Sheet.

Solution :

Process I A/c

	Total	Cost	Profit		Total	Cost	Profit
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.
To Materials	3,000	3,000	—	By Process II A/c	5,000	4,000	1,000
To Wages	2,000	2,000	—				
Total	5,000	5,000	—				
Less Closing Stock	1,000	1,000	—				
Prime cost	4,000	4,000	—				
To Gross Profit (25% on cost)	1,000	—	1,000				
	5,000	4,000	1,000		5,000	4,000	1,000
To Opening Stock b/d	1,000	1,000					

Process II A/c

	Total	Cost	Profit		Total	Cost	Profit
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.
To Process II A/c	5,000	4,000	1,000	By Process III A/c	10,000	7,200	2,800
To Materials	2,000	2,000	—				
To Wages	3,000	3,000	—				
Total	10,000	9,000	1,000				

<i>Less</i> Closing Stock	2,000	1,800	200			
Prime Cost	8,000	7,200	800			
<i>Add</i> Gross Profit (25% on cost)	2,000	—	2,000			
	10,000	7,200	2,800		10,000	7,200
To Opening Stock bid	2,000	1,800	200			

Process III A/c

	Total	Cost	Profit		Total	Cost	Profit
	Rs.	Rs.	Rs.		Rs.	Rs.	Rs.
To Process II A/c	10,000	7,200	2,800	By Finished Stock A/c	15,000	9,760	5,240
To Materials	4,000	4,000	—				
To Wages	1,000	1,000	—				
Total	15,000	12,200	2,800				
<i>Less</i> Closing Stock	3,000	2,440	560				
Prime Cost	12,000	9,760	2,240				
<i>Add</i> Gross Profit (25% on cost)	3,000	—	3,000				
	15,000	9,760	5,240		15,000	9,760	5,240
To Opening Stock b/d	3,000	2,440	560				

Finished Stock A/c

	Total Rs.	Cost Rs.	Profit Rs.		Total Rs.	Cost Rs.	Profit Rs.			
To Process III A/c (transfer)	15,000	9,760	5,240	By Sales	17,000	7,808	9,192			
Less Closing Stock	3,000	1,952	1,048							
	12,000	7,808	4,192							
To Gross Profit	5,000	—	5,000							
	17,000	7,808	9,192					17,000	7,808	9,192
To Opening Stock b/d	3,000	1,952	1,048							

Notes :

(a) Calculation of unrealised profit on closing stock

For this purpose, the cost of closing stock is calculated by taking the figures in the cost and total columns for each process before deducting the closing stock by applying the following formula :

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

Cost of closing stock Unrealised profit

Process I	—		Rs. 100 (given)	Nil
Process II	$\frac{9,000}{10,000} \times 2000$	= Rs. 1,800		Rs. 2000-1800 = Rs. 200
Process III	$\frac{12,200}{15,000} \times 3000$	= Rs. 2,440		Rs. 3000-2400 = Rs. 560
Finished Stock	$\frac{9,760}{15,000} \times 3000$	= Rs. 1,952		Rs. 3000-1952 = Rs. 1048

(b) Actual Profit Realised

	Apparent profit from process (Rs.)	Unrealised profit from closing stock (Rs.)	Actual profit realised (Rs.)
Process I	1,000	-	1,000
Process II	2,000	200	1,800
Process III	3,000	1,048	3,592
Finished Stock	5,000	1,048	3,952
	11,000	1,808	9,192

(c) Stock Valuation for Balance Sheet Purposes

	Cost of closing stock (Rs.)
Process I	1,000
Process II	1,800
Process III	2,440
Finished Stock	1,952
Total	7,192

Work-in-Progress

The problem of ascertaining work-in-progress in process industries is very important and generally difficult. In most firms, production is on a continuous basis and so the problem of work-in-progress is quite common. This problem can be solved by calculating equivalent production (units) or equivalent completed (effective) units.

Equivalent Production : Equivalent production means converting the incomplete production into its equivalent completed units. In each process, an estimate is made of the percentage completion work-in-progress with regard to different elements of cost, viz., material, labour and overhead. It is most

important that the estimate of percentage completion is as accurate as possible.

The formula for computing equivalent completed units is :

$$\text{Equivalent completed units} = \frac{\text{Actual number of units in process of manufacture}}{\text{process of manufacture}} \times \frac{\text{Percentage of work completed}}{\text{work completed}}$$

The steps involved in the computation of equivalent production are outlined below :

(i) Express the opening inventory of work- in-progress in equivalent completed units: This may be done by multiplying the units of opening work-in-progress by the percentage of work required to be done to complete the unfinished work of the previous period.

(ii) Add to (i) above, the number of units completed out of the units introduced during the period.

(iii) Then add (ii) above, the equivalent completed units of closing work in-progress. This can be done by multiplying the units of closing work in progress by the percentage of work done on the unfinished units at the end of the period.

The equivalent units may be required to be computed in respect of each element of cost, viz., material, labour and production overhead.

The cost of units completed from the unfinished units of the previous period (opening work-in-progress) plus the units completed of the current period's input, and the units still remaining uncompleted (closing work-in-progress) should be shown separately.

Illustration 9 :

Opening stock of work- in-progress 4,000 units 40% complete.

Units put into process : Units completed: 30,000

Units put into process : 32,000

Closing stock of work- in-progress 2,000 units, 60% complete.

Calculate equivalent production.

Solution :

	Rs.
Opening stock-work required to be completed	
(4,000 × 60%)	2,400
<i>Add:</i> Units introduced and completed during the period	
(30,000 – 2,000)	28,000
<i>Add:</i> Closing stock (work done i.e. 60%)	
(2,000 × 60%)	1,200
Completed equivalent production	31,600

Alternatively

	Rs.
Units completed during the year	32,000
<i>Add:</i> Closing stock (work done i.e. 60%)	
(2,000 × 60%)	1,200
	33,200
<i>Less:</i> Opening work-in-progress	
(Percentage of work done in the previous period)	
4,000 × 40%	1,600
Complete equivalent Production	31,600

Alternatively

Opening stock of work inclement 4,000 × 60%	2,400
<i>Add:</i> Put into production	30,000
<i>Less:</i> Closing work-in-progress incomplete (2,000 × 40%)	800
Complete equivalent production	31,600

In order to understand the equivalent production clearly, illustrations on equivalent production may be divided into two groups.

- I When there is only closing work-in-progress
- II When there is opening as well closing work-in-progress.

Again, these may be further divided into two groups, i.e. (a) When there are no process losses, and (b) when there are process losses and gains.

I. When There Is only closing work-In-progress

(a) Without Process Losses

Under this case, the existence of process losses is ignored. Closing work-in-progress is converted into equivalent units on the basis of estimates as regards degree or completion of materials, labour and production overhead. After calculating the equivalent units, it is not difficult to evaluate closing work-in-progress.

Illustration 10 : Input 3,800 units; closing work-In-progress 800 units and degree of completion of Material 80%, Labour and Overhead 70%. The Process Costs are : Material Rs. 7280, Labour and Overhead Rs. 17,800.

Find out Equivalent Production, Cost per unit of Equivalent Production and prepare the Process A Account assuming that there is no opening work-in-progress and process loss.

Solution:

Statement of Equivalent Production and Cost

Input		Output	Equivalent Production Units				
Item	Units	Items	Materials			Labour and Overhead	
			Units	Units	%	Units	%
Units Introduced	3,800	Units completed & transferred	3,000	3,000	100	3,000	100

	3,800	Work-in-Progress	800	640	80	560	70
			3,800	3,640		3,560	
Current Cost				7,280		17,800	Total
Cost per Equivalent Unit				Rs.2		Rs.5	Rs.7

Statement of Evaluation

Finished Goods		$3,000 \times 7 =$		Rs. 21,000
Work-in-Progress				
Materials		$340 \times 2 =$	1,280	
Labour and Overhead		$560 \times 5 =$	2,800	Rs. 4,080

Process A Account.

Particulars	Units	Amount Rs.	Particulars	Units	Amount Rs.
To Materials	3,800	7,280	By finished Stock A/c	3,000	21,000
To Labour & Overhead		17,800	By Work-in-Progress	800	4,080
	3,800	25,080		3,800	25,080

(b) With Process Losses : Generally, losses are inherent in process operations. Normal process losses are ignored in ascertaining equivalent production. But abnormal losses or gains should be treated as good units having due regard to the degree of completion. If units scrapped have any realisable value, that amount should be deducted from the cost of materials in the -cost statement before dividing it by equivalent production units. As regards abnormal loss, if the degree of completion is separately given, it has to be duly considered while preparing the Equivalent Production Statement. Otherwise, it may be assumed that the rejection (in respect of units of abnormal loss) has taken place at the stage of final inspection and abnormal loss units may, therefore, be taken to be 100% complete in all respects. But in case of abnormal gain,

the degree of completion should always be taken at 100% as gain is represented by good production units.

Illustration 11 :

During the month of January, 4,000 units were introduced into process A. The costs were :

	Rs.
Materials Direct	30,000
Wages	20,700
Factory Overheads	5% of Direct Wages.

The normal loss was estimated at 10% on input. At the end of the month, 3200 units had been produced and transferred to process B. 500 units had been scrapped. The scrapped units had been completely processed and realised Rs. 5 per unit. 300 units were incomplete and the stage of completion in respect of these units was estimated to be - materials 75% labour and overheads 50% Find out (a) Equivalent production, (b) Cost per unit, (c) Value of output to be transferred. Also show the necessary accounts.

Solution

Statement of Equivalent Production

Input	Output	Units	Equivalent Production			
			Material		Labour & Overheads	
			% age completion	Units	%age completion	Units
4,000	Normal (10% of 4,000)	400	—	—	—	
	Abnormal loss (500-400)	100	100	100	100	100

	Finished production	3,200	100	3,200	100	3,200
	Work-in-progress	300	75	225	50	150
4,000	Total	4,000		3,525		3,450

Statement of Cost

Elements of Cost	Cost	Equivalent Production (Units)	Cost per Unit
Materials	30,200		
Less Scrap value of normal loss (5 x 400)	<u>2,000</u>		
	28,200	3,525	8
Direct wages	20,700	3,450	6
Factory overheads (50% of direct wages)	10,350	3,450	3
Total	59,250		17

Statement of Evaluation

Finished Production

Materials	3,200 units @ Rs. 8 per unit	= 25,600
Labour	3,200 unit @ Rs. 6 per unit	= 19,200
Overheads	3,,200 units @ Rs. 3 per unit	= 9,600
		Rs. 54,400

Work-in-progress

Materials	225 units @ Rs. 8 per unit	= 1,800
Labour	150 units @ Rs. 6 per unit	= 900
Overheads	150 units @ Rs. 3 per unit	= 450
		<u>Rs. 3,150</u>

Abnormal Loss

Materials	100 units @ Rs. 8 per unit	= 800
Labour	100 units @ Rs. 6 per unit	= 600
Overheads	100 units @ Rs. 3 per unit	= 300
		<u>Rs. 1,700</u>

Process A A/c

Particulars	Units	Amt. (Rs.)	Particulars	Units	Amt. (Rs.)
To Materials	4,000	30,200	By Normal loss (10% of 4,000)	400	2,000
To Direct wages		20,700	By Abnormal loss @ Rs. 17	100	1,700
To Factory overheads (50% of direct wage)		10,350	By Process B A/c @ Rs. 17	3,200	54,400
			By Balance c/d	300	3,150
	4,000	61,250		4,000	61,250

Process B A/c

Particulars	Units	Amt. (Rs.)	Particulars	Units	Amt. (Rs.)
To Process A A/c	100	1,700	By Cash (Sale of scrap @ Rs. 5)	100	500
			By Costing Profit & Loss A/C		
	100	1,700		100	1,700

II When There are Opening As Well as Closing Work-in-Process

Often in a continuous process there will be opening as well as closing work-in-progress which are to be converted into equivalent of completed units before apportionment of process costs. The procedure of conversion of opening work-in-progress will vary depending upon whether average cost method or first in first out method of apportionment of costs is followed. Problem of closing work-in-progress have already been discussed in the previous pages. The

following pages will discuss both methods for valuation of work- in-progress one by one :

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

(b) FIFO Method : Under this method one assumes that the raw materials issued to work-in-progress pass through the finished goods in a progressive cycle, i.e. what comes first, goes out first. This method is satisfactory when prices of raw materials and rates of direct labour and overheads are relatively stable. Work-in-progress at the end of the period becomes the opening work-in-progress for the next period, the closing work-in-progress will be valued at costs ruling during the new period, while the opening work-in-progress will be valued at costs ruling during the old period. Thus, where costs are more or less the same in each period, this system is adequate. In this method opening incomplete work-in-progress units are to be converted to equivalent production after taking into consideration the percentage of work yet to be done and shown separately in the statement of equivalent production.

Illustration 12 :

The in-a process inventory in process 4 at the beginning of a period was valued at Rs. 2,950 made up of Rs. 1,400 towards materials, Rs. 1,000 towards labour and Rs. 550 towards overheads for 100 units. The value added during the period was Rs. 53,600 towards an introduction of 4,100 units from the previous process besides Rs. 40,800 towards labour and Rs. 19,400 towards overheads. Out of 3,600 units completed 3,300 units were transferred to the next process leaving the balance in stock. 400 units were held back in process with half completion towards labour and overheads while 200 units were lost in processing considered normal and hence should be borne by the entire inventory. Prepare a cost of production statement using average cost basis.

Solution :

Statement of Equivalent Production And Cost

Input	Output			Materials		Labour		Overhead	
				%	Units	%	Units	%	Units
Opening Stock	100	Normal Loss	200	—	—	—	—	—	—
Added during the period		Units Completed	3,600	100	3,600	100	3,600	100	3,600
	4,100	Closing WIP	400	10	400	50	200	50	200
	4,200		4,200		4,000		3,800		3,800
Current Cost				1,400		1,000		550	
				<u>53,600</u>		<u>40,800</u>		<u>19,400</u>	
				55,600		41,800		19,950	
Total Rs. 30				Rs. 13.75		Rs.11		Rs. 5.25	

Evaluation Statement

Completed units	$3,600 \times \text{Rs. } .30 =$	Rs. 1,08,000
Closing WIP	Material $400 \times \text{Rs. } 13.75 = 5,500$	
	Labour $200 \times \text{Rs. } 11 = 2,200$	
	Overhead $200 \times \text{Rs. } 5.25 = \underline{1,050}$	8,750

Process II Account

Particulars	Units	Rs.	Particulars	Units	Rs
To Opening Inventory	100	2,950	By Normal Loss	200	-
To Input Materials	4,100	53 600	By Completed & transfer to process		
To Labour		40,00	III	3,300	99,000
To Overhead		19,400	By Finished Stock	300	9,000
			By Closing WIP	400	8,750
	4,200	1,16,750		4,200	1,16,750

Illustration 13:

B. Ltd. produced three chemicals during the month of October 1999 by three consecutive processes. In each process, 2% of the total weight put in is lost and 10% of it is left as scrap which from Processes I and II realises Rs. 10 a ton and from Process III Rs. 20 per ton. The products of the three processes undertaken are as follows:

		Process I		Process II		Process III	
Passed on to the Next Process		75%		50%		-	
Transferred to Warehouse		25%		50%		100%	
Expenses Incurred	Qty.	Rs.	Qty.	Rs.	Qty.	Rs.	
Raw Materials	1000 tons	12,000	140 tons	2,800	1,348 tons	10,784	
Manufacturing Wages		2,050		1,852		1,500	
General Expenses		1,030		724		310	

Prepare Process Cost Account showing the cost per ton of each product.

Solution :

Process I A/c

Particulars	Tons	Amt. (Rs.)	Particulars	Tons	Amt (Rs.)
To Raw Materials	1,000	12,000	By Loss of Weight (2% of 1,000 tons)	20	-
To Manufacturing Wages		2,050	By Scrap (10% of 1,000 tons)	100	1,000
To General Exp.		1,030	By Transfer to Warehouse	220	3,520
			By Transfer to Process II A/c	660	10,560
			Cost per ton = $\frac{10,560}{660}$ = Rs. 16		
	1,000	15,080		1,000	15,080

Process II A/c

Particulars	Tons	Amt. (Rs.)	Particulars	Tons	Amt (Rs.)
To Process I A/c	660	10,560	By Loss of Weight (2% of 800 tons)	16	-
To Raw materials	140	2,800	By Scrap (10% of 800 tons)	80	800
To Manufacturing Wag		1,852	By Transfer to Warehouse	352	7,568
To General Expenses		724	By Process III A/c	352	7,568
			Cost per ton = $\frac{Rs. 7,568}{352}$ = Rs. 21.50		
	800	15,936		800	15,936

Process III A/c

Particulars	Tons	Amt. (Rs.)	Particulars	Tons	Amt. (Rs.)
To Process II A/c	352	7,568	By Loss of Weight		
To Raw Materials	1,348	10,784	(2% of 1,700 tons)	34	-
To Manufacturing wages		2,500	By Scrap	170	3,400
To General Expenses		500	By Transfer to		
			Warehouse	1,496	17,952
			Cost per ton = $\frac{\text{Rs. } 17952}{1,496}$		
			= Rs. 12		
	1,700	21,352		1,700	21,352

JOINT PRODUCTS

Joint products are products which by the very nature of the production process cannot be produced separately, and which have more or less equal economic importance. They represent “two or more products separated in the course of the same processing operation, usually requiring further processing, each product being in such proportion that no single product can be designated as the major product (Cost Accountants’ Hand book, edited by T. Lang). For example, gasoline, diesel, kerosene, lubricating oil, coal tar, paraffin and asphalt are the joint products obtained from crude oil in a refinery. Different grades of lumber resulting from a lumbering operation are another example.

Sometimes a distinction is made between joint product and co-products. Coproducts do not always arise from the same operation or raw materials and the quantity of co-products is within the control of the manufacturer. For example, in the automobile manufacturing industry, a number of co-products such as cars, jeeps and trucks of various types may be produced in different quantities according to the need of the concern while in the oil industry, the

quantity of various joint products remains almost the same and cannot be changed without changing the quantity of the rest of the items.

By-Products

By-products refer to secondary or subsidiary products having some saleable or usable value produced incidentally in the course of manufacturing the main product. According to ICMA terminology, a by-product is “a product which is recovered incidentally from the material used in the manufacture of recognized main products, such a by-product having either a net realisable value or a usable value which is relatively low in comparison with the saleable value of the main products. By-products may be further processed to increase their realisable value”. For example, in sugar industries, sugar is the main product, and fibres from sugarcane for lining materials, molasses for the manufacture of alcohol are by products. Similarly in coke ovens, gas and tar produced along with the main product ‘coke’ are by-products.

Distinction between Joint Products and By-products

The classification of various products from the same process into joint products and by-products depends upon the relative importance of the products and their value. If the various end products are almost equal in importance and their value is also more or less the same, they may be identified as joint products. But, if one end-product has greater importance and higher value and the other products are of less importance and rather of low value, the latter may be classified as by-products. It may be noted that the value of some end-products may be so insignificant that they may be classified as waste or scrap. Further joint products are produced simultaneously but by-products are produced incidentally in addition to the main product.

However, cases are not uncommon where the main products of one industry become the by-products of another. In such a case; the following factors may be taken into consideration in making distinction between joint products and by-products.

(i) Manufacturing Objective

If the objective of a concern is to produce say, product A, other products, say B and C, produced incidentally, will be treated as by-products because the plant objective is to produce only one product i.e. product A. On the other hand, if the objective of another concern is to produce products B and C and if product A emerges incidentally, then products B and C will be treated as joint products while Product A will be treated as a by-product. Again, if the objective of a third concern is to produce products. A, B and C simultaneously, then all the three products will be termed joint products.

(ii) Value

If the value of one product is. Considerably low as compared with that of another, which is simultaneously produced, then the former is liable to be classified as a by-product. On the other hand, if the value of a product, which is incidentally produced, is of considerable importance as compared with that of the main product it may be classified as a joint product.

Accounting for Joint Products

Generally the products are not identifiable as different individual products until a certain stage of production known as split off point. All costs incurred prior to the split off point are called joint product costs. Accounting for joint products implies the assignment of a portion of the joint cost to each of the joint products. Unless the joint product costs are properly and reasonably apportioned to different joint products produced, the cost of joint products will vary considerable and this will affect valuation of inventory, pricing of products and profit or loss on sale of different products. There fore, the basic problem in respect of joint products is that of apportioning the joint costs. The following methods of apportionment of total cost before separation point are available for application:

- (a) Average unit cost method.
- (b) Physical measurement method

- (c) Survey method or points value method.
- (d) Contribution or gross margin method.
- (e) Market value method :
 - (i) At point of separation
 - (ii) After further processing.
 - (iii) Net realizable value or reverse cost method.

(a) Average Unit Cost Method : This method is very simple and the total costs are assessed, yielding an average unit cost with one net profit for the total operation. This can be applied where processes are common and inseparable for the joint products and where the resultant products can be expressed in the same common unit. This means that all joint products have the same unit cost and therefore, if price fixing is based on cost of various products which may be of different grades or quality will be sold at the same unit price, resulting in a customer's price advantage in high grades. Moreover, where the end products cannot be expressed in some common unit, this method breaks down.

Illustration 14 :

Jyoti Corporation produces four products in a manufacturing process. The Corporation produced 10,000 units of A, 20,000 units of B, 15,000 units of C and 25,000 units of D. The costs before split off point for the four products were Rs. 1,40,000. Using the average unit cost method (a) calculate the unit cost, and (b) how, the joint cost would be apportioned among the products.

Solution :

(a) Average unit Cost Joint Cost =
$$\frac{\text{Joint Cost}}{\text{Total Number of Units Produced}}$$

(b) Cost apportioned among different products :

Product A = 10,000 × 2 = Rs. 20,000 Product C = 15,000 × 2 = 30,000
 Product B = 20,000 × 2 = Rs. 40,000 Product D = 25,000 × 2 = 50,000

(b) Physical Measurement Method : A physical base such as raw materials weight, linear measure volume etc., is applied in apportioning perspiration point costs to joint products. For example, if there is 40% beef in product X and 60% beef in Product Y, 4/10 of the cost upto separation point will be charged to X and 6/10 to Y. This method is not suitable where, for example, one product is a gas and another is liquid. This method presupposes that each joint product is equally valuable, which is probably not the case in practice.

Illustration 15: The following data have been extracted for the books of M/s India Coke Co. Ltd.

Joint Products	Coke	Coal Tar	Benzol	Sulphate of Ammonia	Gas	Total
Yield in Lbs. of recovered products per tonne of coal	1,420	120	22	26	412	2,000

The price of coal is Rs. 80 per tonne. Direct labour and overhead cost of point of split off are Rs. 40 and 60 respectively per tonne of coal. Calculate the material, labour, overhead and total cost of each product on the basis of weight.

Solution :

Particulars	Yield (in Lbs) Of recovered Products per ton of coal	Percentage of total	Apportioned Cost			
			Coal	Direct Labour	Over head	Total
Coke	1,420	71.0	56.80	28.40	42.60	127.80
Coal Tar	120	6.0	4.80	2.40	3.60	10.80

Benzol	22	1.1	1.04	0.52	078	2.34
Ammonia						
Gas	412	20.6	16.48	8.24	12.36	37.08
Total	2,000	100	80.00	40.00	60.00	180.00

(c) **Survey Method or Points Value Method** : Under this method, the common costs are apportioned to joint products after considering a number of factors such as volume, selling price, mixture, technical, engineering and marketing processes. Accordingly, percentage or points values are assigned to individual products to denote their relative importance and cost are apportioned on the basis of total points. This method is generally considered to be more equitable than other methods in as such as combination of related factors is considered. It can be used period after period until there are changes in the methods of production and sale.

Illustration 16 :

A canning merchant supplies you the following information for a particular period :

Grade	Units produced
A	1,000
B	1,600
C	2,000

The pre-separation costs incurred were Rs. 41,400. The joint costs are apportioned on technical evaluation based in the proportion of 5:3:2 to the three grades respectively. You are required to apportion the join costs.

Solution :

Apportionment of Joint Costs (Survey Method)

Items	Units	Points Attached	Equivalent Units	Cost per Equivalent	Apportioned Cost (Rs.)	Cost per Unit (Rs.)
(1)	(2)	(3)	(4) = 2×3	(5) = 41400/ 13800	(6) = 4×5	(7) = 6/2
Grade A	15,000	5	5,000	3	15,000	15
Grade B	1,600	3	4,800	3	14,400	9
Grade C	2,000	2	4,000	3	12,000	6
	4,600		13,8010		41,400	

(d) Contribution or Gross Margin Method : This method uses the technique of marginal costing. The joint costs are segregated into two parts-variable and fixed. The variable costs are apportioned over the joint products on the basis of units produced or physical quantities. In case the products are further produced after the point of separation, then all variable costs incurred on such processing are added to the variable costs determined earlier to ascertain the contribution of each product. The fixed costs are then apportioned over the joint products on the basis of the contribution ratio.

Illustration 17 :

From the following information, apportion marginal costs and fixed costs on suitable basis and ascertain profit or loss for each of the joint products.

Sales : A 200 kgs. @ Rs. 45 per kg.

 B 240 kgs. @ Rs. 25 per kg.

Total Cost : Variable or marginal Cost Rs. 8,800

 Fixed Cost Rs. 3,100

Solution :

Particulars	Sales Value	Prorated Marginal	Marginal Contribution	Prorated Fixed Cost	Profit (Rs.)
Product A	9,000	4,000	5,00	2,500	2,500
Product B	6,000	4,800	1,200	600	600
Total	15,000	8,800	6,200	3,100	3,100

(e) **Market Value Method :** Under this method, joint costs are apportioned after ascertaining "What the traffic can bear". In other words, the products are made to bear a proportion of the joint costs on the basis of their ability to absorb the same. Market value here means weighted market value, that is, quantity produced multiplied by price per unit of joint product. This is the most popular and convenient method because it makes use of a realistic basis for apportioning joint costs.

(i) **Market Value at the point of Separation or Relative Market Value Method :** Under this method, the separation point are ascertained and joint costs are apportioned in the ratio of either selling prices or sales value. The use of selling prices may result in completely invalid apportionments and as such sales value becomes an equitable basis. This method can be effectively used when disproportionate costs are incurred on joint products after the point of separation.

Illustration 18 :

The joint cost of making 100 units of product A, 200 units of product B and 309 units of product C is Rs. 2,700. The selling prices of products A, B and C are Rs. 4, Rs. 6 and Rs. 8 respectively. The products did not require any further processing after the split off point.

You are required to apportion the joint costs on (a) selling price basis; and (b) sales value basis.

(a) Apportionment on Selling Price Basis

Product	Selling Price per Units (Rs.)	Cost Apportionment Ratio	Apportioned Cost (Rs.)
A	4	4/18	600
B	6	6/18	900
C	8	8/18	1,200
Total	18		2,700

Apportionment on Sales Value Basis

Product	Quantity Sold	Selling Price per Unit (Rs.)	Sales Value (Rs.)	Cost Apportioned	Apportioned Cost (Rs.)
A	100	4	400	1/10	270
B	200	6	1,200	3/10	810
C	300	8	2,400	6/10	1,620
			4,000		2,700

(ii) Market value after further processing : This method is easy to operate because selling prices of the various joint products will be readily available. Further processing cost is deducted from the sales value in order to calculate the ratio in which the joint costs are to be apportioned. Sales value after deducting further expenses are used as the basis for apportioning cost up to the point of separation.

Illustration 19 :

X Co. Ltd. manufactures two joint products A and B and sells them at Rs. 5 and Rs. 4 per unit respectively. During a particular period, 400 units of A and 500 units of B were produced and sold. The joint cost incurred was Rs. 180 and further processing costs for products A and B are Rs.1,600 and Rs.1,500 respectively. Apportion the joint cost.

Solution :

Produced	Unit Produced	Selling Price Per Unit	Sales	Less further processing cost	Sales value less further processing cost	Ratio	Apportioned Joint costs
A	400	5	2,000	1,600	400	4/9	80
B	500	4	2,000	1,500	500	5/9	100
					900		180

(iii) Net Realisable Value or Reverse Cost Method : From the selling price of the finished products are deducted estimated 'net profit, direct selling and distribution expenses and the cost of further processing after the separation point. A ratio is established on the basis of which the total costs before separation point is apportioned. Subsequent costs are added to arrive at product costs. This method is extensively used in many industries such as oil refineries, lumber mills, etc.

ACCOUNTING OF BY-PRODUCTS

Accounting of by-products may broadly be classified into the categories :

(i) Non-cost or sales value methods : These methods do not attempt to cost by products or its inventory. The following are the main methods which are included in this group :

- (a) Other Income or Miscellaneous Income Method.
- (b) By-product's sales added to the main product's sales.
- (c) By-product's value deducted from the total cost.
- (d) Credit of sales value less selling and distribution expenses.
- (e) Credit of sales value less selling and distribution expenses as well as

cost incurred after split off.

(f) Credit of sale value less selling and distribution expenses, cost incurred after split off and estimated profit or Reverse Cost Method.

(ii) Cost Methods : These methods attempt to apportion some of the joint cost to by-products. The following methods are include under this category:

(a) Opportunity or replacement cost method.

(b) Standard cost method, and

(c) Apportionment on suitable basis.

These methods will now be discussed one by one.

(i) Non-cost or Sales Value Methods

(a) Other income or miscellaneous income method : Under this method, the sales value of by-product, which is negligible, is credited to the profit and loss account treating it as other or miscellaneous income. By-products which are not sold and are in stock are valued at nil value for balance sheet purposes and thus vitiate the valuation of closing stock. Accounting of by-products by this method is also inaccurate as there is a time lag between the sale and production. There is also a possibility that by-products may arise in one period but may be accounted in another period and thus distort the profits of two periods.

(b) By-product's sales added to the main product's sales : Under this method, all costs incurred on main and by-products are deducted from the combined sales of the main product and by-products. This method is generally adopted in those cases where either the value of the by-products is very small or where the by-products are sold in the market in the state in which they emerge from the main product. By-products in stock are valued at nil value for balance sheet purposes.

(c) **By-product's sales deducted from total cost :** Under this method, the sales value of by-products “are deducted either from production costs or from the cost of sales. Fluctuating costs of by-products also affect the costs of the main product and may encourage to conceal the inefficiencies therein. The stock in this case will be valued at total cost or cost of sales basis.

(d) **Credit of sales value less selling and distribution expenses :** Under this method, the selling and distribution costs incurred for selling the by-products are deducted from the sales value of by-products and the net amount is either credited to process account or is deducted from total cost.

The closing stock of by-products is valued at selling price less an estimate of the cost likely to be incurred in selling the stock of by-products.

(e) **Credit of sales value less selling and distribution costs and its incurred on by-products after split-off point :** Under this method, selling and distribution costs and costs incurred on further processing the by-products are deducted from the sale value of the by-products and net amount is credited to the process account. The closing stock of by-products is valued at selling price less an estimate of the cost likely to be incurred in selling and processing the stock of such by-products. This method suffers from the disadvantage that, if the market value of by-product fluctuates, the credit to the Process Account of main product will fluctuates accordingly. Owing to the fact that credit to the fact that credit to the main product Process Account fluctuates, inefficiencies in that process may be concealed.

Illustration 20 :

In the Manufacture of main product, 200 units of a certain by-product were produced. The market value of the by-product was Rs. 40 per unit. The by-product required further processing costs amounting to Rs. 3,000 and selling and distribution overheads amounting to Rs. 500 are incurred. Calculate the amount to be credited to the Process Account in respect of the by-product.

Solution :

	Rs.	Rs.
Sales value of 200 units @ Rs. 40		8,000
<i>Less:</i> Further processing costs	3,000	
Selling & distributing costs	500	3,500
Amount to be credited to Process Account		4,500

(f) Reserve cost method : Under this method an estimated profit from the sale of by-products, selling and distribution expenses and further processing costs after the split off point are deducted from the sales value of by-products and the net amount is credit to the-main product.

(ii) Cost Methods

The following methods are included in this category :

(a) Opportunity or Replacement Cost Method : This method is adopted where by-products are utilised in the undertaking itself as input material for some other process. The opportunity cost, i.e., the cost which would have been incurred, had the by-product been purchased from outside suppliers is taken as the cost of the by-product. The process Account is credited with the value of the by-products so ascertained. For example, in the production of a main product, 200 units of a by-product A are produced, which are transferred to another product where they are consumed. If the by-product were purchased from the market, the price would be Rs. 3 per unit. Thus, the amount to be credited to the main product in respect of the by-product under this method is $20 \text{ units} \times \text{Rs.}3 = \text{Rs.} 600$.

(b) Standard Cost Method : Under this method, a standard cost is set on the basis of technical assessment for each by-product and credit is given to the process account on this basis. The standard may be arrived at on the basis of past average price or may be fixed according to the principles of standard costing. As credit in respect of the byproduct cost is a stable figure under this

method, effective control can be exercised on the cost of the main product.

(c) Apportionment on Suitable Basis : Where by-products are of major significance, the cost should be apportioned on the most suitable basis. This method is followed where by-products are processed (i) to dispose of waste material more profitably, or (ii) to utilise idle plant. In the first case, by-products after separation are charged with overheads at full rates, whereas in the second case, by-product costs after separation will include variable costs only.

Illustration 21 :

1,000 Kg of 'X' is processed to give 700 kg. of A and 300 kg. of B. The joint cost before the separation point is Rs. 4,600. From the following data, show the apportionment of the joint cost and the profit of each product under: (a) physical measurement: (b) market value at separation point and (c) market value after further processing.

	A	B
Selling price at the point of separation	8.00	12.00
Further processing costs after separation	800	400
Selling price after further processing	12.00	18.00

Solution :

(a) Physical Measurement Method

	A	B
Ratio for apportionment of the joint costs	700/1000	300/1000
Share in the Joint Cost	$\frac{700}{1000} \times 4600$	$\frac{300}{1000} \times 4600$
	= Rs. 3,220	= Rs. 1,380

(b) Market Value at Separation Point

	A (Rs.)	B (Rs.)	Total (Rs.)
Sales	(700 × 8)	(300 × 12)	
	5600	3,600	9,200
<i>Less</i> Joint Cost	2,800	1,800	4,600
Profit	2,800	1,800	4,600

(c) Market value after Separation Point

	A (Rs.)	B (Rs.)	Total (Rs.)
Sales	(700 × 12)	(300 × 18)	
	8,400	5,400	13,800
<i>Less</i> Joint Cost	2,800	1,800	4,600
Profit	5,600	3,600	9,200

Do Yourself :

1. What do you mean by process costing? In what types of industries is process costing generally applied?
2. Describe the features of Process Costing. How is unit cost determined in process costing?
3. What do you understand by the term “inter-process profits”? What is the utility of transferring the output of one process to another process at more than cost?
4. In a manufacturing concern with several departments, the finished product of one department becomes the raw material of the next department. Would you advocate inclusion of profit in the transfer price of the material? What would be the effect of this in-the profit and loss account of the manufacturing concern as a whole?

5. Define and explain the terms 'Joint Products' and 'by-products'. Enumerate the methods which may be employed in costing 'Joint products'.
6. Explain briefly the methods of accounting for by-products.
7. The product of a manufacturing concern passes through two processes, A and B then to the finished stock. It is ascertained that in each process 5% of the total weight is normally lost and 10% is scrap which from Process A and B, realize Rs. 80 per qtl. and Rs. 120 per qtl., respectively.

The following are the figures relating to both the processes :

	Process A	Process B
Materials in qtls.	1,000	70
Cost of materials in rupees per qtl.	125	200
Wages in rupees	28,000	10,000
Manufacturing expenses in rupees	8,000	5,700
Output in qtls.	830	780

Prepare process cost accounts showing cost per qtl. for each process. There was no stock or work-in-progress in either process

8. From the following details, prepare a statement of equivalent production and a statement of cost and find the value :
 - (a) The output transferred; and
 - (b) The closing work-in-progress

Opening work-in-progress	2,000 unit
Materials	7,500
Labour	3,000
Overheads	1,500

8,000 units were introduced into the process.

There are 2,000 units in process and the state of completion is estimated to be :

	Rs.
Materials	100%
Labour	50%
Overheads	50%

8,000 units were introduced into the process.

The process costs for the period are:

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

9. A Ltd., Produces 'AXE' which passes through two processes before it is completed and transferred to the finished stock. The following data relate to October :

Particulars	Process I Rs.	Process II Rs.	Finished Stock Rs.
Opening stock	45,000	54,000	1935,000
Direct materials	90,000	94,500	-
Direct wages	67,200	67,500	
Factory overheads	63,000	27,0,00	-
Closing stock	22,200	27,000	67,500
Inter-process profit included in the opening stock		9,000	49,500

The Output of Process I is transferred to Process II at 25% profit on the transfer price.

The output of Process II is transferred to the finished stock at 200% profit on the transfer price. The stocks in process are valued at prime cost. The finished stock is valued at the price at which it is received from process II. Sales during the period are Re. 8,40,000.

You are required to prepare Process cost accounts and finished goods account, showing the profit element at the each stages.

10. The Following figures have been taken from the books of M/s East India Coke Company Limited.

Items	Yield in kgs. of recovered products per ton of coal
	710
Coke	60
Cola tar	11
Benzol	13
Sulphate of Ammonia	206
Gas	<u>1,000</u>

The price of coal is Rs. 800 per ton. Direct Labour and overhead costs to the point of split-off are Rs. 400 and Rs. 600, respectively, per ton of coal.

Calculate the materials, labour, overheads and total cost of each product on the basis of weight.

11. A certain process yields 75% of the material introduced as the main product, 20% as a by-product and 5% being lost. The percentage of material consumed by the main product and By-product is 80:20. The time taken to produce one unit of by-product is half the time taken for a main product units. The overheads have been allocated at 200% of the wages for each product.

	Rs.	Units
Cost Data		
Raw Material	10,000	2,000
Labour	8,500	
Overheads	17,000	
Total	<u>35,500</u>	

Ascertain the cost of the main product and by-product.

12. JB Limited 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
A	500	18.00
B	900	8.00
C	400	4.00
D	200	11.00

The company budgets for a profit of 10% of the sales value. The other estimated costs are :

	Rs.
Carriage inwards	1,000
Direct wages	3,000
Manufacturing overheads	2,000
Administration overheads.	10% of sales value

You are required to :

- (a) Calculate the maximum price that may be paid for the raw material.
- (b) Prepare a comprehensive cost statement for each of the products, allocating the materials and other costs based upon :
 - (i) Number of units
 - (ii) Sales value.

LESSON : 9

OPERATION AND OPERATING COSTING

Operation costing is a further refinement of process costing. This system is used where there is a mass production and processes are repetitive in nature, and there is a detailed application of process costing. The procedure of costing is broadly the same as per process costing, except that cost unit is an operation instead of a process. In other words, in those industries where a process consists of distinct operations, the method of costing may be called operation Costing, through it is still process costing in approach and application. For example the manufacturing of handles for bicycles involves a number of activities such as those of cutting steel sheets into proper strips, moulding, machining and finally polishing. Here each of these activities is an operation and it is possible to determine the cost of each operation separately. In operation costing, each operation is treated as a cost centre and the costs are accumulated for each operation instead of each process. The materials, labour and overhead costs accumulated for each operation are transferred to the next operation as in the case of process costing. The waste, rejects and scrap are also accounted for in the same way as in process costing. Thus, basically there is no difference between process costing and operation costing and the two terms may be often used interchangeably.

OPERATING COSTING

Operating costing refers to a method which is designed to ascertain and control the costs of the undertakings which do not produce products but which render services. Operating costing is also known as service costing. It is that form of operation costing which is applied where standardised services are provided either by an undertaking or by a service cost centre within an undertaking.

Operating costing is the cost of rendering services. It is the cost of producing and maintaining a service. Industries using operating costing do not

produce tangible products but render useful services e.g. transport services, utility service like hospitals, canteens etc., distribution services like supply of electricity, gas, etc.

Operating costing is just a variant of unit or output costing. The method of computing operating cost is very simple. The expenses of operating a service for a particular period are grouped under suitable headings and their total is divided by the number of service units for the same period, and thus cost per unit of service is obtained. The cost for a future period may be estimated on the basis of estimated service units and the estimated costs. This will help in fixing the price to be charged for the service. Thus the principle involved under operating costing is the same as under unit costing but they differ in the manner, in which costing information have to be collected and allocated to cost units.

Characteristics

Operating costing has special application to undertakings which provide services to the community as a whole rather than manufacture of products. Such undertakings where operating costing is applied, generally possess the following characteristics :

1. These undertakings render unique service to their customers.
2. They invest a large proportion of the total capital in fixed assets.
3. The requirement of working capital is Comparatively less.
4. The operating cost is divided into fixed cost and variable cost. This distinction is of particular importance because the economies of scale of operations considerably affect the cost per unit of service rendered.

Cost Unit

The selection of a suitable cost unit (unit of service) may sometimes prove difficult. The cost units may be of the following two types:

1. **Simple cost Unit** : In simple cost unit, the unit is obvious, for example, per student, per bed, per mile etc. A few examples are given below :

<u>Undertaking</u>	<u>Cost Unit</u>
(a) Transport	Per kilometer or per passenger or per tonne
(b) School or college	per student
(c) Hospital	per bed
(d) Canteen	per cup of tea

2. **Composite Cost Unit :** In this type, more than one units are combined together Examples are:

<u>Under taking</u>	<u>Cost Unit</u>
(a) Transport	per passenger kilometer or per tonne kilometer
(b) Hospital	per bed per day
(c) Cinema	per seat per show
(d) Electricity	per kilowatt hour
(e) Canteen	per meal per person
(f) Lodge	per person per day

The operating costing procedure used in some of the undertakings is discussed below :

TRANSPORT COSTING

It is very essential to differentiate the costs of different expense heads. In a broad way there are two types - fixed (standing) costs and operating and running charges. Fixed costs are those which are incurred irrespective of mileage run. These are the expenses for the vehicles. At the same time, maintenance repairs, petrol oil etc. which are directly proportional or related to the mileage

run are known as maintenance charges. For the sake of convenience, the costs are classified into the following categories.

1. **Fixed or Standing Costing :** These include salary of operating manager, supervisor, insurance, motor vehicle tax, garage rent, establishment expenses of workshop and head office, general supervision, interest on capital etc.
2. **Maintenance Charges :** These are semi-variable expenses which include the cost of tyres and tubes, repairs and paints, spares and accessories, overheads etc.
3. **Operating and Running Charges :** These vary in direct proportion to kilometers and include :
 - (a) Petrol, oil, grease etc.
 - (b) wages of driver, conductor, attendant, etc., if payment is related to time or distance of trips,
 - (c) commission of undertakings, if any;
 - (d) depreciation, if it is allocated on the basis of mileage run; and as such it is treated as variable expenses.

If the payment is made to drivers and conductors as a fixed sum without taking into account the distance covered or the number of trips made, then it is a fixed charge

Collection of Costs

Like job or contract costing, each vehicle is given a distinct number. All the basic documents of that vehicle will contain the number. The driver has a separate daily report or log book for each vehicle. It will give the performance statistics of each vehicle. It will be helpful for the ascertainment of cost control. All the details of the cost incurred in the course of the day can be known from the log book. A specimen of a log sheet is given in Fig. I

LOG SHEET

Vehicle No.....	Route No.....
Date of purchase.....	Driver.....

Make and specification.....

Time left garage.....

Time returned.....

Particulars of Trips

Trip No.	From	To	Tons or Packages	Kilometer	Time			Remarks
		Out	Collected en-route		Out	in	Hrs. taken	
Supplies		Worker's time			Abnormal delays			
Petrol/Diesel.....		Driver.....			Loading/Unloading.....			
Oil.....		Conductor.....			Traffic delays.....			
Grease.....		Cleaner.....			Accidents.....			

Fig. I Log Sheet

Determination of Number of Cost Units

The cost unit in passenger transport is usually a passenger kilometre and in goods transport it is a ton-kilometre. The calculation of the total number of cost units is illustrated below :

Example : A Delhi-Hisar Transport Co. runs four buses between two towns which are 50 kms. apart. The seating capacity of each bus is 50 passengers and actual passengers carried are 80% of the seating capacity. All the 4 buses run on 25 days in a month and each bus makes one round trip per day.

$$\begin{aligned}
 & \text{Passenger kilometres} = \\
 & \text{No. of Buses} \times \text{Distance} \times \text{Capacity of each bus} \times \text{Actual capacity} \times \text{Round trip} \times \text{No. of days} \\
 & = 4 \times 50 \times 50 \times 80\% \times 2 \times 25 \\
 & = 4,00,000 \text{ passenger kilometers per month.}
 \end{aligned}$$

Operating cost sheet or cost statement

A separate cost sheet for each vehicle is maintained by the cost accounting

department. Every month a vehicle operating statement is prepared. Total fixed costs, operating maintenance charges are collected. This will be posted to respective vehicles. These are divided by the total units (tonne miles or passenger miles) to arrive at average unit cost. A proforma of cost sheet is given below:

MONTHLY COST SHEET	
Vehicle No.....	For the month of
	Rs
Fixed Charges :	
Insurance	
Road tax	
Licence fees	
Garage rent	
Interest on capital	
Maintenance Charges :	
Repairs	
Overhauling	
Painting	
Tyres and tubes	
Garage charges	
Running Charges :	
Petrol	
Oil	
Grease	
Wages of driver	
Depreciation	
Total	

In order to make a comparative assessment it may be beneficial to compare the figures of the current period with those of the previous period. This will help in judging the operating efficiency of the current period. The

performance statement as shown below may be prepared for the purpose:

PERFORMANCE STATEMENT

Particulars	Current Period	Previous Period	Variation
1. Days maintain			
2. Days operated			
3. Days idle (1-2)			
4. Total hours operated			
5. Total Kilometres covered			
6. Total trips made			
Costs			
Total monthly charges			
Cost per day operated			
Cost per day maintained			
Cost per kilometre			
Cost per hour			
Cost per trip			

Objects of Transport Costing

The objects of transport costing may be summarised as follows :

- (i) To provide information whereby the efficiency of the vehicles rented may be judged.
- (ii) To provide accurate basis for quotations and fixing of rates.
- (iii) To ensure that all journeys have been carried out in proper time, fuel consumed is not excessive and that tyres are properly maintained.

- (iv) To provide comparison between own transport and alternative e.g. hiring.
- (v) To compare the cost of maintaining of one group of vehicles with another group.
- (vi) To determine what should be charged against departments using the service.
- (vii) To decide at what price the use of vehicle can be charged.
- (viii) To ensure that cost of maintenance and repairs is not excessive.

Illustration 1 :

A transport company is running two buses between two places 100 kilometers apart. The seating capacity of each bus is 50 passengers. The following particulars are taken from their books for a month:

	Rs.
Wages of drivers, conductors and cleaners	3,000
Salary of supervisory and office staff	1,500
Diesel Oil	6,000
Repairs and maintenance	1,500
Taxation and insurance	2,000
Depreciation	3,000
Interest and other charges	2,500

The actual passengers carried were 80% of the capacity. The buses ran on all the days. Each bus made a to and for trip. Find out the cost per passenger – kilometer.

Solution :

Statement of Operating Cost for the month

	Expenses for the month Rs.	Rs.
<i>Fixed or standing charges :</i>		
Wages of drivers, conductors and cleaners	3,000	
Salary of supervisory and office staff	1,500	
Taxation an insurance	2,000	
Interest and other charges	2,500	9,000
<i>Variable or running charges:</i>		
Diesel oil	6,000	
Repairs and maintenance	1,500	
Depreciation	3,000	10,5000
		19,500

For 4,80,000 passenger-kilometres the cost is Rs. 19,500

For 1 passenger-kilometre $\frac{19,500}{4,80,000} = \text{Rs. } 0.04$

(Passenger kilometer = $2 \times 200 \times 30 \times 50 \times \frac{80}{100} = 4,80,000$)

Illustration 2 :

A practising Chartered Accountant now spends. Rs. 0.90 per kilometre on taxi fare for his client's work. He is considering two other alternatives, the purchase of a new small car or an old bigger ear.

The estimated cost figures are :

<i>Items</i>	<i>New Small Car</i>	<i>Old Bigger Car</i>
Purchase price	Rs. 35,000	Rs. 20,000

(291)

Sale price after 5 years	Rs. 19,000	Rs. 12,000
Repairs & Servicing p.a.	Rs. 1,000	Rs. 1,200
Taxes & Insurance p.a.	Rs. 1,700	Rs. 700
Petrol consumption per litre	10 km.	7 km.
Petrol price per litre	Rs.3.50	Rs.3.50

He estimates that he travels 10,000 km. annually. Which of the three alternatives will be cheaper? If his practice expands and he has to go 19,000 km. per annum, what should be his decision. At how many km. per annum, will the cost of the two cars break-even and why? Ignore income tax.

Solution :

Particulars	New Small Car	Old bigger Car	Taxi
<i>Fixed expenses :</i>	Rs.		
Depreciation : $\frac{35,000-19,000}{5}$ $\frac{20,000-12,000}{5}$	3,200		-
Repairs & Servicing	1,000	1,200	
Taxes & Insurance	1,700	700	-
(A)	5,900	3,500	-
<i>Variable Expenses :</i>			
Petrol: $\frac{3.50}{10} \times 10,000$ kms.	3,500		
$\frac{3.50}{10} \times 10,000$ kms.		5,000	-
Hire charges in case of taxi (0.90 × 10,000)			9,000
(B)	9,400	8,500	9,000
For 19,000 kmns.			

$\frac{3.50}{10} \times 19,000$ kms.	$\frac{3.50}{7} \times 19,000$ kms. (C)	6,650	9,500	
	$0.90 \times 19,000$ kms.			17,100
<i>Total Cost :</i>				
(a) For 10,000 kms.		9,400	8,500	9,000
(b) For 19,000 kms (A +C)		12,550	13,000	17,100

Thus, out of the three alternative, old bigger car is the cheapest for practice which covers 10,000 kms. In case, his practice expands to 19,000 kms. the new small car will be the cheapest.

Breakeven point :

$$\text{Cost of petrol per km. (new small car)} = \frac{0.35}{10} = 0.35$$

$$\text{Cost of petrol per km. (old bigger car)} = \frac{0.35}{7} = 0.50$$

Thus, old bigger car is costlier by 15 paise

But fixed costs p.a. are cheaper in case of old bigger car, i.e., to the extent of 2,400 (5,900-3,500)

$$\text{Therefore, BEP} = \frac{2,400}{0.15} = 16,000 \text{ kms.}$$

The total cost of both the care will be same :

	New Small Car	Old bigger car
	Rs.	Rs.
Fixed costs p.a.	5,900	3,500
Petrol for 16,000 kms. a 0.35 and 0.50 per km.	5,600	8,000
Total	11,500	11,500

BOILER HOUSE COSTING

A Boiler House produces steam which is used for power generation, air-conditioning and air compression. The main purpose of Boiler House Costing

is to ascertain the cost of produced steam in the Boiler House. There are many factors such as steam pressure, evaporation, meter readings, distribution to different processes factory heating, main losses etc. which should be taken into consideration before ascertaining the cost of 1,000 lbs of steam raised. A proforma of Boiler House Cost Sheet is given below :

BOILER HOUSE COST SHEET

Period..... Steam produced in 1,000 lbs.....
 Less Boiler House use.....
 Mains Losses.....
 Total consumption.....

Particulars	Total cost		Cost per 1,000 lbs. of steam		% increase or decrease	Remarks
	Current Period Rs.	Previous Period Rs.	Current Period Rs.	Previous Period Rs.		
<i>Fuel</i>						
Coal						
Oil						
Electric Power						
Labour						
Coal handlers						
Stockers						
Ash Removers						
<i>Water</i>						
Purchased						
Softening						
Boiler cleaning						
<i>Indirect Materials</i>						
Supervision						
Sweepers						
Cleaners						

General Labour, etc.						
<i>Maintenance</i>						
Fixed Plant						
Boilers						
Meters						
Softening Plant						
Economisers						
Coal Bunkers						
Furnace						
Other accessories						
<i>Fixed Overheads</i>						
Rent and Rates						
Depreciation of Plant, Building etc.						
Interest on Capital						
Proportion of General Factory Overheads						
Total						

POWERHOUSE COSTING

Power house operating cost sheet is prepared to ascertain the cost per unit of electricity generated. The cost of producing steam used In power house for the generation of electricity is also included in the power house costs. Power house cost statement proforma is given below :

Power House Operating Cost Sheet

Units of electricity generated for the period.....

Particulars	Total Cost Rs.	Cost per Therm Rs.
Steam Production Costs Coal Water Water softner Wages-Coal handling Stoking Ash disposal Repairs and maintenance Stores Depreciation Supervision		
Total cost of steam		
<i>Less</i> : Used in heating		
Steam used for electricity generation		
Electricity Generation Costs Wages Stores Repairs and maintenance Interest on capital Supervision Depreciation		
Total cost of electricity generated		

Illustration 3 :

The Nikhil Iron and Steel Co. Ltd. generates its own power. From the following data supplied by the Company, compute the cost of generating per unit of electricity in the month of March 2000.

1. Coal consumed during the month Rs. 13,200
2. Oil : 10 tons at Rs. 250 per ton.
3. Water : 40,000 gallons, pumping charges at 60 paise per 100 gallons.
4. Depreciation of Steam Boiler : Capital Value Rs. 12,500 and the rate of depreciation 12 % per annum.
5. Salaries and wages of Boiler House : 10 mechanics at Rs. 100 per month each; 40 coolies at Rs. 20 per month each.
6. Recovery on account of sale of ashes : 100 tons at Rs. 1 per ton.
7. Salaries and wages of the generating station : 50 mechanics at Rs. 100 per month each : 20 coolies at Rs. 20 per month each.
8. Repairs and maintenance of the generating equipment : Rs. 2,600.
9. Depreciation of generating equipment : Capital value Rs. 1,20,000 and the rate of depreciation 12.5% p.a.
10. Share of administration charges Rs. 2,500.
11. Number of units generated : 1,46,500.

There is a normal of 1,500 units of electricity generated.

Solution :**NIKHIL IRON & STEEL CO. LTD.**

	Per Month
	Rs.
Coal consumed	13,200

(297)

Oil		2,500
Depreciation of steam boiler (for one month)		125
Water		240
Salaries, & wages of boiler house :		
Mechanics	1000	
Coolies	800	1,800
<i>Less</i> : Recovery from sale of ashes		17,865
Cost of Producing steam		100
(B) Electricity Generating Costs		17,765
Salaries and Wages:		
Mechanics	5,000	
Coolies	400	5,400
Repairs and maintenance		2,600
Depreciation (for one month)		1,250
Administrative charges		2,500
Total cost of generating electricity		29,515
Cost per unit (29,515 ÷ 1,45,000)		0.204

CANTEEN COSTING

The expenditures incurred for serving meals or wishes of different varieties may be grouped under various heads like provisions, labour, services, consumable stores and miscellaneous items. An estimate will have to be prepared for the number of persons to be catered for each day and the choice of their dishes. The fixation of price for main meals and for subsidiary items is a difficult task because of difficulty in apportioning the overhead costs to different items, some being served frequently and some rather irregularly. However, the

cost per meal can be calculated on a general basis by assembling the cost data and then allocating it to the meals served during a period.

A cost statement may also provide information about the subsidy received, if any, from any agency and the revenue from sales etc. so as to show the net operating profit or loss.

A proforma cost sheet has been given below:

CANTEEN OPERATING COST SHEET

	Total cost Meal Rs.	Cost per meal Rs.
Provisions:		
Bread		
Vegetables		
Milk		
Ice Cream		
Hot drinks		
Cold drinks		
Non-vegetarian items: Meat, Fish, Eggs		
Wages and Salaries:		
Wages of Cooks		
Wages of kitchen assistants		
Wages of porters or bearers		
Salary of supervisors		

Services :		
Gas and electricity		
Power and lighting Water		
Consumable Store :		
Crockery and glassware		
Cleaning materials		
Miscellaneous :		
Rent		
Insurance		
Depreciation		
	Total Cost	.....
	Profit	.....
	Sales	.....

CINEMA HOUSE COSTING

The object of Cinema house costing is to ascertain the cost of operating a cinema theatre. In case of a cinema house the unit of cost is “a man-show”.

Illustration 4 :

The data given relates to Jyoti Talkies, a mini theatre for the year ending 31st March.

Salaries

- 1 Manager Rs. 800 p.m.
- 10 Gate-keepers Rs. 200 p.m. each
- 2 Operators Rs. 400 p.m. each
- 4 Clerks Rs. 250 p.m. each

(300)

Electricity & Oil Rs. 11,655

Carbon Rs. 7,235

Misc. Expenditure Rs. 5,425

Advertisements Rs. 34,710

Administrative expenses Rs. 18,000

Hire of print Rs. 1,40,700

The premises is valued at Rs. 6,00,000 and the estimated life is 15 years. Projector and other equipments cost Rs. 3,20,000 on which 10% depreciation is to be charged.

Daily 3 shows are run throughout the year. The total capacity is 625 seats which are divided into three classes as follows:

Express circle 250 seats

Super Fast circle 250 seats

Rajdhani circle 125 seats.

Ascertain cost per man-show assuming that :

- (a) 20% of the seats remain vacant, and
- (b) Weightage to be given to the three classes in the ratio of 1 :2:3

Determine the rates for each class if the management expects 30% return on gross proceeds. Ignore entertainment taxes.

Solution :

Operating Cost for the month of March

Particulars	(Rs.)
Fixed Costs :	
Salaries :	

Manager-1		9,600
Gate-keeper- 10		24,000
Operators-2		9,600
Clerks-4		12,000
Administration expenses		18,000
Depreciation : Premises		40,000
	Project & other equipment	32,000
	Total	1,45,200
Variable costs :		
Electricity & Oil		11,655
Carbon		7,235
Misc. expenditure		5,425
Advertisements		34,710
Hire of print		1,40,700
	Total	1,99,725
	Grand Total	3,44,925
	Add: 30% returns	1,47,825
	Proceeds (gross)	4,92,750
	Total man-shows	9,85,750
	Cost per man-show	Re. 0.50

Man-shows computation:

	No. of seats	Weightage	
Express	250	1	250

Super Fast	250	2	500
Rajdhani	125	3	375
		Total	1,125 per show
		Total shows	= $1,125 \times 3 = 3,375$
		Less : 20% vacant sets	675
		Total daily man-shows	<u>2,700</u>
		Man-shows per year	$2,700 \times 365 = \underline{9,85,500}$

Rates :

Express	:	$0.50 \times 1 = \text{Rs. } 0.50$
Super Fast	:	$0.50 \times 2 = \text{Rs. } 1.00$
Rajdhani	:	$0.50 \times 3 = \text{Rs. } 1.50$

HOSPITAL COSTING

The main purpose of hospital costing is to ascertain the cost of providing medical services. There are different departments in a hospital which are generally formed on the basis of functions performed by them. The following are the main department in a hospital :

1. O.P.D. (Out-Patient Department) 2. Wards
2. Wards
3. Medial Service Departments as Diagnostic X-ray, Radiotherapy, Pathology etc.
4. General Service Department as Boiler House, if any, Power Heating, Lighting etc.: Catering, Laundry, Medical Records, Works Maintenance, Administration, etc.
5. Miscellaneous Service Departments as Transport, Dispensary Cleaning and General portering etc.

Cost of (5) department will have to be apportioned to the other departments on equitable basis. Cost of departments 1-4 above can be determined separately with reference to the units of cost, which are given below:

O.P.D.	Per out-patient attended
Wards	Per new out patient attended or per case
Radiotherapy	Per course of treatment per day
Diagnostic X-ray	Per 100 units weighted points value
Pathology	Per 100 requests
Boiler House	Per 1,000 lbs. steam raised
Power, Heating & Lighting, etc.	Per 1,000 cubic feet
Catering	Per person fed per week
Laundry	Per 100 articles laundered
Medical Records	Per weighted unit
Works and Maintenance	Per 1,000 cubic fee
Administration	Suitable percentage of turnover

Cost Statement

The expenses of a hospital can be broadly divided into two categories, i.e., (i) Capital expenditure, and (ii) Maintenance Expenditure. Maintenance expenditure includes salaries and wages, provisions, staff uniforms and clothing, patients' clothing, medical and surgical appliances and equipments, fuel, light and power, laundry, water, etc.

Illustration 4 :

Public Health Centre runs an Intensive Care Unit. For this purpose it has hired a building at a rent of Rs. 5,000 p.m. with the understanding that it would bear the repairs and maintenance charges also.

The unit consists of 25 beds and 5 more beds can be comfortably accommodated when the occasion demands. The permanent staff attached to the unit are as follows:

2 Supervisors, each at a salary of Rs. 500 per month.

4 Nurses, each at a salary of Rs. 300 per month.

2 Ward Boys, each at a salary of Rs. 150 per month.

Though the unit was open for the patients all the 365 days in a year, scrutiny of accounts in 1999 revealed that only 120 days in a year, the unit had the full capacity of 25 patients per day and for another 80 days it had on an average 20 beds only occupied per day. But there were occasions when the beds were full, extra beds were hired from outside at a charge of Rs.5 per beds per day this did not come to more than 5 beds extra above the normal capacity anyone day. The total hire charges for the extra beds incurred for the whole year amounted to Rs. 2,000.

The unit engaged expert doctors from outside to attend on the patients and the fees were paid on the basis of the number of patients attended and time spent by them on an average worked out to Rs. 10,000 per month in 1999. The other expenses for the year were as under:

	Rs.
Repairs and maintenance	3,600
Food supplied to patients	44,000
Janitor and other services for them	12,500
Laundry charges for their bed linen	28,000
Medicines supplied	35,000
Cost of oxygen, X-ray, etc. other than directly borne for treatment of patients	54,000

General Administration charges allocated to the unit 49,500

(i) If the unit recovered an overall amount of Rs. 100 per day on an average from each patient, what is the profit per patient day made by the unit in 1999.

(ii) The units want to work on a budget for 2000, but the number of patients requiring intensive care is a very uncertain factor. Assuming that same revenue and expenses prevail in 2000 in the first instance, workout the number of patient day's required by the unit to break even.

Solution :

STATEMENT OF PROFIT

	Rs.	Rs.
(A) Income received (Rs. 100 × 5,000 patient days)		5,00,000
(B) Variable Costs:	<u>Per annum</u>	
Food	44,000	
Janitor and other services for them	12,500	
Laundry charges for their bed linen	28,000	
Medicines supplied	35,000	
Doctor's fees (Rs.10,000 × 12)	1,20,000	
Hire charges for extra beds	2,000	<u>2,41,500</u>
Marginal Contribution (A) - (B)		<u>2,58,500</u>
(C) <i>Fixed Costs</i> :	<u>Per annum</u>	
Salaries: Supervisors 2 × 500 = 1,000 p.m.		
Nurses 4 × 3 00 = 1,200 p.m.		
Wards 2 × 150 = <u>300 p.m.</u>		
2,500 p.m. × 12=	30,000	

(306)

Rent (Rs. 5,000 × 12)	60,000	
Repairs & Maintenance	3,600	
General Administration	49,550	
Cost of Oxygen, X-ray, etc.	<u>54,000</u>	<u>1,97,150</u>
Profit		<u>61,350</u>
Profit per Patient day Rs. 61,350 ÷ 5,000	Rs. 12.27	
Break even Point = $\frac{\text{Fixed Cost}}{\text{Contribution}} \times \text{Income}$		
= $\frac{1,97,150}{2,58,500} \times 5,00,00$		
= Rs. 3,81,335 or		
3,81,335 ÷ 100 = 3,813 patient days.		

Working Note :

Calculation of No. Patient Days in 1999

$$25 \text{ beds} \times 120 \text{ days} = 3,000$$

$$20 \text{ beds} \times 80 \text{ days} = 1,600$$

$$\text{Extra Bed days} \left(\frac{\text{Rs. 2,000}}{\text{Rs. 5}} = 400 \right)$$

$$\underline{\underline{5000}} \text{ Patient days}$$

Do Yourself :

1. What do you mean by operation costing and operating costing? Describe their essential features and state where these can be usefully implemented.
2. What are the main objects of motor costing? A company owner has a fleet of vans and wishes to examine the costs of (a) each van (b) the fleet as a whole. Prepare a report on the accounting arrangements that are needed and draft specimens of the forms that you recommend for presentation to the directors. Show separate rates for fixed and variable expenditure and state how these should be used.

3. Draw up a proforma cost statement for a canteen serving 1,000 workers in a factory. The canteen is subsidised by the factory.
4. Explain briefly the relevance of operating costs in transport and other public utility services.
5. What is service costing? Draw a statement with imaginary figures for working out the-running cost per kilometre of a taxi.
6. From the following data, calculate the cost per kilometer of a vehicle:

	Rs.
Value of vehicle	75,000
Road licence fee per year	500
Insurance per year	100
Garage rent per year	600
Driver's wage per month	500
Cost of petrol per litre	6.00
Kilometres run per litre	8
Proportionate charge for tyre and maintenance per Km.	0.40
Estimated life	1,50,000 km.
Estimated annual kilometres	6,000
Ignore interest on capital	

7. A person owns air condition bus which runs between Delhi and Chandigarh and back for 10 days in a month. The distance between Delhi and Chandigarh is 150 miles. The bus completes the trip from Delhi and Chandigarh and will be back on the same day.

The bus goes to Agra for another 10 days. The distance between Delhi

and Agra is 120 miles. This trip is also completed on the same day. For the rest of 4 days of its operation it runs in the local city. Daily distance covered is 40 miles.

Calculate the charge to be made by the person when he wants to earn profit of $33 \frac{1}{3}\%$ on his takings. The other information is :

Costing of the bus	Rs.	1,00,000	
Depreciation :	Rs.	20%	p.a.
Salary of driver :	Rs.	650	p.m.
Salary of conductor :	Rs.	650	p.m.
Salary of accountant	Rs.	360	p.m.
Insurance :	Rs.	1,680	p.a.
Diesel consumption 4 miles per litre costing Rs. 3 per litre			
Road tax :	Rs.	600	p.a.
Lubricant :	Rs.	20 per	100 miles
Repairs and maintenance	Rs.	500	p.a.
Permit fee	Rs.	284	p.m.
Normal capacity :		50 persons	

The bus generally occupies 90% of the capacity when it goes to Chandigarh, 80% when it goes to Agra. It is always full when it runs within the city. Passenger tax is 20% of his net taking.

8. From the following data relating to two different vehicles A and B compute the cost per running mile :

	A.	B.
	Rs.	Rs.
Mileage run (Annual)	15,000	6,000

Cost of vehicles	25,000	15,000
Road Licence (Annual)	750	750
Insurance (Annual)	700	700
Garage Rent (Annual)	600	600
Supervision, salaries etc. (Annual)	1,200	1,200
Driver wage per hour	8	8
Cost of petrol per litre	10	10
Miles run per litre.	20 miles	15 miles
Repair and Maintenance charge (per mile)	0.20	0.30
Tyre allocation per mile	0.80	0.80
Estimated life of the vehicle	1,00,000 miles	75,000 miles

You are to charge interest on cost of vehicles at 5% per annum. The vehicles run 20 miles per hour on an average.

9. The following cost data pertaining to the year 1998-99 are collected from the books of ABC Power Co. Ltd.

Prepare a cost sheet showing the cost of generation of power per Unit of kwh.

Total units generated	15,00,000	
		Rs.
Operating labour		16,500
Plant supervision		5,250
Lubricants and supplies		10,500
Repairs and maintenance		21,000
Administration overheads		9,000
Capital cost		1,50,000

Coal consumed per kwh. for the year is 1.5 lb. and the cost of coal delivered to the power station is Rs. 30.06 per metric tonne. Depreciation chargeable is 4% per annum and interest on capital is to be taken at 7%.

10. An employee of Pavitra Hotels Limited has started using his personal automobile for company's business purposes with effect from 1st January, 1999. He would be reimbursed by the Company at the rate of 12 paise per km. determined on the basis of the operating costs for 1999 which were as follows :

Operating Cost :

	Rs.
Depreciation-Straight-line	600
Licence Fee	20
Insurance	160
Gas, oil, repairs and other variable costs	420
Total	<u>1,200</u>
Kms. Driven	10,000
Cost per km.	12 paise

During the year 1999, the car is estimated to be used by the employee as thus :

Personal use	12,000 kms.
Business use	<u>8,000 kms.</u>
	<u>20,000 kms.</u>

You are required to :

- Calculate the estimated annual operating cost for 1999 and the estimated cost per km to be driven in 1999.
- Calculate the amount the employee would be required to pay for every km. driven on account of personal in 1999.
- Indicate whether it would be less expensive for the Company to furnish an automobile to the employee.

Note : Assume that operating costs would be the same in 1999 as in 1998.

LESSON : 10

RECONCILIATION OF COST AND FINANCIAL ACCOUNTS

When cost accounts and financial accounts are maintained in two different sets of books, there will be prepared two profit and loss accounts - one for costing books and the other for financial books. The profit or loss shown by costing books may not agree with that shown by financial books. Such a system is termed as, 'Non-Integral System' whereas under the integral system of accounting, there are no separate cost and financial accounts. Consequently, the problem of reconciliation does not arise under the integral system. However, where two sets of accounting systems, namely, financial accounting and cost accounting are being maintained, the profit shown by the two sets of accounts may not agree with each other. Although both deal with the same basic transactions like purchases consumption of materials, wages and other expenses, the difference of purpose leads to a difference in approach in a collection, analysis and presentation of data .to meet the objective of the individual system. Financial accounts are concerned with the ascertainment of profit or loss for the whole operation of the organisation for a relatively long period, usually a year, without being too much concerned with cost computation, whereas cost accounts are concerned with the ascertainment of profit or loss made by manufacturing divisions or products for cost comparison and preparation and use of a variety of cost statements. The difference in purpose and approach generally results in a different profit figure from what is disclosed by the financial accounts and thus arises the need for the reconciliation of profit figures given by the cost accounts and financial accounts. The reconciliation of the profit figures of the two sets of books is necessary due to the following reasons

1. It helps to identify the reasons for the difference in the profit or loss shown by cost and financial accounts.
2. It ensures the arithmetical accuracy and reliability of cost accounts.

3. It contributes to the standardization of policies regarding stock valuation, depreciation and overheads.
4. Reconciliation helps the management in exercising a more effective internal control.

CAUSES OF DIFFERENCE

Difference in profit or loss between cost and financial accounts may arise due to following reasons.

1. Items shown only in financial accounts : There are a number of items which are included in, financial accounts but find no place in cost accounts. These may be items of expenditure or appropriation of profit or items of income. The former reduces the profit while the latter have the reverse effect. The items may be classified as under :

- (a) **Pure financial charges :** (i) Loss arising from the sale of fixed assets, Loss on investments, (ii) Discount on debentures, (iii) Interest on bank loan, mortgages and debentures, (iv) Expenses of the company's share transfer office.
- (b) **Appropriation of Profit :** (i) Donations and Charities, (ii) Income-tax, (iii) Dividend paid, (iv) Transfers to reserves and sinking funds.
- (c) **Purely financial incomes :** (i) Rent receivable, (ii) Profits on the sale to fixed assets, (iii) Transfer fees received, (iv) Interest received on bank deposits, (v) Dividend received.
- (d) **Writing off intangible and fictitious assets :** (i) Goodwill, Patents and copyrights, (ii) Advertisement, preliminary expenses, Organisation expenses, etc.

2. Items shown only in cost accounts : There are certain items which are included in cost accounts but not in financial accounts. These items are very few and usually are notional charges. For example, interest may be calculated on capital employed in production to show the nominal cost of employing the capital though, in fact, no interest has been paid. Similarly, production may be

charged with a nominal rent for premises owned, to enable the concern to compare its cost production with that of a rented factory.

3. Estimates and actuals

Since cost accounts are meant to function as a control device it will be appropriate to adopt estimated costing or preferably standard costing system while preparing cost accounts. Estimates or standards can be nearer to the actuals but in most cases they cannot be the same. This necessarily means that the profit shown by the cost accounts is bound to be different from the profit shown by the financial accounts.

Following are some of the important items the costs of which may be different in financial books and costing books

(a) Direct materials : The estimated or standard cost of the direct materials purchased or consumed in the, production process may be different from the actual costs. This difference will be due to change in price or quantity or both.

(b) Direct Labour : The estimated or standard cost of direct labour may be different from the actual costs because of difference in wage rates or hours of work or both. Sometimes, workers might have to be paid more due to increased dearness allowance, pay revisions, bonus etc. This will cause difference between the profits shown by the two sets of books.

(c) Overheads : In cost accounts the recovery of overheads is generally based on estimates while in financial accounts the actual expenses incurred are recorded. This results in under or over-recovery of overheads.

The under-recovery or over-recovery of overhears may be carried forward to the next period or may be charged by a supplementary rate (positive or negative) or transferred -to Costing Profit and Loss Account. In case the under-recovery or over recovery of overheads has been carried forward to the next period, the profit as shown by the costing books will be different from the profit as shown by the financial books. Such variation may be due to over or under charging of factory, office or selling and distribution overheads.

(d) **Depreciation** : Different methods of charging depreciation may be adopted in cost and financial books. In financial books, depreciation may be charged according to fixed installment method or diminishing balance method etc. while in cost accounts machine hour rate or any other method may be used. This is also an item of overheads and may be one of the reasons of difference between the overheads charged in financial accounts and overheads charged in cost accounts.

4. Valuation of stocks

(a) **Raw materials** : In financial accounts stock of raw materials is valued at cost or market price, whichever is less, while in cost accounts stock can be valued on the basis of FIFO or LIFO or any other method. Thus, the figure of stock may be inflated in cost or financial accounts.

(b) **Work-in-progress** : Difference may also exist regarding mode of valuation of work-in-progress. It may be valued at prime cost or factory cost or cost of production. The most appropriate mode of valuing is at factory cost in cost accounts. In financial accounts; work-in-progress may be valued after considering a part of administrative expenses also.

(c) **Finished goods** : Under financial accounts, stock of finished goods is valued at cost or market price whichever is, lower. In cost accounts, finished stock is generally valued at total cost of production. If the circumstances warrant, prime cost or factory cost may also be taken as the basis for valuing the stock of finished goods.

Thus, mode of valuation of stocks gives rise to different results in the two sets of books. Greater valuation of opening stocks in cost accounts means less profit as per cost accounts and vice versa. Greater valuation of closing stocks in cost accounts means more profit as per cost accounts and vice versa.

5. Abnormal gains and losses

Abnormal gains or losses may completely be excluded from cost accounts or may be taken to costing profit and loss account. In financial accounts

such gains and losses are taken to profit and loss, account. As such, in the former case costing profit/loss will differ from financial profit loss and adjustment will be required. In the latter case there will be no difference on this account between costing profit or loss and financial profit or loss. Therefore, no adjustment will be required on this account. Examples of such abnormal, gains and losses are abnormal wastage of materials e.g. by theft or fire etc., cost of abnormal idle time, cost of abnormal idle facilities, exceptional bad debts, abnormal gain in manufacturing through processes (when actual production exceeds normal production).

The need for reconciliation will not arise in case of a business where Integral Accounting System is in use as there will be only one set of books both for financial and costing records. But where there are separate sets of books, reconciliation is imperative.

PREPARATION ON RECONCILIATION STATEMENT OR MEMORANDUM RECONCILIATION ACCOUNT

A Reconciliation Statement or a Memorandum Reconciliation Account should be drawn: up for reconciling profits shown by the two sets of books. Results shown by any sets of books may be taken as the base and necessary adjustment should be made to arrive at the results shown by the other set of books. The technique of preparing a Reconciliation Statement as well as a Memorandum Reconciliation account is discussed below :

Preparation of Reconciliation Statement

When there is a difference between the profits disclosed by cost accounts and financial accounts, the following steps shall be taken to prepare a Reconciliation Statement

1. Ascertain the various reasons of disagreement (as discussed above) between the profits disclosed by two sets of books of accounts.
2. If profit as per cost accounts (or loss as per financial accounts) is taken as the base :

ADD:

- (i) Items of income included in financial accounts but not in cost accounts.
- (ii) Items of expenditures (as interest on capital, rent on owned premises, etc.)
included in cost accounts but not in financial accounts.
- (iii) Amounts by which items of expenditure have been shown in excess in cost
accounts as compared to the corresponding entries in financial accounts.
- (iv) Amounts by which items of income have been shown in excess in
financial accounts as compared to the corresponding entries in cost
accounts
- (v) Over-absorption of overheads in cost accounts.
- (vi) The amount by which closing stock of inventory is under-valued in cost
accounts.
- (vii) The amount by which the opening stock of inventory is over-valued in
cost accounts.

DEDUCT:

- (i) Items of income included in cost accounts but not in financial accounts
- (ii) Items of expenditure included in financial accounts but not in cost
accounts.
- (iii) Amounts by which item of income have been shown in excess in cost
accounts over the corresponding entries in financial accounts.
- (iv) Amounts by which items of expenditure have been shown in excess in
financial accounts over the corresponding entries in' cost accounts.
- (v) Under absorption of overheads in cost accounts.
- (vi) The amount by which closing stock of inventory is over-valued in cost
accounts.

(vii) The amount by which the opening stock of inventory is under-valued in cost accounts.

3. After making all the above additions and deductions, the resulting figure will be profit as per financial accounts.

Note : If, profit as per financial accounts (or loss as per cost accounts) is taken as the base, then items added shall be deducted and items to be deducted shall be added, i.e., the procedure shall be reversed.

Illustration 1 :

	Rs.
Profit as per Cost Accounts	10,000
Works overheads under-recovered in cost accounts	500
Interest on capital included in financial accounts	500
Dividends received	1,000
Rent for owned building charged in cost accounts	300
Profit as per financial books	10,300

There is a difference of Rs. 300 between the profit as shown by the financial books and the profit as shown by the cost books. A reconciliation statement can be prepared to reconcile, on the following basis, the profits shown by two sets of books

1. Profit as per cost accounts may be taken as the base. In other words, the profit as shown by the financial books can be found out if suitable adjustments are made in this figure of profit and after taking it account the above causes of difference.

2. Works overheads have been charged more in financial accounts than those in cost accounts. This means profit as shown by the financial accounts

is less than the profit as shown by the cost accounts by Rs. 500 (the amount of under-recovery). Since profit as per cost accounts has been taken as the base, the amount of Rs. 500 should be subtracted from this base profit to arrive at the, profit as shown by the financial accounts.

3 The inclusion of interest on capital; as an expense has resulted in decrease in profits as shown by financial books. . In other words, the profit as shown by the cost books is more than the profit as shown by the financial books by Rs. 500 (the amount of interest). The amount should, therefore, be subtracted from the base profit.

4. Dividend received has been credited in financial books. This means the profit as shown by the financial books is more than the profit as shown by the cost books by Rs. 1,000. The amount should, therefore, be added to the profit as shown by the cost books.

5. No charge is made in financial books for rent on owned buildings. The amount has however been charged in the cost books. It means the profit as shown by the financial books is higher than the profit as shown by the cost books by this amount. -The amount, therefore, should be added to the profit as shown by the cost books.

The reconciliation statement may now be conveniently presented in the following form :

Reconciliation Statement

Particulars	+	-
	Rs.	Rs.
Profit as per Cost Accounts.	10,000	
<i>Less:</i> Works overheads under charged in cost accounts		500
Interest on Capital included in financial accounts		500
<i>Add.:</i> Dividends received	1,000	

Rent on owned buildings	300	
	11,300	1,000
Profit as per Financial Accounts	10,300	

In case, in the above example, the cost accounts show a loss of Rs. 10,000, in place of a profit, the amount of loss should be put in the 'minus' column. The reconciliation statement should then be prepared on the same pattern as if there is a profit in place to there being a loss.

Preparation of Memorandum Reconciliation Account

This is an alternative to Reconciliation Statement. The only difference is that the information shown above in the proforma reconciliation statement is shown in the form of an account. The profit as per cost accounts I is the starting point and is shown on the credit side of this account. All items which are 'added' to costing profit for reconciliation are shown on the debit side. The balance figure is the profit as per financial accounts.

It is only a memorandum account and does not form part of the double entry books of accounts.

Memorandum Reconciliation Account

To Financial Expenses	Rs.	By Profit per Cost Accounts	Rs.
Discount		By Financial Income	
Bank interest		Rent	
Donations		Interest	
Underwriter's commission		Transfer fees	
Fine & penalties		Profit on sale of investments	
Loss on sale of assets			
Goodwill written off		By items charged in Cost Account	
To under-absorption of overheads		Rent of own Building	

To under-valuation of opening Stock in Cost Accounts	Interest on Capital By over-absorption of overheads
To Over-valuation of closing Stock in Cost Accounts	By over-valuation of opening Stock in Cost Accounts
To Profit as per Financial Accounts	By under valuation of closing Stock Cost Accounts

Illustration 2 : The following is a summary of the Trading and Profit and Loss Account of Messrs Nikhil Manufacturing Co. Ltd., for the year ended 31st December, 1999;

Dr.	Rs.	Cr.	Rs.
To Materials Consumed	27,40,000	By Sales	
To Wages	15,10,000	(1,20,000 units)	60,00,000
To Factory Expenses	8,30,000	By Finished stock	
To Administration Expenses	3,82,400	(4,000 units)	1,60,000
To Selling and Distribution To Expenses	4,50,000	By Work-in-progress:	
To Preliminary Expenses (Written off)	40,000	Materials	64,000
To Goodwill (written off)	20,000	Wages	36,000
To Net Profit	3,25,600	Factory Expenses	20,000
	62,98,000	By Dividends Received	18,000
			62,98,000

The company manufactures a standard unit. In the Cost Accounts

- (i) Factory expenses have been recovered from production at 20 per cent on prime cost;
- (ii) Administration expenses at Rs. 3 per unit on units produced
- (iii) Selling and distribution expenses at Rs 4 per unit on units sold.

You are required to prepare a statement of cost and profit in cost books of the company and to reconcile the profit disclosed with that shown in the Financial Accounts.

Solution :

	Rs.	Rs.
Materials	27,40,000	
Labour	<u>15,10,000</u>	
Prime Cost	42,50,000	
Factory Expenses applied (20% of Prime Cost) <u>8,50,000</u>		51,00,000
<i>Less:</i> Closing work-in-progress		<u>1,20,000</u>
Works Cost		49,80,000
<i>Add:</i> Administration Expenses (1,20,000 + 4,000) × Rs.3		<u>3,72,000</u>
Cost of Production		53,52,000
<i>Less:</i> Cost of Closing Finished Stock		
($\frac{4,000}{1,24,000}$ units (i.e., 1/3) of Rs. 53,52,000)		<u>1,72,645</u>
Cost of Goods sold		51,79,355
<i>Add :</i> Selling & Distribution Expenses (1,20,000 × Rs. 4)		<u>4,80,000</u>
		<u>56,59,355</u>
Profit as per Cost Accounts		<u>3,40,645</u>
Sales (1,20,000 × 50)		<u>60,00,000</u>

Reconciliation Statement

	Rs.	Rs.
Profit as per costing books		3,40,645
<i>Add:</i> Over-recovery of selling expenses		
(Rs. 4,80,000-4,50,000)	30,000	
Over-recovery of factor) expenses		
(Rs. 8,50,000-8,30,000)	20,000	
Dividend received	18,000	68,000
<i>Less:</i> Under-recovery of Administration Expenses		4,08,645
(Rs. 3,82,400-3,72,000)	10,400	
Preliminary expenses written off	40,000	
Goodwill written off	20,000	
Difference in valuation of finished stock	12,645	83,045
Profit as per financial Accounts		3,25,600

Illustration 3

The following figures are extracted from the financial accounts of a manufacturing firm for the first year of its operation :

	Rs.
Direct material consumption	50,00,000
Direct wages	30,00,000
Factory overheads	16,00,000
Administration overheads	7,00,000
Selling and Distribution overheads	9,60,000
Bad debts	80,000

(323)

Preliminary expenses written off	40,000
Legal Charges	10,000
Dividends received	1,00,000
Interest on Deposit received	20,000
Sales – 1,20,000 units	1,20,000
Closing stock :	
Finished stock 4,000 units	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 @ Rs. 6 per unit of production;

Selling and Distribution overheads are recovered @ Rs. 8 per unit sold.

You are required to prepare Costing and Financial Profit and Loss Accounts and reconcile the difference in the profits as arrived at in the two sets of accounts

Solution :

Costing Profit and Loss Account

Direct Materials	56,00,000
Direct Wages	30,00,000
Prime cost	86,00,000
Factory overhead 20% on Prime cost	17,20,000
	1,03,20,000
Less Work-in-progress (Closing stock)	2,40,000

(324)

Works Cost	1,00,80,000
Administration overhead Rs. 6 per unit of production: 1,20,000 + 4,000	7,44,000
Cost of Production	1,08,24,000
Less Closing stock	3,49,161
	1,04,74,839
Add Selling and distribution expenses @ Rs. 8 per unit i.e. 1,20,000 × 8	9,60,000
Cost of Goods sold	1,14,34,839
Profit	5,65,161
Sales	1,20,00,000

Financial Profit and Loss Account

	Rs.		Rs.
To Direct Materials	50,00,000	By Sales	1,20,00,000
To Direct Wages	30,00,000	By Closing stock:	
To Factory Overheads	16,00,000	Finished Stock	3,20,000
To Gross Profit	29,60,000	WIP	2,40,000
	1,25,60,000		1,25,60,000
To Administration Overheads	7,00,000	By Gross Profit	29,0,000
To Selling and Distribution	9,60,000	By Dividends	1,00,000
To Bad debts	80,000	By Interest	2090000

To Preliminary Expenses	40,000	
To Legal Charges	10,000	
To Net Profit	12,90,000	
	30,80,80	30,80,000

Reconciliation Statement

	Rs.	Rs.
Profit as per cost accounts		5965,161
Add Dividend not taken in costing.	1,00,000	
Interest not take in costing	20,000	
Excess of Direct materials consumed.	6,00,000	
Over-absorbed in Costing:		
(a) Factory overheads	1,20,000	
(b) Administration overheads	44,000	8,84,000
		14,49,161
Less Bad Debts taken in Financial Accounts but not in costing	80,000	
Preliminary expenses taken in Financial Accounting, but not in costing	40,000	
Legal charges taken in financial but not in costing	10,000	
Different in closing stock (3,49,161-3,20,000)	29,161	1,59,161
Profit as per Financial Accounts		12,90,006

Illustration 4

The Manufacturing, Trading, Profit and Loss and Profit and Loss Appropriation Account of Jyoti Ltd. for the year ending December 31 are as follows :

Particulars		Rs.	Particulars	Rs.
To Raw Materials:			By Trading Account	
Opening Stock	27,458		Cost of goods manufactured	
Purchases	1,34,762		transferred	3,18,466
	<u>1,62,220</u>			
Less: Closing Stock	29,326	1,32,894		
To Wages - direct		1,12,378		
Prime Cost		<u>2,45,272</u>		
Production overhead:				
Power	23,246			
Wages - Indirect	31,351			
Rent and rates	10,724			
Heating and lighting	2,841			
Depreciation	6,015			
Expenses	1,020	75,197		
	<u>1,020</u>			
Gross Works Cost		<u>3,20,469</u>		
Deduct Works-in-Progress:				
Closing Stock	21,382			
Less Opening stock	19,379	2,003		
	<u>19,379</u>	<u>3,18,466</u>		<u>3,18,466</u>

(327)

To Finished goods			By Sales	5,00,000
Opening Stock	20,642			
Goods manufactured	3,18,466			
	3,39,108			
Less: Closing Stock	22,435	3,16,673		
To Gross Profit c/d		1,83,327		
		5,00,000		5,00,000
To Office salaries		35,642	By Gross profit bid	1,83,327
To Office expenses		20,326	By Dividend received	300
To Salesmen's salaries		18,421	By Interest on bank deposit	50
To Selling expenses		15,263		
To Distribution expenses		13,248		
To Loss on sale of plant		1,250		
To Fines		200		
To Interest on mortgage		150		
To Net profit for the year		79,177		
		1,83,677		1,83,677
To Taxation		25,000	By Balance bid	35,246
To General Reserve		10,000	By Net Profit fur the year	79,177
To Equity Share dividend		20,000		
To Preference share dividend		10,000		
To Goodwill written off		4,000		
To Balance c/d		45,423		
		1,14,423		1,14,423

The cost accounts revealed a profit of Rs. 1,27,411. In preparing this figure, stocks had been valued as follows :

Raw materials	:	Opening stock Rs. 27,342
		Closing stock Rs. 29,457
Work-in-Progress	:	Opening stock Rs. 19,488
		Closing stock Rs. 21,296

Selling and distribution expenses had been ignored in the cost accounts. Prepare a Reconciliation Account.

Solution :

Memorandum Reconciliation Account

Particulars	Rs.	Particulars	Rs.
Items not charged in cost accounts:		Profits as per cost accounts	
Rs. Rs.		Items not credited in cost accounts	
Loss on sale of Plant	1,250	Rs.	
Fines	200	Dividend received	300
Interest	<u>150</u> 1,600	Interest	<u>50</u>
Salesmen's salaries	18,421		350
Selling expenses	15,263	Difference in stocks	
Distribution expenses	<u>13,248</u> 46,932	Work-in- Progress	
Difference in stocks		Opening	109
Raw materials		Closing	<u>86</u>
Opening	116		195
Closing	<u>131</u> 247		
Profit as per financial accounts	79,177		
	<u>1,27,956</u>		<u>1,27,956</u>

(329)

Reconciliation Statement

Particulars	Rs.	Rs.
Profit as per Cost Accounts		1,27,411
<i>Less:</i> Items not charged In cost accounts		
Loss on sale of plant		
Fines	200	
Interest	150	1,600
<i>Add:</i> Items not credited in cost accounts		1,25,811
Dividend received	300	
Interest	50	350
		1,26,161
<i>Less:</i> Selling and distribution expenses		
Salesmen's salaries	18,421	
Selling expenses	15,263	
Distribution expenses	13,248	46,932
		79,229
<i>Add:</i> Difference in stocks		
Work-in-Progress - Opening	109	
Closing	86	195
		79,424
<i>Less</i> Difference in stocks		
Raw materials - Opening	116	
Closing	131	247
Profit as per Financial Accounts		79,177

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Do Yourself :

1. Why is it necessary to reconcile the profit shown by Cost Accounts and Financial Accounts? What is the procedure to be adopted for their reconciliation?
2. What is the purpose of reconciling Cost and Financial Accounts? Indicate the possible reasons for differences between profit shown in the Cost Accounts and that shown in the Financial Accounts of a concern.
3. An efficient system of costing will not necessarily produce accounts which in their results will agree with the financial accounts”. Comment upon the statement.
4. At the end of an accounting period, it is found that the profit as shown by the Financial Accounts falls considerably short of the profit according to the Cost Accounts. Indicate how the discrepancy might have arisen.
5. From the following details of Ram Tools Ltd., compute profit in financial accounts as well as in cost accounts and reconcile profit between cost and financial accounts showing clearly the reasons for the variation of the two profit figures

		Rs.		Rs.
Sales	20,000	Bad Debts		100
Purchase of Materials	3,000	Interest on Overdraft		500
Closing stock of materials	500	Profit on Sales of assets		1,000
Direct wages	1,000	Selling expenses		2,000
Indirect wages	500	Distribution expenses		1,000
Indirect expenses	2,000			

In cost accounts

Manufacturing overhead recovered @ 30% on direct wages.

Selling overhead recovered Rs. 1,500

Distribution overhead recovered Rs. 700.

6. The financial profit and loss account of Pal Manufacturing Company for the year ended 31st March 1999 is as follows :

Particulars	Rs.	Particulars	Rs.
To Materials Consumed	50,000	By Sales	1,24,000
To Carriage inwards	1,000		
To Direct Wages	34,000		
To Works expenses	12,000		
To Administration expenses	4,500		
To Selling and distribution expenses	6,500		
To Debenture Interest	1,000		
To Net Profit	15,000		
	1,24,000		1,24,000

The net profit shown by the Cost accounts for the year is Rs. 16,270. Upon a detailed comparison of the two sets of accounts it is found that

- (a) the amounts charged in the cost accounts in respect of overhead charges are as follows:

	Rs.
Works overhead charges	11,500
Office overhead charges	4,590
Selling and distribution expenses	6,640

- (b) No Charge has been made in the cost accounts in respect of debenture interest. You are required to reconcile the profits shown by the two sets of accounts.
7. During a particular year, the auditors certified the financial accounts, showing a profit of Rs. 1,68,000, whereas the same as per costing books was coming out to be Rs. 2,40,000. Given the following information you are asked to prepare a reconciliation statement showing clearly the reasons for the gap

Trading and Profit and Loss A/c

Dr.	Rs.	Cr.	Rs.
To Opening Stock	8,20,000	By Sales	34,65,000
To Purchase	24,72,000	By Closing Stock	7,50,000
To Direct Wages	2,30,000		
To Factory Overheads	2,10,000		
To Gross Profit c/d	4,83,000		
	42,15,000		42,15,000
To Administration Exp.	95,000	By Gross Profit	4,83,000
To Selling Expenses	2,25,000	By Sundry Income	5,000
To Net Profit	1,68,000		4,88,000
	4,88,000		4,88,000

The costing records show

- (a) Book value of costing stock Rs. 7,80,000.
- (b) Factory overheads have been absorbed to the extent of Rs. 1,89,800

- (c) Sundry Income is not considered.
 - (d) Administrative Expenses are recovered at 3% of selling price.
 - (e) Total absorption of direct wages Rs. 2,46,000.
 - (f) Selling prices include 5% for selling expenses.
8. Prepare a Memorandum Reconciliation Account from the following particulars Profit shown by cost books Rs. 30,114 and by financial books Rs. 19,760. On reconciling the following information is available:
- 1) Overhead absorbed in cost books Rs. 7,500 and incurred Rs. 6,932
 - 2) Director's fees not included in cost books Rs. 750.
 - 3) Provision for bad debts Rs. 600.
 - 4) A new work was taken for Rs. 12,000 and depreciation of 5% was provided for only in the financial books.
 - 5) Transfer fees Rs. 28.
 - 6) Income tax Rs. 9,000

LESSON : 11

MANAGEMENT ACCOUNTING : NATURE AND SCOPE

INTRODUCTION

Accounting is as old as money itself. In India, Chanakya in his Arthashastra had emphasised the existence and need of proper accounting and auditing. However, the modern system of accounting owes its origin from Pacoili who lived in Italy in 15th century. In those early days the business organisations and transactions were not so complex due to their being small and easily manageable by the proprietor himself. Things have changed fast during the last fifty years. The advent of industrial revolution has resulted in large scale production, cut-throught competition and widening of the market. This has also reduced the effectiveness of personal supervision resulting in the decentralisation of authority and control. Old technique, management by intuition is no longer considered dependable in the situations in which the modern firm operates. Accounting today, therefore, cannot be the same as it is used to be about half a century back. It has also grown in importance and undergone change in its structure with the evolution of complex and giant industrial organisations. In the early stages accounting developed as a result of the needs of the business firm to keep track of their relationship with outsiders, listing of their assets and liabilities. In recent years, changes in technology have also brought a remarkable changes in the field of accounting. The whole concept of accounting has changed. It provides information that can be drawn upon by those responsible for decisions affecting the organisation's future. This history is written mostly in quantitative terms. It consists partly of files of data, partly of reports summarising various protions of these data, and partly of the plan established by management to guide its operations.

WHAT ACCOUNTING DOES

Accounting in modem times has two distinct functions to perform:

- a) Historical function; and
 - b) Managerial function
- a) **Historical Function :** This function is concerned with recording, classifying, summarising, analysing and interpreting the past transactions for an accounting period of a business enterprise. The objective of this function is to report at regular intervals to owners, managers and other interested parties by means of financial statements.
- b) **Managerial function :** This function is concerned with planning the future activities of the enterprise and controlling the operations of the business. This helps the management in looking forward. The actual results are compared with predetermined targets with the objective of the promoting maximum operational efficiency.

In the early stages of development of accounting, the historical function used to be the primary functions of the accountants. However, in recent time, the managerial function has become the important, function of accountants.

CLASSIFICATION OF ACCOUNTS

Based on the above functions, accounting can broadly be classified into two categories :

- A) Financial Accounting, and
- B) Management Accounting

A- FINANCIAL ACCOUNTING

Meaning : In its originating stage and even till recently, accounting developed mainly as an instrument of recording the transactions of the business to satisfy the requirements imposed by the fiduciary relationship between the business and its owners as well as third parties connected with the business such as creditors, financial institutions, etc. It thus developed along with the direction of 'Financial Accounting'.

The definition given by the American Institute of Certified Public Accountant clearly brings out the meaning and functions of Financial Accounting. According to it, “Financial Accounting is the art of recording, classifying and summarising in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character and interpreting the result thereof.”

Functions : An analysis of the definition brings out the following functions of financial accounting :

1. Recording :

This is the basic function of accounting. It is essentially concerned with not only ensuring that all business transactions of financial character are in fact recorded but also that they are recorded in an orderly manner. Recording is done in the book “Journal”. This book may be further sub-divided into various subsidiary books such as Cash Journal (for recording cash transactions), Purchases Journal (for recording credit purchases of goods), Sales Journal (for recording credit sales of goods etc.) The number of subsidiary books to be maintained will be according to the nature and size of the business.

2. Classifying :

Classification is concerned with the systematic analysis of recorded data, with a View to group transactions or entries of one nature at one place. The work of classification is done in the book termed as ‘Ledger’. This book contains on different pages individual account heads under which all financial transactions of similar nature are collected. For example, there may be separate account heads for Travelling Expenses, Printing and Stationery, Advertising, etc. All expenses under these heads after being recorded in the Journal will be classified under separate heads in the Ledger. This will help in finding out the total expenditure incurred under each of the above heads.

3. Summarising : This involves presenting the classified data in a manner which is understandable and useful to the internal as well external end users

of accounting statements. This process leads to the preparation of the following statements:

(i) Trail Balance, (ii) Income Statement (iii) Balance Sheet

4. Deals with financial transactions : Accounting records only those transactions and events in terms of money which are of a financial character. Transactions which are not of a financial character are not recorded in the books of account. For example, if a company has got a team of dedicated and trusted employees. It is of great use to the business but since it is not a financial character and capable of being expressed in terms of money, it will not be recorded in the books of business.

5. Interpreting : This is the final function of accounting. The recorded financial data is interpreted in a manner that the end-users can make a meaningful 'judgment' about the financial condition and profitability of the business operations. The data is also used for preparing the future plans and framing of policies for executing such plans.

LIMITATIONS OF FINANCIAL ACCOUNTING : Financial Accounting well answered the needs of business in the initial stages when the business was not so complex. The growth and complexities of modern business brought out the following limitations of Financial Accounting:

- 1. Provides only limited informations :** There are not no set-patterns of business on account or radical changes in business activities. An expenditure may not bring an immediate advantage to the business but it may have to be incurred because it may bring advantage to the business in the long run or may be necessary simply to sell the name of the business. The management needs a lot of others information to decide whether on the whole it will be justifiable to incur a particular expenditure or not. Financial accounting fails to provide such information.
- 2. Treats figures as single, simple silent items :** Financial accounting fails to make the people realise that accounting figures are not mere isolated phenomena but they represent a chain of purposeful and pertinent

events. The role of accountants these days is not only of a book-keeper and auditor but also that of a financial adviser. Recording of transactions is now the secondary function of the accountant. His primary function now is to analyse and interpret the results.

3. Provides only a post-mortem record of business transactions:

Financial accounting provides only a post-mortem record of business transactions since it records transactions only on historical basis. These days business decisions are made on the basis of estimates and projections rather than on sufficient facts. Thus, needs of modern management demand a break-up from the principles and practice of traditional accounting.

4. Considers only quantifiable information : Financial accounting considers only those factors which are capable of being quantitatively expressed. In modern times the concept of welfare state has resulted in increased government intervention in all sectors of the national economy. The management has, therefore, to take into account government decisions over and above purely commercial considerations. Some of these factors are not capable of being quantitatively expressed and hence their impact is not reflected in financial statements.

5. Fails to provide informational needs of different levels of management: company form of business organisation has divorced ownership from management. The shareholders are only rentiers of capital. The business is run in reality by different executives, each an expert in his area. These executives have powers based on the level of management to which they belong. There are usually three levels of management-Top, Middle and Lower. The top management is mainly concerned with the policy decisions. They therefore, are interested in knowing about the soundness of the plans, proper structuring of the organisation, proper delegation of authority and its effectiveness. The middle management executives function as coordinators. They must know (i) What happened? (ii) Where happened? and (iii) Who is

responsible? The lower management people function as operating supervisors. They should get information regarding effectiveness of their operations. The reports submitted to them should give details about the planned performance, actual performance and the deviations with their reasons. Financial accounting does not have a built-in system to provide all such information.

Management Accounting is to a large extent free from the above limitations. It makes use of information that is drawn from financial accounting.

B-MANAGEMENT ACCOUNTING

Meaning : The terms management accounting refers to accounting for the management, i.e. accounting which provides necessary information to the management for discharging its functions. The functions of the management are planning, organising, directing and controlling. Thus, management provides information to management so that planning, organising, directing and controlling of business operations can be done in an orderly manner.

The Chartered Institute of Management Accountants, London, defines Management Accounting as follows: “The application of professional knowledge and skill in the preparation of accounting information in such a way to assist management in the formation of policies and in the planning and control of the operations of the undertaking.”

The definition given by the American Accounting Association is as follows :

“Management Accounting is the application of appropriate techniques and concepts in processing historical and projected economic data of an entity to assist management in establishing plans for reasonable economic objectives in the making of rational decisions with a view towards achieving these objectives.”

The above definitions clearly indicate that management accounting is concerned with accounting information which is useful to the management.

Efficiency of the various phase of management is, as a matter of fact, the common thread which underlies all these definitions. However, it should be clearly understood that it does not supplant financial accounting but rather it supplements it in order to serve the diverse requirements of modern management.

Management accounting, covers all rearrangement, combination or adjustment of the orthodox accounting figures which may be required the Chief Executive with the information from which he can control the business.. It comprises accounting methods, systems and techniques which coupled with special knowledge and ability, assist management in its task of maximising profits or minimising losses.

FUNCTIONS OF MANAGEMENT ACCOUNTING

The basis function of management accounting is to assist the management in performing its function effectively. The functions of the management are planning; organising, directing and controlling. Management accounting helps in the performance of each of these functions in the following ways:

1. Provides Data :

Management accounting serves as a vital source of data for management planning. The accounts and documents are a repository of a vast quantity of data about the past progress of the enterprise which are a must for making forecasts for the future.

2. Modifies data :

The accounting data required for managerial decisions are properly compiled and classified. For example, purchase figures or different months may be classified to know total purchases made during each period product-wise, supplier-wise and territory-wise.

3. Analyses and Interprets data : The accounting data is analysed

meaningfully for effective planning and decision-making. For this purpose the data is presented in a comparative form. Ratios are calculated and likely trends are projected.

4. **Serves as a means of communicating :** Management accounting provides a means of communicating management plans upward, downward and outward through the organisation. Initially, it means identifying the feasibility and consistency of the various segments of the plan. At later stages it keeps all parties informed about the plans that have been agreed upon and their roles in these plans.
5. **Facilitates Control :** Management accounting helps in translating given objectives, and strategy into specified goals for attainment by a specified time and secures effective accomplishment of these goals in an efficient manner. All this is made possible through budgetary control and standard costing which are an integral part of management accounting.
6. **Uses also qualitative information :** Management accounting is concerned with presentation of accounting information in the most useful way for the management. Its scope is, therefore, quite vast. It includes within its fold almost all aspects of business operations. However, the following areas can rightly be identified as falling within the ambit of management accounting :
 - a) **Financial Accounting :** Management accounting is mainly concerned with the rearrangement of the information provided by financial accounting. Hence, management cannot obtain full control and coordination of operations without a properly designed financial accounting system.
 - b) **Cost Accounting :** Standard costing : Standard Costing, marginal costing, opportunity cost analysis, differential costing and other cost techniques play a useful role in operation and control of the business undertaking.

- c) **Revaluation Accounting** : This is concerned with the ensuring that capital is maintained intact in real terms and profit is calculated with this fact in mind.
- d) **Budgetary Control** : This includes framing of budgets, comparison of actual performance with the budgeted performance, computation of variances, finding of their causes, etc.
- e) **Inventory Control** : It includes control over inventory from the time it is acquired till its final disposal.
- f) **Statistical Method** : Graphs, charts, pictorial presentation, index numbers and other statistical methods make the information more impressive intelligible.
- g) **Interim Reporting** : This includes preparation of monthly, quarterly, half-yearly income statements and other related reports, cash flow and funds statements, scrap and reports, etc.
- h) **Taxation** : This includes computation of income in accordance with the tax laws, filing of returns and making tax payments.
- i) **Office Services** : This includes maintenance of proper data processing and other office management services, reporting on the best use of mechanical and electronic devices.
- j) **Internal Audit** : Development of a suitable internal audit system for internal control.

FUNCTIONS OF THE MANAGEMENT ACCOUNTANT

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

1. **Planning** : He has to establish, Coordinate and administer as an integral part of management, and adequate plan for the control of the operations. Such a plan would include profit planning, programme of capital

investment and financing, sales forecasts, expense budgets and cost standards.

2. Controlling : He has to compare actual performance with operating plans and standards and to report and interpret the result of operations to all levels of management and the owners of the business. This is done through the compilation of appropriate accounting and statistical records and reports.

3. Coordinating : He consults all segments of management responsible for policy or action. Such consultation might concern any phase of the operation of the business having to do with attainment of the objectives and the effectiveness of the organisation structures and policies.

4. Other functions :

- (i) He administers tax policies and procedures.
- (ii) He supervises and coordinates the preparation of reports to government agencies.
- (iii) He ensures fiscal protection for the assets of the business through adequate internal control and proper insurance coverage.
- (iv) He carries out continuous appraisal of economic and social forces, and the government influences, and interprets their effect on the business.

It should be noted that the functions of a Management Accountant are more of those of a 'staff official'. He, in addition to processing historical data, supplies a good deal of information concerning the future operations, in line with the management's needs. Besides serving top management with information concerning the company as a whole, he supplies detailed information to the line officers regarding alternative plans and their profitability, which help them in decision making.

REQUISITES FOR ACCOUNTANT SUCCESSFUL MANAGEMENT

The following are the basic requisites for a management Accountant to be successful in his job.

- 1. Direct Contact with the top management :** The goal of the management accountant is to channel for use in the process data that will have a vital influence on company policy. Technicalities and red-tape cause delay which may prove very costly to the business. He should, therefore, report directly to the President or the Chief Executive of the company.
- 2. Freedom From detail :** The most likely title of the Management Accountant is that of the controller. He is the principal officer incharge of accounts and performs such additional duties which the Board of Directors, the executive committee or the President of the company may assign to him from time to time. He cannot possibly measure up to this status if he is immersed in accounting routine or is a 'slage' to the operation of balancing.
- 3. Personal Qualities :** The Management Accountant has perhaps the maximum chances of going up high in the management hierarchy. He can make best use of the opportunities if he possess the following personal qualities :
 - a) A personality acceptable to all types of individuals that may make up the management group in company.
 - b) The ability to receive the views of management with comprehension and to appreciate the type of information management requires.
 - c) An understanding of how to fill the role of specialist and adviser.
 - d) A knowledge of theory as well as practice of management.
 - e) A balanced outlook on functioning of the business.
 - f) The capacity to think and confer with top management about matters central to the profitability and progress of the company.

MANAGEMENT ACCOUNTING PRINCIPLES

Besides the basic accounting principles which are accepted generally throughout the accounting profession, the following are the additional conventions/ principles which are now generally regarded as, essential part of management accounting:

1. Designing and Compiling :

Accounting information, records, reports statements, and other evidence of past, present, or future results should be designed and compiled to meet the needs of the particular business and/or specific problem.

This implies a certain flexibility of system. When a particular problem is to be solved the system should be capable of producing the relevant data. If necessary, there must be departure from double entry principles. Accounting and operational -research principles should be linked together. Information should be modified and adapted to meet each need whenever possible. However, it is important to remember that if this principle is carried too far, the cost of the management accountancy system may become excessive. It is partly for the reason that a systematic rather than an adhoc method, is used for accumulating costing data.

2. Management by exception :

The “principle of management by exception” is followed when presenting information to management.

This assumes than plans are predetermined and then-actual results are compared with expected results. If there are no deviations there is no necessary to report. When there are variations from predetermined plans, management is informed precisely of what is going wrong. In this way, the information presented to management is kept to the minimum, yet at the same time all important facts are being revealed. What is more,

management has less to read and study and therefore, should have more time to take action.

3. Control at source accounting :

Costs are best controlled at the points at which they are incurred. “Control-at-source accounting”. Recognition of this convention is acknowledge through the preparation, of departmental operating statements and the design of costing system which control individual workers, material issues, and the usage of services.

4. Accounting for inflation :

A profit can not be said to be earned unless capital is maintained intact in real terms. This convention recognizes that the monetary unit is not stable. Attempts to overcome the effects of changes in the value of money have been made via revaluation -accounting, bus as yet there is not general acceptance of the theory, However, there is strong evidence that more and more accountants are modifying their views to meet the dynamic state of business and the economy.

5. Use of ROI :

Return on capital employed is used as the criterion for measuring the efficiency of the business. For this purpose the capital employed should be calculated by reference to current replacement values.

6. Integration :

There should be integration of all management information so that fullest use is made of the facts available and at the same time, the accounting service should be provided minimum cost.

7. Absorption of overhead costs :

Overhead cost should be apportioned to cost centres and absorbed to products on the basis of benefits received for fixed costs or

responsibilities incurred for variable costs. The methods or methods selected should bring about the desired results of recovering the overheads in the most equitable manner. However, this is subject to what is stated on this matter later in the chapter on “Marginal Costing and Profit Planning”.

8. Utilisation of resources :

Management accountancy should endeavour to show whether or not the resources of the business are being utilised in the most effective manner.

9. Forwarded looking approach :

Management accountancy should seek to anticipate problems and prevent them. There should be a forward-looking approach, and actual costs should be employed only as measures of achievements realised. The principle recognises the importance of budgetary control and standard costing.

10. Appropriate means :

The most appropriate means of accumulating, recording and presenting the accountancy information should be selected.

This normally implies that mechanisation should be adopted as much as possible. It does not mean that every business should employ computer. The machines selected should be of a size and type that can economically be employed by the particular concern to deal, with its own problems. If there is insufficient work for a computer, then clearly this should not be acquired.

11. Personal Contacts :

Personal contact with departmental managers, foremen, and others can not be replaced entirely by reports and statements.

The above list of conventions is not exhaustive on account of the subject of management accounting being a growing own. It may be possible that in the

times to come many more suitable conventions may be developed by the management accountants all over the world which may be developed by the management accountants all over the world which may take the form of universally acceptable management accounting principles.

BENEFITS OF MANAGEMENT ACCOUNTING

Management accounting provides invaluable services to management in the performance of its functions effectively as explained below :

1. Planning : It involves formulation of policies, setting up of goals and initiating necessary programmes for achievement of the goals. Management accounting makes an important contribution in performance of this function. It makes available the relevant data after pruning and analysing them suitably by effective planning and decision-making.

2. Controlling

It involves evaluation of performance keeping in view that the actual performance coincides with the planned one, and remedial measures are taken in the event of variation between the two. The techniques of budgetary control, standard costing and departmental operating statements greatly help in performing this function. As a matter of fact the entire system of control is designed and operated by the management accountant designated as controller.

3. Coordinating :

It involves interlinking of different divisions of the business enterprise in a way so as to achieve the objectives of the organisation as a whole. Thus, perfect coordination is required among production, purchase, finance, personnel, sales, departments, etc. Effective coordination is achieved through departmental budgets and reports which form the nucleus of management accounting.

4. Organising :

It involves grouping of operative action in a way as to identify the authority

and responsibility within the organisation. Management accounting, here also plays a prominent role. The whole organisation is divided into suitable profit or cost centres. A sound system of internal control and internal audit for each of the cost or profit centres helps in organising and establishing a sound business structure

5. Motivating :

It involves maintenance of a high degree of morale in the organisation. Conditions should be such that each person gives his best to realise the goals of the enterprise. The superiors should be in a position to find out whom to demote or promote and to reward or penalise. Periodical department profit and loss accounts, budgets and reports go a long way in achieving this objective.

6. Communicating :

It involves transmission of data, result, etc. both to the insiders as well outsiders. The orders of the supervisors should be communicated to the subordinates while the results achieved by the subordinates should be reported to the, supervisors. Moreover, the management owes a duty to the creditors, prospective investors, shareholders, etc. to communicate to them about the progress, financial position, etc. of the enterprise, Management accounting helps the management in performance of this function by developing a suitable system of reporting which emphasis and highlights the relevant facts.

Management accounting is thus helpful to the management in every field of activity. This is the reason why management accountant is considered not only a service are to management but also a part of management.

LIMITATIONS OF MANAGEMENT ACCOUNTING

Management accounting being comparatively a new discipline, it suffers from the following limitations :

- 1. Limitations of basic records :** Management accounting derives its information from financial accounting and other records. The Strength

and weakness of the management accounting, limitations are also the limitations of the management accounting.

2. **Persistent efforts :** The conclusions drawn by the management accountant are not executed automatically. He has to convince people at all levels. In other words he must be an efficient salesman in selling his ideas.
3. **Management Accounting is only a tool :** Management accounting cannot replace the management. Management accountant is only an advisor to the management. The decision regarding implementing his advice is to be taken by the management. There is always a temptation to take an easy course of arriving at decision by intuition rather than going by the advice of the management accountant.
4. **Wide scope :** Management accounting has a very wide scope incorporating many disciplines. It considers both monetary as well as non-monetary factors. This all brings inexactness and subjectivity in the conclusions obtained through it.
5. **Top-heavy structure :** The installation of management accounting system requires heavy costs on account of an elaborate organisation and numerous rules and regulations. It can, therefore, be adopted only by big concerns.
6. **Oppositions to change :** Management accounting demands a breakaway from traditional accounting practices. It calls for a rearrangement of the personnel and their activities which is generally not liked by the people involved.

EXERCISE QUESTIONS

1. Define Management Accounting. Discuss the scope and functions and limitations of management Accounting.
2. Distinguish between financial Accounting and Management Accounting.
3. Define Management Accounting and state its advantages.

4. Management Accounting is the presentation of accounting information in such a way as to assist the management in the creation of policy and in the day-to-day operation of the undertaking. Elucidate the above statement giving suitable illustrations.
5. What are the duties and responsibilities of a Management Accountant?
6. There are no externally imposed generally accepted accounting principles for management accounting. In the light of the above statement discuss giving illustrations the nature and scope of management accounting.

References :

1. Production/operations Management
(Irwin/Toppan Publication - William J. Stevenson)
2. Production and Operations Management - Adam & Ebert (Prentice Hall of India Pvt. Ltd.)
3. Production Management - James Dilworth (McGraw Hill Publications)
4. Production/operations Management - B S Goel (Pragati Prakashan)
5. Production anti Operations Management - Chuna Wala and Patel (Himalya Publishing Housing)

LESSON : 12

ANALYSIS AND INTERPRETATION OF FINANCIAL STATEMENTS

Financial statements refer to at least two statements which the accountant prepares at the end of a given period of time for the business enterprise. These statements are :

1. Profit and Loss A/c which is prepared to ascertain the net results of a year's working of the business.
2. Balance Sheet which is prepared to ascertain the financial position of the business as on a particular date.

In the case of a limited company, financial statements also include Profit and Loss Appropriation Account. Sometimes the Statement of Sources and Applications of Funds also forms part of the financial statements.

Financial statements are prepared primarily for decision-making. They play a dominant role in setting the framework of managerial decisions. But the information provided in the financial statements is not an end in itself as no meaningful conclusions can be drawn from these statements alone. However, the information provided in the financial statements is of immense use in making decisions through analysis and interpretation of financial statements. Financial analysis is the process of identifying the financial strengths and weaknesses of the firm by properly establishing relationship between the items of the balance sheet and the profit and loss account. There are various methods or techniques used in analysing financial statements, such as comparative statements, common-size statements, trend analysis, schedule of changes in working capital, funds flow and cash flow analysis .and ratio analysis.

Meaning of Analysis of Financial Statements

An analysis is the process of critically examining in detail accounting

information given in the financial statements. For the purpose of analysis, individual items are studied, their interrelationships with other related figures are established, the data is sometimes rearranged to have better understanding of the information with the help of different techniques or tools for the purpose. Analysing financial statements is a process of evaluating relationship between component parts of financial statements to obtain a better understanding of firm's position and performance. The analysis of financial statements thus refers to the treatment of the information contained in the financial statements in a way so as to afford a full diagnosis of the profitability and financial position of the firm concerned. For this purpose financial statements are classified methodically, analysed and compared with the figures of previous years or other similar firms.

Meaning of Interpretation

Analysis and interpretation are closely related. Interpretation is not possible without analysis and without interpretation analysis has not value. Various account balances appear in the financial statements. These account balances do not represent homogeneous data so it is difficult to interpret them and draw some conclusions. This requires an analysis of the data in the financial statements so as to bring some homogeneity to the figures shown in the financial statements. Interpretation is thus drawing of inference and stating what the figures in the financial statements really mean. Interpretation is dependent on interpreter himself. Interpreter must have experience, understanding and intelligence to draw correct conclusions from the analysed data.

Objectives of Financial Analysis

Financial analysis is helpful in assessing the financial position and profitability of a concern. This is done through comparison by ratios for the same concern over a period of years; or for one concern against another; or for one concern against the industry as a whole; or for one concern against the predetermined standards; or for one department of a concern against other departments of the same concern. Accounting ratios calculated for a number of years show the trend of the change of position, i.e., whether the trend is

upward or downward or static. The ascertainment of trend helps us in making estimates for the future. For example, ratios of gross profit to sales for the last five years indicate a rising trend. We can safely estimate that ratio of gross profit to sales for the next years will also rise. Keeping in view the importance of accounting ratio the accountant should calculate the ratios in appropriate form as early as possible, for presentation to management for managerial control.

In short, the main objectives of analysis of financial statements are to assess :

- (i) the present and future earning capacity or profitability of the concern,
- (ii) the operational efficiency of the concern as a whole and of its various parts or departments,
- (iii) the short-term and long term solvency of the concern for the benefit of the debenture holders and trade creditors,
- (iv) the comparative study in regard to one firm with another firm or one department with another department,
- (v) the possibility of developments in the future by making forecasts and preparing budgets,
- (vi) the financial stability of a business concern, and
- (vii) the long-term liquidity of its funds.

TOOLS OF FINANCIAL STATEMENT ANALYSIS.

A variety of tools can be used by a financial analyst for the purposes of analysis and interpretation of financial statements particularly with a view to suit the requirements of the specific enterprise.. The principal tools are as under :

1. Comparative Statements
2. Common-size Statements
3. Trend Analysis

4. Cash Flow Statement
5. Ratio Analysis
6. Funds Flow statements

1. Comparative Statements

Comparative statements are the statements prepared to trace the periodic changes in the financial performance of a company. Comparative statements will contain items at least for two periods. Generally two separate statements (one for Balance Sheet and one for Profit and Loss Account) are prepared in comparative form for the purpose of financial analysis. The changes in Balance Sheet and Profit Loss Account over period can be shown in two ways.

- a) Aggregate Changes
- b) Proportionate Changes.

Comparative statements can also be used to compare the performance of a firm with that of other firms. However, the financial data will be comparable only when same accounting policies are used in preparing these statements. In case of different accounting policies and frequent changes in them, both inter-firm comparison and inter-period comparison will be misleading.

a) Comparative Income Statement

The comparative Income Statement is the study of the trend of the same items / group of items in two or more Income Statements of the firm for different periods. The changes in the Income Statement items over the period would help in forming opinion about the performance of the enterprise in its business operations.

Interpretation of Comparative Income Statement

- (i) The changes in sales should be compared with the changes in cost of

goods sold. If increase in sales is more than the increase in the cost of goods sold, then the profitability will improve.

- ii) An increase in operating expenses or decrease in sales would imply decrease in operating profit and a decrease in operating expenses or increase in sales would imply increase in operating profit.
- iii) The increase or decrease in net profit will give an idea about the overall profitability of the concern.

Illustration 1 : The Income Statement of Nikhil Ltd. are given for the years 1998 and 1999. Rearrange the figures in a comparative form and study the profitability position of the firm

Items	1998 (Rs.)	1999 (Rs.)
Net Sales	15,00,000	20,00,000
<i>Less</i> Cost of Goods Sold	12,00,000	15,00,000
Gross Profit	3,00,000	5,00,000
<i>Less</i> Operating Expenses (Administration, Selling Distribution Expenses)	75,000	1,00,000
Operating Profit	2,25,000	4,00,000
<i>Add</i> Other Incomes	25,000	40,000
Earnings before Interest & Tax	2,50,000	4,40,000
<i>Less</i> Interest	40,000	40,000
Earnings before Tax	2,10,000	4,00,000
<i>Less</i> Tax Payable	84,000	1,60,000
Profit after Tax	1,26,000	2,40,000

Solution :

Comparative Income Statement

For the year ended 31st Dec. 1998 and 1999

Items	31.12.98 Rs.	31.12.99 Rs.	Increase (Decrease) (Rs.)	Percentage Increase (Decrease)
Net Sales	15,00,000	20,00,000	5,00,000	33.3
<i>Less</i> Cost of Goods Sold	12,00,000	15,00,000	3,00,000	25.0
Gross Profit	3,00,000	5,00,000	2,00,000	66.7
<i>Less</i> Operating Expenses (Administration Selling & Distribution Expenses)	75,0000	1,00,000	25,000	33.3
Operating Profit	2,25,000	4,00,000	1,75,000	77.8
<i>Add</i> Other Incomes	25,000	40,000	15,000	60.0
Earning before Interest & Tax	25,00	4,40,000	1,90,000	76.0
<i>Less</i> Interest	40,000	40,000	-	-
Earning before tax	2,10,000	4,00,000	1,90,000	90.5
<i>Less</i> Tax	84,000	1,60,000	76,000	90.5
Earnings after Tax	1,26,000	2,40,000	1,14,000	90.5

b) Comparative Balance Sheet

The comparative Balance Sheet analysis would highlight the trend of various items and groups of items appearing in two or more Balance Sheets of a firm on different dates. The changes in periodic balance sheet items would reflect the changes in the financial position at two or more-periods.

Interpretation of Comparative Balance Sheet

- i) The increase in working capital would imply increase in the liquidity position of the firm over the period and the decrease in working capital would imply deterioration in the liquidity position of the firm.
- ii) An assessment about the long-term financial position can be made by studying the changes in fixed assets; capital and long-term liabilities. If the increase in capital and long-term liabilities is more than the increase in fixed assets, it implies that a part of capital and long-term liabilities has been used for financing a part of working capital as well. This will be a reflection of the good financial policy. The reverse situation will be a signal towards increasing degree of risk to which the long-term solvency of the concern would be exposed to
- iii) The changes in retained earnings, reserves and surpluses will give an indication about the trend in profitability of the concern. An increase in reserve and surplus and the Profit-and Loss Account is an indication of improvement in profitability of the concern. The decrease in these accounts may imply payment of dividends, issue of bonus shares or deterioration in profitability of the concern.

Illustration 2 : From the following Balance Sheets of Pal Ltd. as on 31st December, 1998 and 1999, prepare a comparative Balance Sheet for the concern

Balance Sheet of Pal Ltd. as on

Liabilities	1998 (Rs.)	1999 (Rs.)	Assets	1998 (Rs.)	1999 (Rs.)
Equity share capital	3,00,000	4,00,000	Land & Building	2,00,000	1,50,000
Reserves & surpluses	1,60,000	1,10,000	Plant & Machinery	2,00,000	3,00,000
Debentures	1,00,000	1,50,000	Furniture	25,000	30,000
Mortgage loan	80,000	1,00,000	Bills receivables	75,000	45,000
Bills Payable	30,000	25,000	S. Debtors	1,00,000	1,25,000

S. Creditors	50,000	60,000	Stock	1,13,000	1,72,000
Other current Liabilities	5,000	10,000	Prepaid Expenses	2,000	3,000
			Cash & Bank Balance	10,000	30,000
	7,25,000	8,55,000		7,25,000	8,55,000

Solution :

Comparative Balance Sheet of Pal Ltd.

Item	Year Ending		Increase (Decrease) (Rs.)	Increase/ (Decrease) (Percentage)
	31.12.98 (Rs.)	31.12.99 (Rs.)		
Fixed Assets				
Land & Building	2,00,000	1,50,000	(50,000)	(25.0)
Plant & Machinery	2,00,000	3,00,000	1,00,000	50.0
Furniture	25,000	30,000	5,000	20.0
Total Fixed Assets	4,25,000	4,80,000	55,000	12.9
Current Assets				
Bills receivable	75,000	45,000	(30,000)	(40.0)
S. Debtors	1,00,000	1,25,000	25,000	25.0
Stock	1,13,000	1,72,000	59,000	52.2
Prepaid Expenses	2,000	3,000	1,000	50.0
Cash & Bank Balance	10,000	30,000	20,000	200.0
Total Current Assets	3,00,000	3,75,000	75,000	25.0
Total Assets	7,25,000	8,55,000	1,30,000	17.9

(360)

Shareholders' Funds				
Equity Share Capital	3,00,000	4,00,000	1,00,000	33.3
Reserves & Surpluses	1,60,000	1,10,000	(50,000)	(31.3)
Total Shareholders Funds	4,60,000	5,10,000	50,000	10.9
Long- Term Loans				
Debentures	1,00,000	1,50,000	50,000	50.0
Mortgage Loan	80,000	1,00,000	20,000	25.0
Total Long- Term Loans	1,80,000	2,50,000	70,000	38.9
Current Liabilities				
Bills Payable	30,000	25,000	(5,000)	(16.7)
S. Creditors	50,000	60,000	10,000	20.0
Other Current Liabilities	5,000	10,000	5,000	100.0
Total Current Liabilities	85,000	95,000	10,000	11.8
Total Liabilities	7,25,000	8,55,000	1,30,000	17.9

2. Common-size Statements

Financial statements when read with absolute figures are not easily understandable. It is, therefore, necessary that figures reported in these statements should be converted into percentage to total which is taken equivalent to hundred. This kind of analysis is also called as vertical analysis. It depicts a static view of the qualitative relationship between the items of the Balance Sheet and Profit and Loss Account. But if it is studied over a period of time, then it becomes a dynamic analysis, that is, vertical analysis presented horizontally.

This technique throws light on the structure of the Balance Sheet and Profit and Loss Account. The trend depicted by common size analysis is more authentic as it reflects qualitative assessment as against quantitative assessment depicted by absolute figures.

a) Common Size Income Statement

In the case of Income Statement, the sales figure is assumed to be equal to 100 and all other figures are expressed as percentage of sales. The relationship between items of Income Statement and volume of sales is quite significant since it would be helpful in evaluating operational activities of the concern.. The selling expenses will certainly go up with increase in sales. The administrative and financial expenses may go up or may remain at the same level. In case of decline in sale, selling expenses should definitely decrease.

Illustration 3 : From the following Profit and Loss Account of Ram Ltd. for the year ending 31st December 1998, and 1999 prepare common size Income Statement and give your interpretation.

**Profit & Loss Account of Ram Ltd. for the
year ending 31st December**

	1998 (Rs.)	1999 (Rs.)
Net Sales	22,30,000	31,85,000
<i>Less</i> Cost of Goods sold	15,35,000	22,70,000
Gross Margin	6,95,000	9,15,000
<i>Less</i> Operating Expenses	4,02,000	6,02,000
Income before interest & tax	2,93,000	3,13,000
<i>Less</i> Interest	18,000	30,000
Net Income before Tax	2,75,000	2,83,000
<i>Less</i> Tax @ 50%	1,37,500	1,41,500
Net Income After Tax	1,37,500	1,41,500

Solution :

Common Size Income Statement of Ram Ltd.
for the year ending 31st December

Item	1998		1999	
	Rs.	%age	Rs.	%age
Net Sales	22,30,000	100.00	31,85,000	100.0
<i>Less</i> cost of goods sold	15,35,000	68.80	22,70,000	71.3
Gross Margin	6,95,000	31.20	9,15,000	28.7
<i>Less</i> operating expenses	4,02,000	18.00	6,02,000	18.9
Income Before interest & tax	2,93,000	13.20	3,13,000	9.8
<i>Less</i> interest	18,000	0.80	30,000	0.9
Net Income before Tax	2,75,000	12.30	2,83,000	8.9
<i>Less</i> Tax	1,37,500	6.15	1,41,500	4.45
Net income tax	1,37,500	6.15	1,41,500	4.45

Comments

The absolute figures reveal that sales, cost of goods sold and gross margin all have increased over the last year. But the common size statement reveals that cost of goods sold has increased in 1999 in relation to sales. Consequently gross profit margin has declined during the current year. Similarly, net income after tax, in terms of absolute figures, shows an increase on the previous year, but the rate of net profit on sales in 1999 is 4.45 as against 6.15 in 1998. Thus, the overall profitability has decreased in 1999 due to rise in cost of sales.

b) Common Size Balance Sheet

For the purpose of common size Balance Sheet, the total of assets or

liabilities is taken as 100 and all the figures are expressed as percentage of the total. In other words, each asset is expressed as percentage to total assets/liabilities and each liability is expressed as percentage to total assets/liabilities. This statement will throw light on the solvency position of the concern by providing an analysis of pattern of financing both long-term and working capital needs of the concern.

Illustration 4 : The following are the Balance Sheets of X Ltd. and Y Ltd. for the year ending 31st December, 2000

**Balance Sheet of X Ltd. and Y Ltd.
for the year ending 31st Dec. 2000**

Liabilities	X Ltd.	Y Ltd.	Assets	X Ltd.	Y Ltd.
Equity Share Capital	3,00,000	00,000	Land & Building	60,000	3,40,000
Prof. Share capital	2,00,000	3,20,000	Plant & Machinery	6,60,000	10,00,000
Reserve & Surpluses	68,000	1,36,000	Investment	10,000	80,000
Long-term loans	2,30,000	3,50,000	S. Debtors	20,000	50,000
Bills Payable	4,000	10,000	Stock	16,000	60,000
S. Creditors	24,000	38,000	Prepaid Expenses	2,000	4,000
Expenses Outstanding	30,000	42,000	Cash in Hand	8,000	22,000
Proposed Dividend	20,000	60,000			
	876,000	15,56,000		8,76,000	5,56,000

Compare the financial position of two companies with the help of common size Balance Sheet.

Solution :

Common Size Balance Sheet as on 31st December, 2000

Item	X Ltd.		Y Ltd.	
	Rs.	%age	Rs.	%age
Shareholder Funds				
Equity Share Capital	3,00,000	34.2	6,00,000	38.6
Preference Share Capital	2,00,000	22.8	3,20,000	20.6
Reserve & Surplus	68,000	7.8	1,36,000	8.7
Total	5,68,000	64.8	10,56,000	67.9
Long Term Loans	2,30,000	26.3	3,50,00	22.5
Total	2,30,000	26.3	3,50,000	22.5
Current Liabilities				
Bills payable	4,000	0.5	10,000	0.6
S. Creditors	24,000	2.7	38,000	2.4
Expenses outstanding	30,000	3.4	42,000	2.7
Proposed dividend	20,000	2.3	60,000	3.9
Total	78,000	8.9	1,50,000	9.6
Grand Total	8,76,000	100.0	15,56,000	100.0
Fixed Assets				
Land & Building	1,60,000	18.3	3,40,000	21.8
Plant & Machinery	6,60,000	75.3	10,00,000	64.3
Total	8,20,000	93.6	13,40,000	86.1
Investments	10,000	1.2	80,000	5.1

Total	10,000	1.2	80,000	5.1
Current Assets				
S. Debtors	20,000	2.3	50,000	3.2
Stock	16,000	1.8	60,000	3.9
Prepaid expenses	2,000	0.2	4,000	0.3
Cash in hand	8,000	0.9	22,000	1.4
Total	46,000	5.2	1,36,000	8.8
Grand Total	8,76,000	100.0	15,56,000	100.0

The statements show that both the companies depend more on shareholders funds for meeting their long-term requirements as the proportion of shareholders funds stands at 64.8% for X Ltd. and 67.9% for Y Ltd. However the long-term funds are not sufficient to finance the requirements of fixed assets in case of X Ltd. X Ltd.'s long-term funds stand at 91.1% (64.8+26.3) against fixed asset at 93.3% of the total of the Balance Sheet. Both the companies suffer from inadequacy of working capital since the proportion of current liabilities is more than the proportion of current assets. However, X Ltd.'s positions much worse than Y Ltd. in this regard.

3. Trend Analysis

Trend analysis is an important tool of horizontal financial analysis. This is immensely helpful in making a comparative study of the financial statements of several years. Under this method trend percentages are calculated for each item of the financial statement taking the figure of base year as 100. The starting year is usually taken as the base year. The trend percentages show the relationship of each item with its preceding year's percentages. These percentages can also be presented in the form of index numbers showing relative change in the financial data of certain period. This will exhibit the direction, (i.e., upward or downward trend) to which the concern is proceeding. These trend ratios may be compared with industry ratios in order to know the strong

or weak points of a concern. These are calculated only for major items instead of calculating for all items in the financial statements.

While calculating trend percentages the following precautions may be taken:

- (a) The accounting principles and practices must be followed constantly over the period for which the analysis is made. This is necessary to maintain consistency and comparability.
- (b) The base year selected should be normal and representative year.
- (c) Trend percentages should be calculated only for those items which have logical relationship with one another.
- (d) Trend percentages should also be carefully studied after considering the absolute figures on which these are based. Otherwise, they may give misleading conclusions.
- (e) To make the comparison meaningful, trend percentages of the current year should be adjusted in the light to price level changes as compared to base year.

Illustration 5 : Interpret the results of operations of a manufacturing concern using trend ratios, on the following information:

(Amount in '000 Rupees)

For the year ended 31st March

Items	1999	1998	1997	1996
Sales (net)	13,000	12,000	9,500	10,000
Cost of goods sold	7,280	6,960	5,890	6,000
Gross Profit	5,720	5,040	3,610	4,000
Selling Expenses	1,200	1,100	970	1,000
Net Operating Profit	4,520	3,940	2,640	3,000

Solution :

Trend Ratios

31st March, 1996 = 100

Items	1996	1997	1998	1999
Sales	100	95	120	130
Gross of Goods sold	100	98.	116	121
Gross Profit	100	90	126	143
Selling Expenses	100	97	110	120
Net Operating Profit	100	88	131	150

Interpretation

From the above statement the following points are worth noting:

- (a) The sales volume, cost of goods sold and selling expenses all declined in 1997 as compared to 1996 but the decrease in cost of goods sold and selling expenses was lesser to the decrease in sales volume.
- (b) The sales volume, cost of goods sold and selling expenses in 1998 and 1999 have increased in comparison to 1996 but the increase in cost of goods sold and selling expenses is lesser to the increase in sales volume.

In conclusion, it can be said that a large proportion of cost of goods sold and selling expenses is fixed and is not affected by changes in sales volume. This fact also becomes clear from this fact that in 1997 when sales fell down, the decrease in the company's net operating profit was faster to sales volume and in 1999 when the sales volume increased, the increase in company's net profit was faster to sales volume.

4. Cash Flow Statement

A cash flow statement shows an entity's cash receipts classified by major sources and its cash payments classified by major uses during a period.

It provides useful information about an entity's activities in generating cash from operations to repay debt, distribute dividends or reinvest to maintain or expand its operating capacity; about its financing activities, both debt and equity; and about its investment in fixed assets or current assets other than cash. In other words, a cash flow statement lists down various items and their respective magnitude which bring about changes in the cash balance between two balance sheet dates. All the items whether current or non-current which increase or decrease the balance of cash are included in the cash flow statement. Therefore, the effect of changes in the current assets and current liabilities during an accounting period on cash position, which is not shown in a fund flow statement is depicted in a cash flow statement. The depiction of all possible sources and application of cash in the cash flow statement helps the financial manager in short term financial planning in a significant manner because the short term business obligations such as trade creditors, bank loans, interest on debentures and dividend to shareholders can be met out of cash only.

The preparation of cash flow statement is also consistent with the basic objective of financial reporting which is to provide information to investors, creditors and others which would be useful in making rational decisions. The basic objective is to enable the users of information to make prediction about cash flows in an Organisation since the ultimate success or failure of the business depends upon the amount of cash generated. This objective is sought to be met by preparing a cash flow statement.

DISTINCTION BETWEEN FUND FLOW STATEMENT AND CASH FLOW STATEMENT

Both fund flow statement and cash flow statement are prepared to summarise the causes of changes in the financial position of a business. A fund flow statement is prepared on the assumption that the changes in the financial position of a business are effected through inflow or outflow of net working capital (excess of total of current assets over total of current liabilities), whereas a cash flow statement assumes that the financial position of a business changes through the inflow and outflow of cash. Some of the main difference between

a fund flow statement and a cash flow statement are described below:

1. Concept of funds : A fund flow statement is prepared on the basis of a wider concept of funds i.e., net working capital (excess of current assets over current liabilities) whereas cash flow statement is based upon narrower concept of funds i.e., cash only.

2. Basis of accounting : A fund flow statement can also be distinguished from a cash flow statement from the point of view of the basis of accounting used for preparing these statements. A fund flow statement is prepared on the basis of accrual basis of accounting, whereas a cash flow statement is based upon cash basis of accounting. Due to this reason, adjustments for incomes received in advance, incomes outstanding, prepaid expenses and outstanding expenses are made to compute cash earned from operations of the business (refer to computation of cash from operations). No such adjustments are made while computing funds from operations in the funds flow statement.

3. Mode of preparation : A fund flow statement depicts the sources and application of funds. If the total of sources is more than that of applications then it represents increase in net working capital. On the other hand if the total of applications of funds is more than that of sources then the difference represents decrease in net working capital. A cash flow statement depicts opening and closing balance of cash and inflows and outflows-of cash. In a cash flow statement, to the opening balance of cash all the inflows of cash are added and from the resultant total all the outflows of cash are deducted. The resultant balance is the closing balance of cash. A cash flow statement is just like a cash account which starts with opening balance of cash on the debit side to which receipts of cash are added and from the resultant total, the total of all the payments of cash (shown on the credit side) is deducted to find out the closing balance of cash.

4. Treatment of current assets and current liabilities : While preparing a funds flow statement the changes in current assets and current liabilities are not disclosed in the funds flow statement rather these changes are shown in

a separate statement known as schedule-of changes in working capital. In a cash flow statement no distinction is made between current assets and fixed assets, and current liabilities and long-term liabilities. All changes are summarised in the cash flow statements.

5 Usefulness in planning : A cash flow statement aims at helping the management in the process of short term financial planning. A cash flow statement is useful to the management in assessing its ability to meet its short term obligations such as trade creditors, bank loans, interest on debentures, dividend to shareholders and so on. A fund flow statement on the other hand is very helpful in intermediate and long-term planning, because though it is difficult to plan cash resources for two, three or more years ahead yet one can plan adequate working capital for future periods.

Uses and Importance of Cash Flow Statements

Cash flow statements are of great importance to a financial manager. The information contained in cash flow statement can help the management in the field of short-run financial planning and cash control. Some of the important advantages of cash flow statements are discussed below:

1. Cash flow statements help in the process of the formulation and implementation of financial policies and plans. They also help in controlling the cash position of business. The projected cash flow statements if prepared in a business disclose surplus or shortage of cash well in advance. This helps in arranging utilisation of surplus cash as bank deposits or investment in marketable securities for short periods. Should there be shortage of cash, arrangement can be made for raising the bank loan or sell marketable securities.
2. Cash flow statements are of extreme help in planning liquidation of debt, replacement of plant and fixed assets and similar other decisions requiring outflow of cash from the business as they provide information about the cash generating ability of the business.

3. The cash flow statement pertaining to a particular year compared with the budget for that year reveals the extent to which the actual sources and applications of cash were in consonance with the budget. This exercise helps in refining the planning process in future.
4. Cash flow statements also explain the situations when there is an absence of sufficient cash in a business despite the fact its profit and loss account shows profit. In the same fashion, presence of surplus cash, despite profit and loss account showing losses is also explained by a cash flow statement.
5. The inter-firm and temporal comparison of cash flow statements reveals the trend in the liquidity position of a firm in comparison to other firms in the industry. It can serve as a pointer to the need for taking corrective action if it is observed that the management of cash in the firm is not effective.
6. Cash flows statements are more useful in short term financial analysis as compared to fund flow statements since in the short run it is cash which is more important for executing plans rather than working capital.

Limitation of Cash flow Statements

Cash flow statement serves a number of objectives of the management but at the same time it also suffers from some limitations. Some of the limitations of cash flow statements are :

1. The possibility of window dressing in cash position is more than in the case of working capital position of a business. The cash balance can easily be maneuvered by deferring purchases and other payments, and speeding up collections from debtors before the balance sheet date. The possibility of such maneuvering is lesser in respect of working capital position. Therefore a fund flow statement which shows reasons responsible for the changes in the working capital presents a more realistic picture than cash flow statement.

2. The liquidity position of a business does not depend upon cash position only. In addition to cash it is also dependent upon those assets also, which can be converted into cash. Exclusion of these assets while assessing the liquidity of a business obscures the true reporting of the ability of the business in meeting its liabilities on becoming due for payment.
3. There are occasions when there is a difference of opinion over the exact meaning of the term cash. Some people include items like cheques, stamps, postal orders etc., in cash whereas others do not include these items while assessing the cash position.
4. Equating of cash generated from the operations of the business with the net operating income of the business is not fair because while computing cash generated from business operations, depreciation on fixed assets is excluded. This treatment leads to a mismatch between the expenses and revenue while determining the business results as a charge is made in the profit and Loss account for the use of fixed assets.
5. A relatively larger amount of cash generated from business operations vis-a-vis net profit earned may prompt the management to pay a higher rate of dividend, which in turn may affect the financial health of the firm adversely.

PROCEDURE FOR PREPARING A CASH FLOW STATEMENT

Cash flow statement shows the impact of various transactions on the cash position of a firm. It is prepared with the help of financial statements, i.e., balance sheet and profit and loss account and some additional information. A cash flow statement starts with the opening balance of cash and balance at bank, all the inflows of cash are added to the opening balance and the outflows of cash are deducted from the total. The balance, i.e., opening balance of cash and bank balance plus inflows of cash minus outflows of cash is reconciled with the closing balance of cash. The preparation of cash flow statement involves the determining of :

- (a) Inflows of cash
- (b) Outflows of cash.

(a) Sources or Cash Inflows :

The main sources of cash inflows are :

- (1) Cash flow from operations.
- (2) Increase in existing liabilities or creation of new liabilities.
- (3) Reduction in or Sale of Assets.
- (4) Non-trading Receipts.

(b) Application or Cash :

- (1) Cash lost in operation.
- (2) Decrease in or discharge of liabilities.
- (3) Increase in or purchase of assets.
- (4) Non-trading payments.

Generally, cash flow statement is prepared in two forms

- (a) Report form
- (b) T Form or an Account Form or Self Balancing Type

SPECIMEN OF REPORT FORM OF CASH FLOW STATEMENT
Cash balance in the beginning
Rs.
<i>Add: Cash inflows:</i>
Cash flow from operations
Sale of assets
Issue of shares Issue of debentures

Raising of loans	
Collection from debtors	
Non trading receipts such as :	
Dividend received	
Income tax refund	
<i>Less: Applications or Outflows of cash:</i>	
Redemption of Preference shares	
Redemption of debentures	
Repayment of loans	
Purchase of assets	
Payment of dividend	
Payment of taxes	
Cash lost in operations	
Cash Balance at the end	

**SPECIMEN OF T FORM OR AN ACCOUNT OF
CASH FLOW STATEMENT**

	Rs.		Rs.
Cash balance in the beginning		<i>Outflow of Cash:</i>	
<i>Add: Cash inflows:</i>		Redemption of Preference	
Cash flow from operation		Shares	
Sale of Assets		Redemption of Debentures	
Issue of Shares		Repayment of Loans	
Issue of Debentures		Purchase of Assets	
Raising of Loans		Payment of Dividends	

Collection from Debtors		Payment of Tax	
Dividends Received		Cash lost in Operations	
Refund of tax		Cash Balance at the end	

SOURCE OF CASH INFLOWS

1. Cash from Operations or Cash Operating Profit

Cash from trading operations during the year is a very important source of cash inflows. The net effect of various transactions in a business during a particular period is either net profit or net loss. Usually, net profit results in inflow of cash and net loss in outflow of cash. But it does not mean that cash generated from trading operations in a year shall be equal to the net profit or that cash lost in operations shall be identical with net loss. It may either be more or less. Even, there may be a net loss in a business, but yet there may be a cash inflow from operations. It is so because of certain non operating (expenses or incomes) charged to the income statement, i.e., Profit and Loss Account.

How to Calculate Cash- from Operations or Cash Operating Profit?

There are three methods of determining cash from operations:

(a) From Cash Sales : Cash from operations can be calculated by deducting cash purchases and cash operating expenses from cash sales, i.e. Cash from Operations=

$(\text{Cash Sales}) - (\text{Cash Purchases} + \text{Cash Operating Expenses}).$

Cash sales are calculated by deducting credit sales or increase in receivables from the total sales. From the cash sales, the cash purchases and cash operating expenses are to be deducted. In the absence of any information, all expenses may be assumed to be cash expenses. In case outstanding and prepaid expenses are known/given, any decrease in outstanding expenses or increase in prepaid expenses should be deducted from the corresponding figure.

(b) From Net Profit/Net Loss

Cash from operations can also be calculated with the help of net profit or net loss. Under this method, net profit or net loss is adjusted for non-cash and non-operating expenses and incomes as follows :

Calculation of Cash From Trading Operations	Amount
Net Profit (as given)	
<i>Add:</i> Non cash and Non-operating items which have already been debited to P & L A/c :	
Depreciation	
Transfer to Reserves	
Transfer to Provisions	
Goodwill written off	
Preliminary expenses written off	
Other intangible assets written off	
Loss on sale or disposal of fixed assets	
Increase in Accounts Payable	
Increase in outstanding expenses	
Decrease in prepaid expenses	
<i>Less:</i> Non-cash and Non-operating items which have already been credited to P & L A/c:	
Increase in Accounts Receivables	
Decrease in Outstanding Expenses	
Increase in Prepaid Expenses	
Cash from Operations	

(C) Cash Operating Profit

Cash operating profit is also calculated with the help of net profit or net loss. The difference in this method as compared to the above discussed method is that increase or decrease in accounts payable and accounts receivable is not adjusted while finding cash from operations and it is directly shown in the cash flow statement as an inflow or outflow of cash as the cash may be. The cash from operations so calculated is generally called operating profit.

Calculation of Cash Operating Profit	Amount
Net Profit (as given) or Closing Balance of Profit and Loss A/c	
<i>Add:</i> Non-cash and non-operating items which have already been debited to P& L A/c :	
Depreciation	
Transfers to Reserves and Provisions	
Writing off intangible assets	
Outstanding Expenses (current year)	
Prepaid Expenses (previous year)	
Loss on Sale of fixed Assets	
Dividend Paid, etc.	
<i>Less:</i> Non-cash and non-operating items which have already been credited to P&L A/c :	
Profit on Sale or disposal of fixed assets	
Non-trading receipts such as dividend received, rent received, etc.	
Re-transfers from provisions	

(excess provisions charged back)	
Outstanding income (current year)	
Pre-received income (in previous year)	
Opening balance of P & L A/c	
Cash Operating Profit	

Note: Generally the cash operating profit method has to be followed because of its similarity with calculating funds from operations. However, if this method is followed the following two points need particular care:

(i) Outstanding/Accrued Expenses : The outstanding/accrued expenses represent those expenses which are although charged to profit and loss account but no cash is paid during the year. For this reason, outstanding /accrued expenses of the current year are added back while calculating cash operating profit. However if some outstanding expenses of the previous year are also given, these may be assumed to have been paid during the year and hence shown as an outflow of cash in the cash flow statement.

(ii) Prepaid Expenses : Prepaid expenses are those expenses which are paid in advance and hence result in the outflow of cash but are not charged to profit and loss account because they do not relate to the current period of profit and loss account. For this reason, prepaid expenses of the current year should be taken as an outflow of cash in the cash flow statement. But the expenses, if any, paid in the previous year do not involve outflow of cash in the current year but are charged to profit and loss account. Therefore, prepaid expenses of the previous year (related to the current year) should be added back while calculating cash operating profit. In the similar way, we can deal with outstanding and pre-received incomes.

Illustration 6 : From the following information calculate cash from operations:

Rs.

Net Profit for the year	30,000
-------------------------	--------

Total Sales	60,000
Debtors Outstanding in the beginning of the year	20,000
Debtors outstanding at the end of the year	15,000

Solution :

Calculation of Cash From Operations

	Rs.
Net profit for the year	30,000
<i>Less:</i> Debtors outstanding at the end of the year	15,000
<i>Add:</i> Debtors outstanding in the beginning of the year	20,000
Cash from operations	35,000

Illustration 7 : Calculate Cash from operations from the following informations :

	Rs.
Sales	70,000
Purchases	40,000
Expenses	8,000
Creditors at the end of the year	15,000
Creditors in the beginning of the year	12,000

Solution :

	Rs.	Rs.
		70,000
Sales	40,000	
<i>Less :</i> Purchases	8,000	48,000
Profit for the year	<u> </u>	<u>22,000</u>

(380)

<i>Add:</i> Creditors at the end of the year	15,000
	<hr/>
	37,000
<i>Less:</i> Creditors at the beginning of the year	12,000
	<hr/>
Cash from operations	<u>25,000</u>

2. Increase in Existing Liabilities or Creation of new Liabilities

If there is an increase in existing liabilities or a new liability is created during the year, it results in the flow of cash into the business. The liability may be either a fixed long-term liability such as equity share capital, preference share capital, debentures, long-term loans, etc. or a current liability such as sundry creditors, bills payable, etc.

The inflow of cash may be either Actual or Notional

There is an actual inflow of cash when cash is actually received and generally long-term liabilities result into actual inflow of cash, e.g.

For issue of Shares, during the year, the journal entry shall be

Cash A/c	Dr.
To Share Capital A/c	

So, actual cash flows into the business. In the same manner, issue of debentures, raising of loans for cash, etc. result into actual inflows of cash. But when the fixed liabilities are created in consideration of purchase of assets, i.e., other than cash, there is no inflow of actual cash. The journal entry for the issue of debentures in lieu of purchase of machinery is :

Plant and Machinery A/c	Dr.
To Debentures A/c	

Usually, current liabilities result into inflow of notional cash. For example, increase in sundry creditors implies purchase of goods on credit. In this case although no cash is actually received but we may say that creditors have given us loans which have been utilised in purchasing goods from them

Hence, increase in the current liabilities may be taken as a source of inflow of cash and decrease in current liabilities as an outflow of cash.

3. Reduction in or Sale of Assets

Whenever a reduction in or sale of any asset-fixed or current-takes place (otherwise than depreciation) it results into inflow of actual or notional cash. There is an actual inflow of cash when assets are sold for cash and notional cash flows in when assets are sold or disposed off on credit. Thus, sale of building, machinery or even reduction in current assets like stocks, debtors, etc. result in inflow of actual notional cash.

4. Non-Trading Receipts

Sometimes, there may be non-trading receipts like dividend received, rent received, refund of tax, etc. Such receipts or incomes are although non-trading in nature but they result into inflow of cash and hence taken in the cash flow statement.

APPLICATIONS OF CASH OR CASH OUTFLOWS

1. Cash Lost in Operations : Sometimes the net result of trading in a particular period is a loss and some cash may be lost during that period in trading operations. Such loss of cash in trading is called cash lost in operations and is shown as an outflow of cash in Cash Flow Statement.

2. Decrease in or Discharge of Liabilities : Decrease in or discharge of any liability, fixed or current results in outflow of cash either actual or notional. For example, when redeemable preference shares are redeemed and loans are repaid, it

will amount to an outflow of actual cash. But when a liability is converted into another such as issue of shares for debentures, there will be a notional flow of cash into the business.

3. Increase in or Purchase of Assets : Just like decrease in or sale of assets is a source or inflow of cash, increase or purchase of any assets is an outflow or application of cash.

4. Non Trading Payments : Payment of any non-trading expenses also constitute outflow of cash. For example, payment of dividends, payment of income-tax, etc.

Illustration 8 : The following details are available from a company.

Liabilities	31-12-98 Rs.	31-12-99	Assets Rs.	31-12-98 Rs.	31-12-99 Rs.
Share Capital	70,000	74,000	Cash	9,000	7,800
Debentures	12,000	6,000	Debtors	14,900	17,700
Reserve for doubtful debts	700	800	Stock	49,200	42,700
Trade Creditors	10,360	11,840	Land	20,000	30,000
P & L A/c	10,040	10,560	Goodwill	10,000	5,000
	1,03,100	1,03,200		1,03,100	1,03,200

Additional Information : (i) Dividend paid total Rs. 3,500, (H) Land was purchased for Rs. 10,000. Amount provided for amortisation of goodwill Rs. 5,000 and (iii) Debentures paid off Rs. 6,000

Prepare Cash Flow Statement.

Solution :

Cash Flow Statement

(for the year ended 31.12.1999)

	Rs.		Rs.
Opening balance of cash on 1. 1. 1999	9,000	<i>Cash Outflows</i> Purchase of Land	10,000
<i>Add : Cash Inflows:</i>		Increase in Debtors	2,800

(383)

Issue of Share Capital	4,000	Redemption of Debentures	6,000
Increase in trade creditors	1,480	Dividends Paid	3,500
Cash inflow from operations	9,120	Closing balance of cash on	
Decrease in stock	6,500	31.12.1999	7,800
	30,100		30,100

Workings :

- Cash inflow from operations

Adjusted Profit And Loss A/c

	Rs.		Rs.
To Dividend (non-operating)	3,500	By Balance bid	10,040
To Goodwill (non-fund/cash)	5,000	By Cash inflow from operation	9,120
To Reserve for doubtful debts	100		
To Balance c/d	10,560		
	19,160		19,160

Alternatively

Balance of P & L A/c on 31.12.1999 10,560

Add: non-fund/cash and non-operating items which

have already been debited to P & L A/c :

Dividend paid 3,500

Goodwill written off 5,000

Reserve for doubtful debts 100

Less: Opening balance of P & L A/c and non-operating

incomes :

Opening balance of P/L A/c (on 31.12.1998)	<u>10,040</u>	<u>10,040</u>
Cash Inflow from operations		<u>9,120</u>

Illustration 9 : The following are the Balance Sheets of Golu & Co. Ltd. as on 31st December 1998 and 31st December 1999.

	1998	1999		1998	1999
Liabilities	Rs.	Rs.	Assets	Rs.	Rs.
Equity share capital	15,75,000	18,00,000	Fixed Assets	11,25,000	13,50,000
General Reserve	10,12,500	13,50,000	Additions	2,25,000	1,80,000
P/L Account	3,89,250	5,24,250		13,50,000	15,30,000
Trade creditors	15,75,000	20,25,000	Depreciation	4,50,000	7,20,000
Bank overdraft	25,87,500	31,50,000		9,00,000	8,10,000
Outstanding Expenses	1,80,000	2,07,000	Trade Investment	2,70,000	-
Provision for Taxation	4,43,250	8,32,500	Debtors	40,05,000	49,16,250
Proposed Dividend	3,37,500	3,37,500	Stock	29,25,000	45,00,000
	<u>81,00,000</u>	<u>1,02,26,250</u>		<u>81,00,000</u>	<u>1,02,26,250</u>

The profit for the year 1999 as per profit and loss account after providing for depreciation amounted to Rs. 1575000 which was further adjusted as follows

Profit & Los Balance b/f	3,89,250
Profit after Depreciation	15,75,000
Add Profit on sale of Investment	<u>45,000</u>
	20,09,250
<i>Less:</i> Provision for tax	8,10,000
Transfer dividend	3,37,500

(385)

Proposed dividend	<u>3,37,500</u>	<u>14,85,000</u>
Balance c/d		5,24,250

You are informed that

- i) The sales and purchases of the year 1999 amounted to Rs. 180,00,000 and Rs. 146,25,000 respectively.
- ii) In arriving at the profit from the sales referred to above, the cost of sales, administration and selling expenses were deducted.

You are required to prepare a cash flow statement.

Solution :

Cash Flow Statement

Year ended 31.12.1999

Particulars	Rs.	Particulars	Rs.
Cash from operations	20,52,000	Bank overdraft (31.12.98)	25,87,500
Equity share capital issued	2,25,000	Outstanding expenses of 998 paid	1,80,000
Increase in Trade creditors	4,50,000	Tax paid	4,20,750
Investment sold	3,15,000	Dividend paid	3,37,500
Bank overdraft (31.12.99)	31,50,000	Purchase of fixed Assets	1,80,000
		Increase in Debtors	9,11,250
		Increase in stock	15,75,000
	<u>61,92,000</u>		<u>61,92,000</u>

Working Notes

Investment Account

Particulars	Rs.	Particulars	Rs
To Balance bid	2,70,000	By Bank Account (balancing fig)	3,15,000

(386)

To P/L Account Profit on sale	45,000	
	3,15,000	3,15,000

Provision for Taxation Account

Particulars	Rs.	Particulars	Rs.
To Bank Account	4,20,750	By Balance bid	4,43,250
To Balance c/d	8,32,500	By P/L Account	8,10,000
	12,53,250		12,53,250

Adjusted Profit and Loss Account

Items	Rs.	Items	Rs.
To Depreciation on fixed assets (Rs.7,20,000 - Rs.4,50,000)	2,70,000	By Balance bid	3,89,250
To Provision for tax	8,10,000	By Profit on sale of investments	45,000
To General Reserve	3,37,500	By cash from operations	20,52,000
To Proposed Dividend	3,37,500	(Balancing figure)	
To Outstanding Expenses at the end of 1999	2,07,000		
To Balance c/d	5,24,250		
	24,86,250		24,86,250

5. **Ratio Analysis :** This has already been covered in BBA-206 'Financial Management' in Lesson No. 12.
6. **Funds Flow Statement :** This has already been covered in BBA-206 "Financial Management" in Lesson No. 13.

Do Yourself :

1. Discuss the different methods used for the analysis and interpretation of financial statements.

2. What are comparative statements? What is their usefulness?
3. What is meant by common-size statements? What purpose do they serve?
4. How common-size statements are different from comparative statements?
5. From the following balance sheets of Par deep Ltd. for the year ending 31st March 1998 and 31st March 1999, prepare a comparative balance sheet of the company and comment upon the financial position of the company.

Liabilities	31.3.1998	31.3.1999	Assets	31.3.1998	31.3.1999
	(Rs.)	(Rs.)		(Rs.)	(Rs.)
Equity Share Capital	3,00,000	4,00,000	Goodwill	60,000	55,000
10% Preference Share	80,000	50,000	Land & Building	1,25,000	85,000
Capital Reserve	5,000	20,000	Plant & Machinery	1,20,000	2,25,000
General reserve	26,000	40,000	Furniture	15,000	12,000
Profit and Loss Account	25,000	35,000	Trade Investments	12,000	48,000
Sundry Creditors	30,000	57,000	Sundry Debtors	65,000	1,05,000
Bills payable	12,000	9,000	Stock	90,000	84,000
Outstanding expenses	6,000	5,000	Bills Receivable	16,000	30,000
Proposed Dividend	30,000	42,000	Cash at Bank	15,000	20,000
Provision for tax	32,000	36,000	Cash in Hand	13,000	20,000
			Preliminary Expenses	15,000	10,000
	5,46,000	6,94,000		5,46,000	16,94,00

6. From the following balance sheets of Lata. Ltd. as on December 31, 1998 and December 31, 1999, prepare common size balance sheets and comment upon the changes in the financial position of the company :

Balance sheet as on

Liabilities	31.3.1998	31.3.1999	Assets	31.3.1998	31.3.1999
	(Rs.)	(Rs.)		(Rs.)	(Rs.)
Owners Equity			Fixed Assets		
Share Capital	75,000	1,75,000	Land and Building	1,00,000	1,50,000
Share Premium	7,500	12,500	Plant & Machinery	1,20,000	1,38,000
Reserve and Surplus	17,500	62,500		2,20,000	2,88,000
	1,00,000	2,50,000	Current Assets		
Long-term Liabilities			Inventory	90,000	1,25,000
Term Land	15,000	23,000	S. Debtors	45,000	40,000
Debentures	1,50,000	1,20,000	Cash	50,000	70,000
	1,65,000	1,43,000		1,85,000	2,35,000
Current Liabilities					
S. Creditors	30,000	25,000			
Outstanding Salary	10,000	15,000			
Provision for Tax	60,000	50,000			
Proposed Dividend	40,000	40,000			
	1,40,000	1,30,000			
Total Funds	4,05,000	5,23,000	Total Assets	4,05,000	5,23,000

7. From the following figure of Shalu & Co., calculate the trend percentages, taking 1991 as the base and interpret them :

Year	Sales	Cost of goods Sold	Stock	Profit before tax
1991	17.80	10.30	2.78	3.20

1992	20.40	12.50	3.24	4.05
1993	22.50	13.60	3.40	4.22
1994	28.10	15.80	3.44	5.25
1995	35.25	20.40	4.35	6.40
1996	40.30	25.00	4.70	6.90

8. Distinguish between fund flow and cash flow statements. What are the advantages of preparing cash flow statements?
9. Explain the different formats for preparing a cash flow statement. How this statement can be used as a tool for planning and control?
10. Balance Sheets of M/s Pardeep & Co. as on 31.12.98 and 31.12.99 were as follows :

Liabilities	1998	1999	Assets	1998	1999
	(Rs.)	(Rs.)		(Rs.)	(Rs.)
Creditors	40,000	44,000	Cash	10,000	7,000
Mrs. White's Loan	25,000	-	Debtors	30,000	50,00
Loan from P.N. Bank	40,000	50,000	Stock	35,000	25,000
Capital	1,25,000	1,53,000	Machinery	80,000	55,000
			Land	40,000	50,000
			Buildings	35,000	60,000
	2,30,000	247,000		2,30,000	2,47,000

During the year a machine costing Rs. 10,000 (accumulated depreciation Rs. 3,000) was sold for Rs. 5,000. The provision for depreciation against machinery as on 1. 1.98 was Rs. 25,000 and on 31.12.1999 Rs. 40,000. Net profit for the year 1998 amounted to Rs. 45,000. You are required to prepare:

- (a) Cash Flow Statement
- (b) Funds (working capital) Flow Statement

LESSON : 13

BUDGETARY CONTROL

What Is Budget

A budget is a plan relating to a period of time, expressed in quantitative terms. It has been defined by I.C.M.A. London as “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 attaining a given objective.” This definition reveals the following characteristics of a budget:-

- (i) A budget may be expressed in terms of quantity or money or both.
- (ii) A budget is prepared for a definite future period.. In other words, a budget is prepared in advance of the period during which it is to operate.
- (iii) The purpose of a budget is to implement the policies formulated by the management for attaining the given objective.

What is Budgetary Control

Budgetary control is a system of controlling costs through budgets. Budgeting is thus only a part of the budgetary control. I.C.M.A. London defines budgetary control as “the establishment of budgets relating to the responsibilities of executives of a policy and the continuous comparison of the actual with the budgeted results, either to secure by individual action the objective of the policy or to provide a basis for its revision.”

The following characteristics of budgetary control are important :-

- (i) Establish a budget or target of performance for each department or function or the organisation.
- (ii) Compare actual performance with the budget.
- (iii) Ascertain the reason for the difference between actual and budget performance.

- (iv) Take suitable remedial action so that budgeted performance may be achieved.

Budgetary control is one of the vary important tools of organisational planning and control. It involves a constant comparison of actual performance with the budgeted goals of the business. Many businesses fail because of lack of planning. By planning, many problems and dangers are anticipated which the business has to face.

Motive of Budgetary Control

The objectives of budgetary control may be explained under three heads Planning, Co-ordination and Control. These three objectives are so much interrelated that it is not possible to discuss one without the other.

(i) Planning

A budget provides a detailed plan of action for a business over a definite period of time. Detailed plans relating to production, sales, raw material requirements, labour needs, advertising and sales promotion, performance research and development activities, capital additions, etc. are drawn up. By planning, many problems are anticipated long before they arise and solutions can be sought through careful study. Thus most business emergencies can be avoided by planning. In brief, budgeting forces management to think ahead to anticipate and prepare for the anticipated conditions.

(ii) Co-ordination

Budgeting aids managers in co-ordinating their efforts so that objectives of the organisation as a whole harmonise with the objective of its parts. Effective planning and organisation contributes a lot in achieving co-ordination. There should be co-ordination in the budgets of various department. For example, budget of sales should be in co-ordination with the budget of production. Similarly production budget should be prepared in co-ordination with the purchase budget, and so on.

(iii) Control

Control is necessary to ensure that plans and objectives as laid down in the budgets are being achieved. Control, as applied to budgeting, is a systematised effort to keep management informed of whether planned performance is being achieved or not. For this purpose, a comparison is made between plans and actual performance. The difference between the two is reported to management for taking corrective action. Thus control is not possible without planning.

Advantages of Budgetary Control

Budgetary control provides the following advantages:

1. Budgeting compels managers to think ahead- to anticipate and prepare changing conditions.
2. Budgeting co-ordinates the activities of various departments and functions of the business.
3. It increases production efficiency, eliminates waste and controls the costs.
4. It pinpoints efficiency or lack of it.
5. Budgetary control aims at maximisation of profits through careful planning and control.
6. It provides a yardstick against which actual results can be compared.
7. It shows management where action is needed to remedy the situation.
8. It ensures that working capital is available for the efficiency operation of the business.
9. It directs capital expenditure in the most profitable direction.
10. It instils into all levels of management a timely, careful and adequate consideration of all factors before reaching important decisions.
11. A budget motivates executives to attain the given goals.

12. Budgetary control system creates necessary conditions for the introduction of standard costing technique.
13. Budgeting also aids in obtaining bank credit.
14. A budgetary control system assist in delegation of authority and assignment of responsibility.
15. Budgeting creates cost consciousness and introduces an attitude of mind in which waste and efficiency cannot thrive.

Limitations of Budgetary Control

The list of advantages given above is impressive, but a budget is not a cure for all organisation ills. Budgetary control system suffers from certain .limitation and those using the system should be fully aware of them.

The main limitations are :

1. The budget plan's based on estimates

Budgets are based on forecasts and forecasting cannot be an exact science.

Absolute accuracy, therefore, is not possible in forecasting and budgeting. The strength or weakness of the budgetary control system depends to a large extent, on the accuracy with which estimates are made. Thus while using the system, the fact that budget is based on estimates must be kept in view.

2. Danger of rigidity

A budget programme must be dynamic and continuously deal with the changing business conditions. Budgets will lose much of their usefulness if they acquire rigidity and are not revised with the changing circumstances.

3. Budgeting Is only a tool of management

Budgeting cannot take the place of management but is only a tool management. "The budget should be regarded not as a master but as a servant." Sometimes it is believed that introduction of a budget programme is alone

sufficient to ensure its success. Execution of a budget will not occur automatically. It is necessary that the entire organisation must participate enthusiastically in the programme for the realisation of the budgetary goals.

4. Expensive technique

The installation and operation of a budgetary control system is a costly affair as it requires the employment of specialised staff and involves other expenditure so that small concerns may find it difficult to adopt it. However it is essential that the cost of introducing and operating a budgetary control system should not exceed the benefits derived therefrom.

Requirements For Effective Budgeting

A budgetary control system can prove successful only when certain conditions and attitudes exist, absence of which will negate, to large extent, the value of a budget system in any business. Such conditions' and attitudes which are essential for effective budgeting, are as follows :

1. Support of top management

If the budget system is to be successful, it must be fully supported by every member of management and the impetus and direction must come from the vary top management. No control system can be effective unless the organisation is convinced that the top management considers the system to be important. Thus the top management must be committed to the budget idea as well as to the principles, policies and philosophy underlying the system.

2. Participation by responsible executives

Those entrusted with the performance of the budgets should participate in the process of setting the budget figures. This will ensure proper implementation of budget programmes.

3. Reasonable goals

The budget figures should be realistic and represent reasonably attainable goals. The responsible executives should agree that the budget goals are reasonable.

4. Clearly defined organisation

In order to derive maximum benefits from the budget system, well defined responsibility centres should be built up within the organisation. The controllable costs for each responsibility centres should be separately shown.

5. Continuous budget education

The best way to assure the active interest of the responsible supervisors is continuous budget education in respect of objectives potentials and techniques of budgeting. This may be accomplished through written manuals, meetings, etc. where by preparation of budgets, actual results achieved etc. may be discussed.

6. Adequate accounting system

There is close relationship between budgeting and accounting. For the preparation of budgets, one has to depend heavily on accounting department for reliable historical data which necessarily forms the basis for many estimates. The accounting system should be so designed as to set up accounts 'in terms of areas of managerial responsibility. In other words, responsibility accounting is essential for successful budgetary control.

7. Constant vigilance

Reports comparing budget and actual results should be promptly prepared and special attention should be focused on significant exceptions- figures, that are significantly different from those expected.

8. Maximum profits

The ultimate object of realising the maximum profits should always kept uppermost.

9. Cost of the system

The budget system should not cost more than it is worth. Since it is not practicable to be calculate exactly what budget system is worth, it only

implies a caution against adding expensive refinements unless their value clearly justifies them.

10. Integration with standard costing system

Where standard costing system is also used, It should be completely integrated with the budget programme, in both budget preparation and variance analysis.

Essentials for the Installation of Budget System

Pre-requisites for the successful implementation of a budgetary control system are as follows :

1. Creation of budget centres

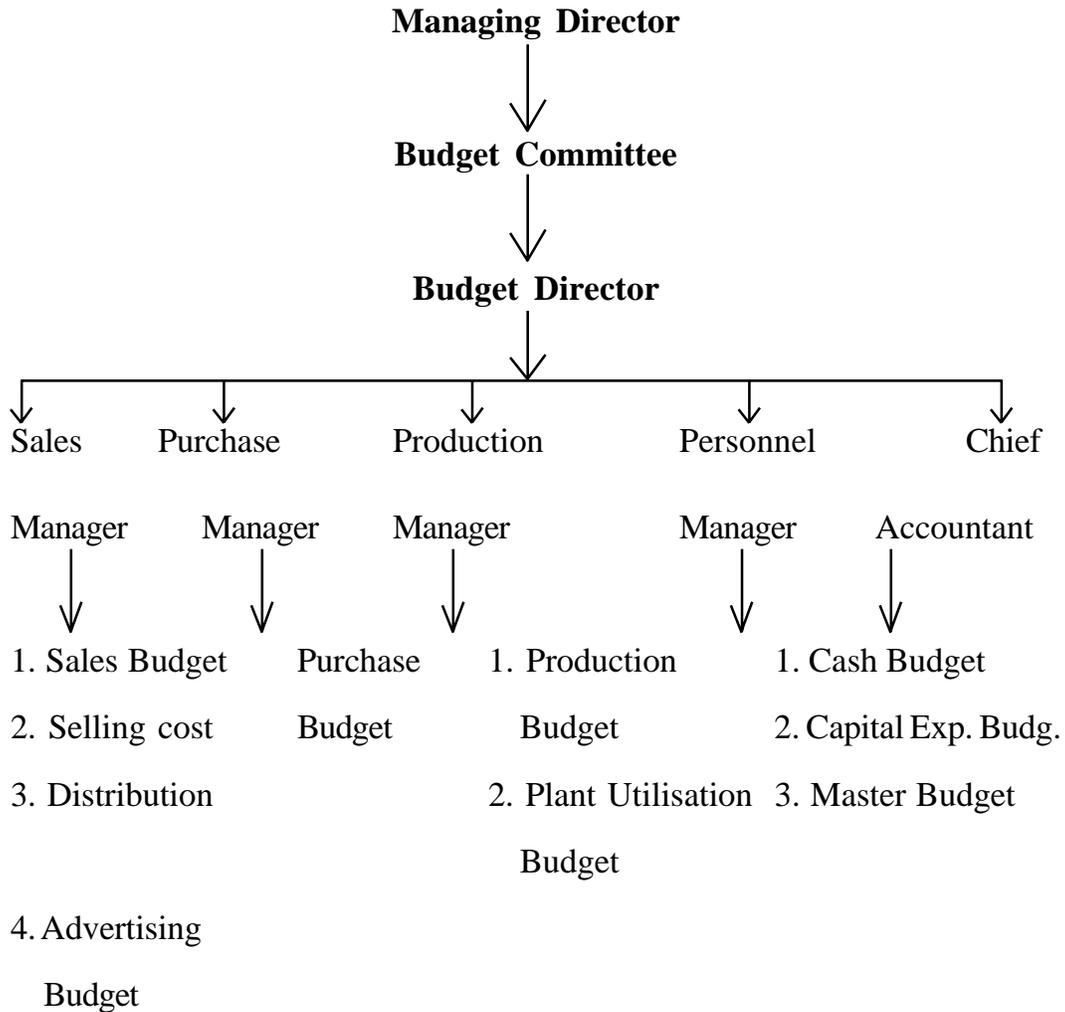
A budget centre is a section of the organisation of an undertaking created for the purpose of budgetary control. Budget centre must be clearly defined because a separate budget has to be set for each such centre with the help of the head of the departmental, concerned. For example, in the preparation of purchase budget, the purchase manager has to be consulted. Similarly while preparing labour cost budget, the personnel manager will be of great help.

2. Introduction of adequate accounting records

The accounting system should be designed as to be able to record and analyse the information required. The budget procedures must also comply the same classification of revenues, and expenses as the accounting department. Comparisons cannot be made if the classifications do not coincide. A chart of accounts corresponding with the budget centres should be maintained.

3. Preparation of an organisation chart

Proper organisation is essential for a successful budget system. An organisation chart should be prepared which clearly shows the plan of the organisation. Each member of management should know the exact scope of his authority, and responsibility and his relationship to other members. For this purpose copies of the organisation chart and written supplements should be distributed to all concerned.



The organisation chart will depend upon the nature and size of the company. A specimen Budget of the organisation chart is given above.

4. Establishment of budget committee

In large concerns, generally the direction and execution of the budget committee which report directly to the top management. The financial controller is usually appointed to serve as the budget director. He is in-charge of preparing budget manual of instructions and accumulates the budget the actual figures for reporting. Other members of the budget committee usually comprise of

various heads of functional departments, like sales manager, purchase manager, production manager, chief accountant, etc. as shown in the above organisation chart. Each member prepares his own departmental budget(s) which will be then considered by the committee for co-ordination.

The following functions of a budget committee are :

1. To provide historical data to all departmental heads to help them in estimating.
2. To issue instructions to departments regarding requirements, dates of submission of estimates, etc.
3. To define the general policies of the management in relation to the budget system.
4. To receive budget estimates from various departments for consideration and review.
5. To discuss difficulties with departmental heads and suggest possible revisions.
6. To evaluate and revise the estimates before preparing the final budget.
7. To make recommendations on budget matters where there is conflict between departments.
8. To prepare budget summaries.
9. To prepare a master budget after functional budgets have been approved.
10. To inform departmental budget after functional budgets have been approved.
11. To coordinate all budget work.
12. To analyse variances and recommend corrective action, where necessary.

5. Preparation of budget manual

A budget manual has been defined by I.C.M.A., London as “a document which sets out the responsibilities of the persons engaged in the routine of and the forms and records required for budgetary control”. A budget manual is thus a statement of budget policies and lays down the details of the organisational set-up with duties and responsibilities of executives including the budget committee and budget director and the procedures and programmes to be followed for developing budgets for various activities.

The contents of a budget manual are summarised as follows :

1. Description of the budget system and its objectives.
2. Procedure and forms to be used in budget preparation.
3. Responsibilities of operational executives, budget committee and budget director.
4. Budget calendar, specifying definite dates for the completion of each part of the budget and submission of the reports.
5. Method of accounting and account codes in use.
6. Procedure to be adopted in operating the system.
7. Follow-up Procedures.

6. Budget period

Budget period is a length of time for which a budget is prepared and operated. Budget periods vary between short-term and long-term and no specific period can be laid down for budgets. It varies among concerns and industries as a result of several factors.

A budget is usually prepared for one year which corresponds to the accounting year. It is then sub-divided into quarters and in turn each quarter is broken down into three separate months. When a business experiences

seasonal fluctuations, the budget period may be fixed to cover one seasonal cycle covers (say) two or three years, a long term budget should be prepared to cover that period by preparing short term budgets.

Budgets for capital expenditure are usually prepared on long term basis. For example, in electricity companies which incur very heavy capital expenditure, the need for new power stations is possibly forecast five to ten years in advance. Such long term budgets are supplemented by short term ones.

An important point to note is that short term budgets will be much more detailed and are costly to prepare and operate, while long term budgeting is considerably affected by unforeseen conditions.

7. Determination of the key factor

Also, known as 'limiting factor', 'governing factor' and 'principal budget factor', the key factor means the factor which limits the size of output. It is defined as "*the factor the extent of whose influence must first be assessed in order to ensure that functional budgets are capable of fulfilment.*" Such a factor is of vital importance and affects all budgets to a large extent.

The key factor serves as the starting point for the preparation of budgets. For instance, when sales potential is limited, sales is the key factor. Therefore, sales budget should be prepared first. Production and other budgets will follow the sales budget.

Thus a key factor determines priorities in functional budgets. Among the various key factors which affect budgeting are the following:

a) Sales

- i) Low market demand
- ii) Shortage of experienced salesmen.
- iii) Inadequate advertising due to shortage of funds.

b) Materials

- i) Availability.
- ii) Restrictions imposed by licences, quota, etc.

c) Labour

- i) General shortage
- ii) Shortage of specialised labour in a particular process.

d) Plant

- i) Limited plant capacity
- ii) Bottleneck in certain key processes.

It is possible that more than one key factor is operating the same time. Under such conditions, the relative impact of such factors is considered in budget preparation.

Moreover, key factor is not necessarily a permanent factor. The management may be provided with the opportunities to overcome the limitations imposed by key factors. For example, plant and machinery which may be financed by the issue of new shares.

Forecast and Budget

It is important to note carefully the distinction between a forecast and a budget. A forecast is a prediction of what will happen as a result of a given set of circumstances. It is an assessment of probable future events.

A budget, on the other hand, is planned result that an enterprise aims to attain. It is based on the implications of a forecast. Forecasting thus precedes the preparation of budget.

Thus the main point of distinction between the two is that forecast is concerned with 'probable events' where budget relates to 'planned events'. Furthermore, forecast can be made by anybody, whereas a budget, being an enterprise objective, can be set only by the authorised management.

FUNCTIONAL BUDGETS

A functional budget is one which relates to a function of the business, e.g. Sales Budget, Production, Purchase Budget, etc. There are many type of functional budgets, of which the following are important:

1. Sales Budget
2. Production Budget
3. Production Cost Budget
4. Raw Materials Budget.
5. Purchase Budget
6. Labour Budget.
7. Production Overhead Budget.
8. Selling and Distribution Cost Budget.
9. Administration Cost Budget.
10. Capital Expenditure Budget.
11. Cash Budget.

Sales Budget

In most companies, the sales budget is not only the most important but also the most difficult budget to prepare. The importance of this budget arises from the fact that if sales figures is incorrect, then practically all other budgets will be affected. The difficulties in the preparation of this budget arise because it is not easy to estimate consumer demand, particularly when a new product is introduced.

The sale budget is a statement of planned sales in terms of quantity and value. It forecasts what the company can reasonably expect to sell to its customers during the budget period. The sales budget can be prepared to show sales classified according to products, salesmen, customers, territories and period, etc.

The factors to be considered in, forecasting sales are the following :

1. Past Sales

Analysis of the past sales shows the trends to date and any seasonal or cyclical fluctuations. It is, therefore, not difficult to suggest future trends from the analysis of the past sales.

2. Reports by salesmen

The salesmen are in close touch with market and thus, they may be required to prepare detailed estimates of sales that they are likely to make in their respective areas during the budget period. The report of each salesman should be studied in the light of his “past assessment and actual sales.

3. Company conditions

Any change in policies and methods of the company and their effect on sales should be considered. For example, additional spending on advertising, introduction of new channel of distribution, introduction ‘of new products, etc. should all have some effect on a sales budget.

4. Business Conditions

Any changes in economic conditions and that in related business activities and their effect on company sales should be considered. Information should be obtained about competing industries to assess the strength of competition and about the customer requirements to determine their demand.

5. Special conditions

In the preparation of sales forecast any new external developments taking place should also be considered. For example when an industry manufactures products for another industry it will be necessary to analyse the trend of sales in that industry. A tyre manufacture would estimate the sales of cars or scooters on which his tyres are used.

6. Market Analysis

Some companies depend upon market analysis and research to measure the potential demand for their products. Such an analysis reports on the state

of the market, fashion trends, the sort of product design required, activities of the competitors and other factors which may have a bearing on the sales of the company.

Illustration - I

ABC Ltd., sells two products Jay and Kay in four areas- North, South, East and West.

The following sales are budgeted for the month of Jan., 1999:

North - Jay 6000 units and Kay 3250 units.

South - Kay 6500 units

East - Jay 8500 units

West- Jay 4500 units and Kay 2750 units.

Selling prices - Jay Rs. 30 per unit; Kay Rs. 15 per unit

It was decided that additional advertising campaign will be undertaken in south and east which will result in additional sales of 1500 units of Jay in South and 2500 units of Kay in east.

You are required to prepare a sales budget for the month of January 1999.

Solution :

Sale Budget for January 1999

Area	Product	Quantity Units	Price Rs.	Amount
North	Jay	6,000	30	180000
	Kay	3250	15	48750
Total		9250		228750 South
Jay		1500	30	45000
	Kay	6500	15	97500

	Total	8000		142500
East	Jay	8500	30	255000
	Kay	2500	15	37500
	Total	11000		292500
West	Jay	4500	30	135000
	Kay	2750	15	41250
	Total	7250		176250
	Jay	20500	30	
	Kay	15000	15	225000
	Total	33500		840000

Production Budget

The production budget is an estimate of production for the budget period. It is first drawn up in quantities of each product and when the remaining budgets have been compiled and cost of production calculated, then the quantities of production cost are translated into money terms, what in effect, becomes a production cost budget.

The production budget is the initial step in budgeting manufacturing operations. There are at least three principal budgets related to manufacturing in addition to production budget. These are raw material budget, labour budget and production overhead budget.

The principal considerations involved in budgeting production are:

- a) **Sales Budget.** When sales is the principal budget factor, the production budget will be based on the volume of sales predicated by the sales budget.
- b) **Inventory policy.** The production capacity of each department should be worked out and budget figures should be within these limits.

c) **Production capacity.** The production capacity of each department should be worked out and budget figures should be within these limits.

However, when production capacity falls short of sales requirements, the following alternatives may be considered:

- i) Purchase of additional plant and machinery.
- ii) Introduction of additional shift.
- iii) Introduction of overtime working.
- iv) Hiring machinery.
- v) Sub- Contracting production of components.

d) **Management Policy.** Production policy of the management plays an important role in budgeting production. For example, management may decide to buy a particular component part from outside instead of manufacturing it. This will influence production budget.

Illustration II. Ganga Agro Chemicals manufactures chemical X. A forecast for the quantity sold in the first four months of the year is as follows:

	Quantity in Units
January, 2000	6000
February, 2000	6000
March, 2000	5200
April, 2000	4400

It is anticipated that

- a) there will be no work-in-progress at the end of any month.
- b) Finished units equal to half the sales for the next month will be in stock at the end of each month including (December, 1999).

You are required to prepare a Production Budget for each of the three months ending 31st March, 2000.

Solution :

Production Budget

For the three months ending 31st March, 2000

	Jan.	Feb.	March
	—————	—————	—————
	Units	Units	Units
Budgeted Sales	6000	6000	5200
<i>Add</i> : Closing stock	3000	2600	2200
	—————	—————	—————
	9000	8600	7400
<i>Less</i> : Opening stock	3000	3000	2600
	—————	—————	—————
Production	6000	5600	4800

Production Cost Budget. This budget shows the estimated cost of production budget (explained above) shows the quantities of production. These quantities of production are expressed in terms of cost in production cost budget. The cost of production is shown in detail in respect of material cost, labour cost and factory overhead. Thus production Cost budget is based upon Production Budget, Material Budget, Labour Budget and Factory Overhead Budget.

Illustration III. The following information has been made available from the records of Inchape Precision Tools Ltd., for the six months of 1999 (and of only the sales of January 2000) in respect of product X :

i) The units to be sold in different months are :

July, 99	1100	November, 99	2500
August, 99	1100	December, 99	2300

September, 99	1700	January, 2000	2000
October, 99	1900		

- ii) There will be no work-in-progress at the end of any month.
- iii) Finished units equal to half the sales of the next month will be in stock at the end of every month (including June, 1999)
- iv) Budgeted production and Production cost for the year ending 31st Dec. 1999 are thus:

Production (units)	22,000
Direct materials per unit	Rs. 10
Direct wages per unit	Rs. 4
Total factory overhead apportioned to production	Rs.88,000

You are required to prepare :

- a) A Production Budget for the six months of 1999, and
- b) A Summarised Production Cost Budget for the same period.

Solution :

Production Budget

For the six months ending Dec. 1999

	July	Aug.	Sep.	Oct.	Nov.	Dec.
	_____	_____	_____	_____	_____	_____
	Units	Units	Units	Units	Units	Units
Estimated sales	1100	1100	1700	1900	2500	2300
<i>Add:</i> Closing Stock	550	850	950	1250	1150	1000
	_____	_____	_____	_____	_____	_____

(409)

	1650	1950	2650	3150	3650	3300
<i>Less:</i> Opening stock	550	550	850	950	1250	1150
	—	—	—	—	—	—
Production	1100	1400	1800	2200	2400	2150

Total Production (July to Dec) = 11050) Units.

**Production cost Budget
For the six months ending Dec. 1999**

Production – 11.050 unit

	Rs.
Direct Materials @ Rs. 10 for the 11,050 units	1,10,500
Direct wages @ Rs. 4 for 11050 units	44,200
* Factory overhead @ Rs. 4 for 11,050 units	44,200
Total Production cost	<u>1,98,900</u>

*Factory overhead per unit = $88,000 \div 22,000 = \text{Rs. } 4$

Raw Material Budget

This budget shows the estimates quantities of all the raw materials and components needed for the output demanded by the production budget. Raw material budget serves the following purposes :

- a) It assists purchasing department in planning the purchases.
- b) It helps in the preparation of purchase budget.
- c) It provides date for raw material control.

It should be noted that raw material budget generally deals with only the direct materials; indirect materials and supplies are generally included in the overhead cost budget.

Purchase Budget

Careful planning of purchases offers one of the most significant areas of cost saving in many concerns. The purchase manager should be assigned the direct responsibility for preparing a detailed plan of purchases for the budget period and for submitting the plan in the form of a purchase budget.

The purchase budget provides details of the purchases which are planned to be made during the period to meet the needs of the business. It indicates :

- a) the quantities of each type of raw material and other items to be purchased.
- b) the estimated cost of material purchases.

In preparing this budget, a number of factors must be considered, including the following :

- a) Opening and closing stocks to be maintained as if will affect material requirements.
- b) Maximum and minimum stock quantities.
- c) Economic order quantities.
- d) Financial resources available
- e) Purchase order placed before the budget period against which supplies will be received during the period under considerations.
- f) Policy of the management regarding materials or components to be manufactured within the business as distinct from those purchased from outside.

Illustration IV. The sales manager of Golu & Co. Ltd. reports that next year he expects to sell 50,000 units of a certain product.

The production manager consults the storekeeper and casts his figures, as follows: Two kinds of raw materials A and B are required for manufacturing

the product. Each unit of the product requires 2 units of A and 3 units of B. The estimated opening balances at the commencement of the next year are finished product, 10,000 units; A, 12,000 units; B 15,000 units. The desirable closing balance at the end of the next year are- finished product, 14,000 units; A, 13,000; units, B, 16,000 units.

Draw up a Materials Purchases Budget for the next year.

Solution. As production during the year is not given, it is calculated as under:

	Units
Sales during the year	50,000
Add Desired stock at the end of next year	14,000
	64,000
Less Expected stock at the beginning of the next year	10,000
Estimated production	54,000

Purchases Budget for the period

Item	Material A	Material B
	Units	Units
Consumption during the year		
A – 54, 000 x 2	1,08,000	
B – 54,000 x 3		1,62,000
Add : desired stock at the end of next year	13,000	16,000
	1,21,000	1,78,000
Less Expected stock at the commencement		
Of the next year	12,000	15,000
Quantity of materials to be purchased	1,09,000	1,63,000

The main purposes of a purchase budget are :

- a) To enable the purchasing department to plan its purchases and enter into long term contracts, where advantageous.
- b) To record the, material prices on which the plan represented by the budget is based.
- c) To facilitate the management of finance of the business by defining the cash requirements in respect of the budget period and for shorter runs.

The purchases budget differs from the raw material budget in that purchases budget specifies both quantities and rupee costs, whereas raw material budget is usually limited to quantities only. Secondly, purchases budget includes direct and indirect materials, finished goods for resale, services like electricity and gas, etc. while raw material budget includes only direct material requirements.

Labour Budget

Labour is classified into direct and indirect. Some concerns prepare a labour budget that includes both direct and indirect labour, while others include only direct labour cost and include indirect labour in the overhead cost budget.

The labour budget represents the forecast of labour requirements to meet the demands of the company during the budget period. This budget must be linked with production budget and production cost budget. The method of preparing of labour budget is like this. The standard direct labour hours of each grade of labour required for each unit of output and standard wage rate for each grade of labour are ascertained. Multiplication of the units of finished goods to be produced by the labour cost per unit gives the direct labour cost. The indirect labour is within limits normally a fixed amount, so should be easy to calculate in total for the period.

The labour budget serves the following purposes :

- a) To estimates the labour cost production.

- b) To determine the direct labour required in terms of labour hours and hence the number and grade of workers required to meet the production requirements.
- c) To provide the personnel department with personnel requirements so that it may plan recruitment activities.
- d) To provide data for determination of cash requirements of payment of wages.
- e) To provide data for managerial control labour cost.

Production Overhead Budget

After budgeting of material and labour costs, next logical step is to budget for production overheads. The production overhead budget represents the forecast of all the production overhead (fixed, variable and semi-variable) to be incurred during the budget period. The fact that overheads include many dissimilar types of expenses creates considerable problems in:

- a) The allocation of production overheads to products manufactured, and
- b) Control of production overheads.

The production overhead budget involves the preparation of overhead budgets for each department of the factory as it is desirable to have estimates of manufacturing overheads Prepared by those individuals who have the responsibility for incurring them. The budget expenses for each sub-period during the budget period should be indicated and the classification or expenses should be the same as used by the accounting department.

The budgeted overhead costs of service departments are totaled and apportioned to production departments according to the services received by each production department.

The factors to be considered in preparing this budget are as follows :

- a) The classification of all over head costs into fixed and variable elements. In the case of semi-variable items, the degree of variability should be

ascertained. The level of output at which fixed costs changes also be determined.

- b) The level of activity likely to be achieved during the budget period, like units of output, labour hours, etc.
- c) Policy of management regarding matters like overtime work, number of shifts to be worked, description, replacement of hand labour by machines, etc.
- d) Individual items of cost incurred in the past.

Selling and Distribution Cost Budget

This is closely concerned with the sales budget and represents the forecast of all costs incurred selling and distributing the company's products during the budget period. As a general rule, the sales budget and the selling and distribution cost budgets are prepared simultaneously, since each has a definite impact on the other.

The sales manager is held responsible for selling and distribution cost budget. He prepares this budget with the help of heads of sub-divisions of the sales departments. Some companies prepare a separate advertising budget, particularly when spending on advertising are quite heavy.

Administration Cost Budget

This budget represents forecast of all administration expenses like director's fee, managing directors' salary, office lighting, heating and air conditioning, etc. Most of these expenses are fixed, so should be too difficult to forecast.

Capital Expenditure Budget

This budget represents the expenditure on all fixed assets during the budget period. It includes such items as new buildings, machinery, land and intangible items like patents etc.

- a) Capital expenditure budget deals with items not directly to profit and

loss account. Expenses related to capital expenditure, such as depreciation, repairs and maintenance, etc. are however, co-related to this budget and they are included in overhead budgets.

- b) Capital expenditure is frequently planned a number of years in advance, perhaps five or ten years, in which case it is broken into convenient periods, like years or months. As compared to this, other functional budgets are normally prepared for a shorter period, say one year.
- c) This budget involves large amount of expenditure which need top management approval. The capital expenditure budget is, therefore, subject to a strict management control.

The objectives of capital expenditure budget are stated below :

- a) To enable the company to establish a system of priorities in expenditure.
- b) To provide a tool for controlling capital expenditure.
- c) To make proper financial provision to meet planned expenditure.
- d) To provide budgets for depreciation and maintenance costs for inclusions in the departmental expenses budgets.

Cash Budget

The cash budget is one of the most important and one of the last to be prepared. It is a detailed estimate of cash receipts from all sources and cash payments for all purposes and the resultant cash-balances during the budget period. It makes certain that the business has sufficient cash available to meet its needs as and when these arise. It is a device for co-ordinating and controlling the financial side of the business to ensure solvency in cash. Cash budget thus play an important role in the financial management of a business undertaking.

The main purposes of cash budget are outlined below :

- a) It ensures that sufficient cash is available when required.
- b) It indicates cash excesses and shortages so that action may be taken in time to invest any excess cash or to borrow funds to meet any shortages.

- c) It establishes a sound basis for credit.
- d) It shows whether capital expenditure may be financed internally.
- e) It establishes a sound basis for control of cash position.

Construction of Cash Budget

There are three methods of preparing cash budget:

- a) Receipts and Payments Method
- b) Adjusted Profit and Loss Method
- c) Balance Sheet Method

Receipts and Payments Method

This method is usually used for short term cash forecast and is much more detailed than the other two methods.

The cash budget begins with the opening balance of cash in hand and at bank. To this will be added the cash receipts from various sources and against this will point of sales and realisation of cash.

Cash payments are made for raw material purchases, direct labour out of pocket expenses, capital expenditure, projects, dividends; etc. The period of credit appropriate to the payment concerned should be taken into account.

A cash budget may be presented in the following form:

Cash Budget
For the period ending _____

	Jan	Feb	March	Total
Opening Balance				
Receipts				
Cash sales				

Receipts from debtors				
Dividend income				
Issue of shares etc.				
Total Receipts				
Payments				
Cash purchases				
Trade creditors				
Wages and salaries				
Dividend payable				
Capital expenditure				
Taxes				
Total payments				
Cash available (Closing Balance)				

Illustration V

DCM Textiles Ltd. wishes to arrange overdraft facilities with its bankers the period April-June 2000 when it will be manufacturing mostly stocks. Prepare a cash budget for the above period from the following data, indicating the extent of the bank facilities the company will required at the end of each month.

Period	Sales	Purchases	Wages
	Rs.	Rs.	Rs.
Feb., 1992	1,80,000	1,24,000	12,000
March, 1992	1,92,000	1,44,000	14,000
April, 1992	1,08,000	2,43,000	11,000

Remarks. The company will require overdraft facilities to the extent of Rs. 51,000 at the end of May and Rs. 1,66,000 at the end of June.

Adjusted Profit and Loss Method

This method is suitable for long term cash forecast. It is based on the view that it is the profit that is the source of cash in the business. The profit as per Profit and Loss Account. All those items of income and expenditure (like depreciation, provisions etc.) which do not involve an inflow or outflow of cash are adjusted in the forecasted profit figure to arrive at the figure of cash made available by profit.

Given below is a cash budget performa under this method showing the various items that require adjustment in the profit figure for finding out the cash position at the end of a particular period.

The adjusted profit and loss method is often termed as cash flow statement because it converts the profit and loss account into a cash forecast. The main difference between this method and the receipts and payment method is that whereas the former considers non-cash items for adjustment in the profit figure, the latter takes into account only cash transactions.

It will be appreciated that under the adjusted profit and loss method, the equation that PROFIT = CASH will hold good if there were no credit transactions, accruals, capital transactions, stock fluctuations or appropriations of profit. But such a situation can not exist in practice.

Cash Budget

For the period.....

	Jan.	Feb.	March	Total
	Rs.	Rs.	Rs.	Rs.
Opening Balance of cash				
<i>Additions :</i>				

(420)

Budgeted Net Profit				
Depreciation				
Provisions				
Sale of Plant				
Issue of capital and debentures				
Reduction in debtors				
Reduction in stocks				
Accured expenses				
Increase in liabilities				
Total additions				
Total Cash Available				
<i>Deductions :</i>				
Dividends				
Prepayments				
Capitals				
Increase in stocks				
Increase in debtors				
Decrease in liabilities				
Total Deductions				
Closing balance of cash				

Balance Sheet Method

This method is also used for forecasting cash requirements for long periods and is rather similar to adjusted profit and loss account method discussed above. Under this method, a budgeted balance sheet is prepared with all items

of assets and liabilities excepting cash or bank balance. The two sides of the balance sheet are then balanced and the balancing figure is taken as cash. If the liabilities are more than, assets, this reveals a balance of cash and or/bank, and if assets exceed liabilities, this reveals a bank overdraft.

Thus, under the adjusted profit and loss method, cash figure is computed by preparing a cash flow statement and the figure is computed as a balancing figure under the balance sheet method.

MASTER BUDGET

When all the subsidiary budgets have been prepared, these are summarised into what is known as a Master Budget. The master budget shows the overall plan of the business for the next period. It is commonly prepared in the form of a forecasted profit and loss account and balance sheet and is variously known summary budget, planning budget, operating plan etc.

The master budget is prepared by the budget director (or budget officer) and is presented to the budget committee for approval. If approved, it is submitted to the Board of Directors for final approval. The Board may make certain amendments/alternations before it is finally approved.

Master budget may be prepared in the following form (Data is assumed)

MASTER BUDGET

For the year end.....

	Budget period		Previous period	
	Rs.	%	Rs.	%
(A) Net sales	7,00,000	100.00	6,55,000	100.00
Less : Production cost :				
Direct material	2,50,000	35.71	2,35,000	35.88
Direct labour	90,000	12.85	98,000	14.96
Production overhead	70,000	10.00	81,000	12.37

(B) Total Production				
Cost	4,10,000	58.56	4,14,000	63.21
(C) Gross profit [(A)-(B)]	2,90,000	41.44	2,41,000	36.21
Less : Operating expenses:				
Adm. Expenses	16,000	2.29	17,000	2.60
Selling and dist. Exp.	35,000	5.00	38,000	5.80
Research and dev. Exp.	12,000	1.71	10,000	1.53
Financial expenses	9,000	1.29	9,000	1.37
(D) Total operating Exp.	72,000	10.29	74,000	11.30
Operating profit [(C)-(D)]	2,18,000	31.15	1,67,000	25.49
Add: Other incomes	8,500	1.21	8,000	1.22
Net Profit	2,26,500	32.36	1,75,000	26.71
Assets:				
Fixed	4.65,000	63.70	4,92,500	68.88
Current	2.65,000	36.30	2,22,500	31.12
Total capital employed	7,30,000	100	7,15,000	100

FIXED AND FLEXIBLE BUDGETS

A fixed budget is one which is prepared keeping in mind one level of output. It is defined as one “*which is designed to remain unchanged irrespective of the level of activity attained.*” If actual output differs from budgeted level of output, variances, will arise. Fixed Budget is prepared on the assumption that output and sales can be estimated with a fair degree of accuracy. This means that in those situations where sales and output can not be accurately estimated fixed budget does not suit.

Flexible Budget

In contrast to a fixed budget, a flexible budget is one ‘’ which is designated to change in relation to the level of activity attained. The underlying principle of flexible budget is that a budget is of little use unless and revenue are related to the actual volume of production. Flexible budgeting has been developed with the objective of changing the budget figures to correspond with the actual output achieved. Thus a budget might be prepared for various level of activity, say 70%, 80%, 90% and 100% capacity utilisation. Then whatever the level of output actually reached, it can be compared with an appropriate level.

Flexible budgets are prepared in those companies’ where it is extremely difficult to forecast output and sales. Such a situation may arise in the following cases.

1. Where nature of business is such that sales are difficult to predict e.g. demand for luxury goods is quite unpredictable.
2. Where sales are affected by weather conditions, e.g. soft drink industry, woolen garments.
3. Where sales are affected by changes in fashion, e.g. readymade garments.
4. Where company & frequently introduces new products.
5. Where large part or output is intended for export.

Uses of Flexible Budget

The figure in flexible budget are adaptable to any given set of operating conditions. It is, therefore, more realistic than a fixed budget which is true only in one set of operating conditions.

Flexible budgets are also useful from control point of view. Actual performance of an executive should be compared with what he should achieved in the actual circumstances and not with what-he should have achieved under quite different circumstances.

In brief, flexible budgets are more realistic, practical and useful. Fixed budgets, on the other hand, have a limited application and are suited only for items like fixed costs.

Preparation of Flexible Budgets

The preparation of flexible budgets necessitates the analysis of all overheads into fixed and variable components. This analysis, of course not peculiar to flexible budgeting, is more important in flexible budgeting than in fixed budgeting. This is so because in flexible budgeting, varying levels of output are considered and each class of overhead will be different for each level. In flexible budgeting a series of budgets are prepared for every major level of activity so that whatever the actual level of output, it can be compared with appropriate budget or can be interpolated between budgets of the activity levels on either side. For example, budgets may be set for (say) 60%, 70%, 80%, 90, 100 % levels of activity. If the actual level of activity is 85%, then the budget allowance for 85% activity should be computed by interpolation.

Illustration VI

The expenses budgeted for production of 10,000 units in a factory are furnished below :

	Rs.	Per unit
Materials	70	
Labour		25
Variable overhead	20	
Fixed overheads (Rs. 1,00,000)	10	
Variable expenses (Direct)	5	
Selling expense (10% fixed)		13
Distribution expenses (20% fixed)	7	
Administration expenses (Rs.50,000)		5
Total	155	

(425)

Prepare a budget for e production of :

- a) 8,000 units, and
- b) 6,000 units

Assume that administration expenses are rigid for all levels of production.

Solution :

FLEXIBLE BUDGET

	6000 Units		8,000 Units		10,000 Units	
	Per Unit Rs.	Total Rs.	Per Units Rs.	Total Rs.	Per Units Rs.	Total Rs.
Materials	70	4,20,000	70	5,60,000	70	7,00,000
Labour	25	1,50,000	25	2,00,000	25	2,50,000
Direct exp (variable)	5	30,000	5	40,000	5	50,000
Variable overhead	20	1,20,000	20	1,60,000	20	2,00,000
Fixed overhead	16.67	1,00,000	12.50	1,00,000	10	1,00,000
Selling Exp:	2.17	13,000	1.63	13,000	1.30	13,000
Fixed Variable Distribution Exp	11.70	70,200	11.70	93,600	11.70	1,17,000
Fixed	2.33	14,000	1.75	14,000	1.40	14,000
Variable	5.60	33,600	5.60	44,800	5.60	56,000
Administrative Exp: Fixed	8.33	50,000	6.25	50,000	5.00	50,000
Total	166.8	10,00,800	159.42	12,75,400	155	15,50,000

In the above flexible budget, the following important points should be noted.

1. Total fixed costs for each level remains unchanged.
2. Per unit fixed cost decreases when level of output-increase.
3. Total variable cost increases in proportion to increase in the level of output.
4. Per unit variable cost remains Unchanged at each level.

Illustration VII

Prepare a Flexible Budget for production at 80 per cent and 100 per cent activity on the basis of the following information :

Production at 50% capacity - 5,000 units

Raw materials - Rs.80 per unit

Direct labour - 50 per unit

Direct expenses Rs. 50,000 (50% fixed)

Administration expenses - Rs. 60,000 (60% variable)

Solution :

Flexible Budget

Items	80% (8,000 units)		100% (10,000) units	
	Per unit Rs.	Total Rs.	Per unit Rs.	Total Rs.
Raw Materials	80	6,40,000	80	8,00,000
Direct Labour	50	4,00,000	50	5,00,000
Direct Expenses	15	1,20,000	15	1,50,000
Prime Cost	145			
Factory Expenses				
- Fixed	3.125	25,000	2.50	25,000

(427)

- Variable	5,0000	40,000	5.00	50.000
Factory Cost	153.25	12,25,000	152.50	15,25,000
Adm. Expenses:				
- Fixed	3.00	24,000	2.40	24,000
- Variable	7.20	57,600	7.20	72,000
Total cost	163.325	1306,600	162.10	16,21,000

Responsibility Accounting and Budgeting

Responsibility accounting is one of the basic components of good control system. Budgeting and variance analysis (standard costing) are thus part of the responsibility accounting process.

Responsibility accounting is method of accounting whereby business activities are identified with persons rather than products or functions and where responsibility is assigned to the manager best placed to effect control. The idea of responsibility to accounting that managers will be held responsible only for those items over which they can exercise a significant amount of control. The basic method of control is the same as used in budgetary control and standard costing and may be stated in the following points:

- a) A plan is prepared in the form of budgets or standards.
- b) The performance is evaluated by comparing actual results with those budgeted in the regular monthly reports.
- c) Variances between actual and budgeted performance are analysed so as to fix responsibility.
- d) Corrective and preventive action is taken wherever possible. Although some factors causing the variances from budgets will be beyond the

control of the manager, it is his responsibility to use any means available to recover in the event of poor performance.

Requirements of an Effective Responsibility Accounting System. Some of the principal requirements of an effective system of responsibility accounting are as follows :

1. The organisation structure should be created within the organisation. A responsibility for each individual in the organisation.
2. Responsibility centres should be created within the organisation. A responsibility centre is a unit of an organisation under the supervision of a manager who has the responsibility for the activities of that responsibility centre.
3. Budgets prepared should be accurate and acceptable with full participation of managers of various responsibility centres.
4. The system of responsibility accounting should have the support of all levels of management.

Responsibility accounting is based on the authority responsibility relationship that exist between managers and their subordinates. This means authority should be coupled with responsibility. A person is obliged to perform his duties only when he has adequate authority to do so. Some managers might complain. “It is unfair to allocate revenues or costs to me unless I can control them”, or “There should be no responsibility without control.”

Responsibility accounting is often focused on the lowest level managers who have the most day-to-day influence on cost where a person can significantly influence the amount of cost through his own action, may be charged with such costs. A major problem in responsibility accounting is establishing it can be definitely influenced by a given manager within a given time span. But the

problem is that few costs are clearly under the sole influence of one person. Take the case of material costs. Materials prices are heavily influenced by the purchase manager while material quantities are heavily influenced by the production manager.

Responsibility accounting can never be substitute of good management. It is simply a tool of management. Some systems that are otherwise sound never get off the ground because the managers do not really understand them nor put them to good use. Nor it is an accounting technique that stands or falls on the accountant's use of it. It is an integral part of the management process and the accountant's role is a technical and supporting one. Unless the operating managers enthusiastically support responsibility accounting and make it to work, even the best conceived system will fail.

Zero Base Budgeting (ZBB)

Zero Base Budgeting (ZBB) was introduced at Texas Instruments in the United States in 1969 by Peter Peter Pyrrh, who is known as the father of ZBB.

It is a modern management tool for planning and controlling expenditure. However, ZBB is not conceptually new because every company might have experienced this approach once in its life time, e.g. when the company had prepared its first budget or when a re-organisation of a company calls for a budget revision.

ZBB may be defined as “operating planning and budgeting process which requires each manager to justify his entire budget request in detail from scratch (hence zero base). Each manager states why he should spend any money at all. This approach requires that all activities be identified as decision packages which will be evaluated by systematic analysis ranked in order of importance.” It is also defined as “a system whereby each budget item, regardless or whether

it is new or existing, must be justified in its entirety each time a new budget is prepared.” The novel part of the ZBB is the requirement that the budgeting process starts at zero with all expenditures completely justified. This contrasts with the usual approach, in which a certain level of expenditure is allowed as a starting point and the budgeting process focuses on request for incremental expenditures.

Traditionally, most firms prepare their budget on the basis of their previous year’s budget, perhaps with some adjustment for price level changes. Additional items requested are scrutinised, but the portion of a budget request representing a continuation of the previous year’s level of activity is not generally challenged. As a result many organisations found that wasteful and unnecessary activities were being continued year after year simply because nobody was ever asked to explain their need. ZBB attempts to correct this problem. ZBB requires every item of the budget to be justified every year. Under ZBB there is a continuous re-evaluation of the activities of the organisation to ascertain that activities are absolutely necessary for the organisation. Those of the activities which are of no value find no place in the forthcoming budget even though these might have been an integral part of the-past budget prepared under traditional approach ZBB in a way tries to locate activities which are not essential.

Advantages and Limitations of ZBB

The advantages are :

1. In ZBB all activities included in the budget are justified on cost benefit considerations which promotes more effective allocation of resources.
2. ZBB discards the attitude of accepting the current position in favour of an attitude of questioning and challenging each item of budget.
3. It is an educational process and can promote a management team of

talented and skilful people which tends to promptly respond to changes in the business environments.

4. It facilitates identification of inefficient and unnecessary activities and avoid wasteful expenditure.
5. Cost behaviour patterns are more closely examined.

The disadvantages are :

1. ZBB involves high cost of preparing budgets every year.
2. It also requires high volume of paper work.
3. In ZBB there is danger of emphasising-short-term gains at the expense of long term-ones.
4. It has a tendency to regard any activity not foreseen and sanctioned in the most recent ZBB as illegitimate.

EXERCISE QUESTIONS :

1. Define 'budgetary control'. State the advantages of budgetary control in an organisation.
2. Discuss briefly the objectives and limitations of the budgetary control.
3. Describe briefly the fundamental functions of business budgets.
4. Define budgetary control and discuss the objectives of introducing a budgetary control in an organisation.
5. Define budgetary control. State its objectives. Explain the process by which the various budgets are prepared.
6. What do you think are the essentials of an effective budgetary control system?

7. Discuss the nature and functions of a budget committee.
8. Explain the 'Key-factor' in any budgeting system. Describe the necessity for and advantages of co-ordination between sales and production budgets.
9. What is sales budget? How is it prepared?
10. What factors would you consider when preparing a purchase budget?
11. What is flexible budget? What advantages, if any, has a flexible budget over an ordinary budget?
12. Define 'flexible budget'. Outline the advantages of and the procedure for setting up flexible budgets.

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S.N. MITTAL
5. ADVANCED MANAGEMENT ACCOUNTING : RAVI M.
KISHORE

LESSON : 14

STANDARD COSTING AND VARIANCE ANALYSIS

MEANING OF STANDARD COSTING

Standard costing is a very important system of cost control. It is a system which seeks to control the cost of each unit or batch through determination in advance of what should be the cost and then its comparison with actual cost. Through carefully planned and accounting procedures, the difference between the actual and pre-determined costs are analysed and then promptly reported upon to managers. The latter, in turn, take corrective and preventive action, as well as employ the data for planning, co-ordination and control.

Standard costing “may be defined as a technique of cost accounting which compares the standard cost of each product or service with the actual cost to determine the efficiency of the operation, so that any remedial action may be taken immediately”. [Brown and Howard]. According to I.C.M.A. London, “Standard costing is the preparation and use of standard costs, their comparison with actual costs and the analysis of variances to their causes and points of incidence”.

Salient Features of Standard Costing

Following are the salient features of standard costing :

- (1) Setting of standards - standards for each element of cost, i.e. material, labour and overhead, are ascertained separately.
- (2) Measurement of actual costs.
- (3) Comparison of actual costs with pre-determined standards to determine variances.
- (4) Analysis of variances for the purpose of ascertaining the reasons of variances.

- (5) Reporting the variances to management and taking appropriate actions to correct them.

Standard Costing and Budgetary Control Compared

Standard costing and budgetary control both are closely interrelated. They both aim at the improvement of the system of managerial control. They both achieve the same objective of maximum efficiency and cost control by establishing pre-determined standards, comparing actual performance with the predetermined standard and taking necessary steps to improve the situation, where necessary. The nature of both of these techniques is forward looking. However, they differ in the following respects:

1. The scope of budgetary control is wider. It is an integrated plan of action a co-ordinated plan in respect of all functions of an enterprise. The scope of standard costing is limited to the operating level. Here too it is further linked to costs. Budgetary control is extensive whereas standard costing is intensive in its application. The budgets embrace revenues as well as costs and all functions and activities - sales, purchase, finance, capital expenditure, personnel etc. in addition to production whereas the coverage of standard costing is limited to costs only.
2. Budgetary control requires functional co-ordination whereas standard costing does not require such co-ordination since it is possible -to think even of one aspect of cost.
3. It is possible to introduce the standard costing into the accounting routine itself. In such a case, the variances are given out by the accounting system itself. Budgetary control can not be introduced into the accounting system.
4. In standard costing standards are based on technical assessment whereas budgetary targets are based on past actuals adjusted to future trends. The standards set up under standard costing are attainable level of performance whereas the actual expenditure should not normally exceed. Thus, they differ in approach.

5. Budgets are projection of final accounts while standard costs are projection of only cost accounts.
6. By nature, budgetary control emphasizes the forecasting aspect of the future operations while the scope and utility of standard costing is limited to only operating level of the concern.
7. In standard costing, variances are analysed in details according to their originating causes and are revealed through different accounts whereas in budgetary control, the degree of variance analysis tends to be much less and variances are not revealed through the accounts but are revealed in total.

Thus standard costing and budgetary control are two different aspects of the process of managerial control. But they both are complementary to each other and should be used simultaneously in order to achieve maximum efficiency and economy.

It is often emphasized that budgetary control and standard costing can not function independently. This opinion is supported by the fact that both methods use pre-determined costs for the coming period. Strictly speaking, this is not true but it is a fact that both function better in conjunction with each other. When standard costs have been determined, it is relatively easy to compute budgets for production costs and sales. With the use of standard costs, a budget becomes a summary of standards for all items of revenue and costs. On the other hand, in determining standard costs it is essential to ascertain the level of output for the period and this is much easier when budgeted level has been formulated.

Standard Costs

Standard costs are the basis of the system of standard costing. They are the pre-determined costs of manufacturing a single unit or a number of product units during a specific period in the immediate future. They are the planned costs of a product under current and/or anticipated operating conditions. Here is a definition of the term standard cost :

The standard cost is a pre-determined cost which is calculated from management's standards of efficient operation and the relevant necessary expenditure.

Thus, it is clear from these definitions that standard costs represent the costs that should have been incurred under the expected circumstances. In a standard cost system, each unit of product has a standard material cost, a standard labour cost, a standard overhead cost for each product centre. The total standard cost for the period under consideration is obtained by multiplying these standard unit costs by the number of units flowing through the cost centre in that period.

Purposes of Standard costs

Standard costs are used for :

1. Establishing budgets.
2. Controlling costs and motivating and measuring efficiencies.
3. Promoting possible cost reduction.
4. Simplifying costing procedures and expediting cost reports.
5. Assigning costs to materials, work-in-process and finished goods inventories.
6. Forming the basis for establishing bids and contracts and for setting selling prices.

Historical or Actual Costs

Historical costs are actual costs. They are recorded after they have been incurred. One major responsibility of cost accounting department is to record the different types of cost and ascertainment of actual cost of production total production cost as well as production cost per unit.

Difference between Standard Costs and Historical Costs

1. The main difference between standard cost and historical cost is of recording them. Standard cost is a pre-determined cost while actual cost is an

after-production recorded cost. Thus, standard cost is of forward nature while historical costs are actual and of historical nature.

2. Historical costs are actual costs which have been actually incurred while standard costs are reasonably attainable Ideal costs.
3. Historical costs relate to past, hence not useful for control purposes. On the other hand, standard costs relate to future, hence they are very useful in controlling the costs.

Importance of Standard Costs

Standard costs are very useful for managerial control and planning. The limitation of historical costing system in this respect has given the way to the wide-spread use of standard costs. Though the historical costs have their own value. They form the basis of financial accounting and reporting but they have certain serious drawback from the point of view of modern management. The main drawbacks are as follows:

1. Actual costs are received -very late. These data are available to the management after the expiry of accounting period and closing the accounts. Hence, the management can not control them.
2. They do not provide any yardstick to ascertain the efficiency of the operations and performances.
3. They can not become the basis of budgeting, planning and price determination because they are based on past situations.

Standard costs are free from the above drawbacks and possess the following advantages :

First, it is often simpler and requires less work than an actual cost system. It is economical in terms of time as well as money.

Secondly, they provide yardsticks against which- actual costs are compared and ascertain efficiency or inefficiency of actual performances.

Thirdly, they provide a valuable guidance to management in the formulation of price and production policies.

Fourthly, they, being pre-determined costs, are useful in cost planning and budgetary control.

Fifthly, the use of standard costs in the organisation makes the people cost conscious, economical and efficient. It - assists in effective delegation of authority also.

Establishing Standard Costing System

(1) Establishment of Cost Centres - According to I.C.M.A. London, a cost centre is “a location, person or item of equipment (or group of these) for which costs may be ascertained and used for the purposes of cost control”. A centre which relates to persons is referred to as a personal cost centre and one which relates to location or to equipment as an impersonal cost centre. The determination of a suitable and appropriate cost centre is very important for ascertainment and control of costs. There should be no overlapping in establishing cost centres.

(2) Classification of Accounts : To introduce standard costing it is essential that accounts should be classified and integrated. The different accounts can be codified and different symbols can be used to facilitate speedy collection, communication and reporting. For example, following codes may be used for elements of cost :

0-10	Direct Materials
11-20	Direct Labour
21-25	Indirect Materials
26-30	Indirect Labour
31-40	Other Indirect Expenses

3. Setting of standards : One of the most important and difficult task in standard costing is setting of standards. “A standard is an ideal which it is anticipated can be attained over a future period of time, normally in the next

accounting year.” The success of standard costing system depends to a large extent on the genuineness, reliability and acceptance of these standards. The cost accountant, departmental heads, foremen and technical experts should work together in setting standards. Just like a budget committee, a committee should be formed to set standards.

It is very essential to ascertain the type of standard used in setting of the standards. The following types of standards may be used :

- 1. Current Standard :** Such standards are fixed on the basis of current conditions and remain in operation for a limited period in the sense that they are revised at regular intervals, the most common period being a year.
- 2. Basic Standard :** This is a standard which is established and operated without revision for a number of years. This standard is fixed for long periods so as to help forward planning. Variances calculated on the basis of such standards will help in studying the trends in manufacturing costs over a long period of time. But this type of standards is not suitable for cost control.
- 3. Normal Standard :** This standard is meant to smooth out fluctuations caused by seasonal and cyclical changes. This is defined by the Terminology as “the average standard which it is anticipated can be attained over a future period of time, preferably, long enough to cover one trade cycle”. It is difficult to follow such standards in practice because it is not possible to forecast performances with adequate accuracy for a long period of time. As such normal standards have little relevance for planning and cost control.
- 4. Establishing Standard Costs :** After determining the type of standard to be used, the next step in this process is to determine the standard costs for each element of cost. As we know that there are mainly three elements of cost—direct material, direct labour and overhead, hence standards should be fixed for each of them separately as follows:
- 5. Preparing Standard cost Card :** Finally, a standard cost card should be prepared for each product or service incorporating standard established for

each element of cost. This card will show the total and per unit standard cost of output. A specimen of standard cost card is given below.

Standard Cost Card

Product

Date of Standard.....

Elements of cost	Code	Qty./ Hours	Price/ Rate	Department			Total	Per	unit
				A	B	C			
				Rs.	Rs.	Rs.			
1. Direct Materials	RK 25	20	1	20					
	SN 50	80	2			160			
	RB 10	50	450		225		405	3.00	
Normal Loss		150							
		15							
		135							
2. Direct Labour	M 30	20	1.50	30					
	W 20	10	1.00		10				
	C 10	6	2.00			12	52	0.39	
3. Variable Production									
Overheads				10	15	20	45	0.33	
4. Fixed Production									
Overheads				30	25	80	135	100	
							637	4.72	

Advantages of Standard Costing

Standard costing is a very important managerial tool of cost reduction and cost control. The following are the possible advantages which can be derived by the

management of an industrial concern by installing standard costing system:

- 1. Simplification of Cost Bookkeeping :** Standard costing is simple and less complicated than historical costing. Standards set once for a product, continue for a long time. Once the standards are established, the records can be simplified and uniformity observed so that less is spent on clerical work.
- 2. Basis for Measuring Operating Performance :** Standards set provide yardsticks against which actual costs are compared to ascertain efficiency or inefficiency of actual performances.
- 3. Cost Reduction and Control :** By eliminating lost time, idle time, spoilage, material wastage and lost machine hours, cost control is effected. Standard costing provides information which is helpful in cost reduction.
- 4. Helpful in Budgeting :** Standard costs are useful in planning and budgeting Standard costing is really linked with budgetary control.
- 5. Formulation of Production and Price Policies :** Standard costing helps the management in the formulation of ideal production policy. For the purpose of fixing prices, it provides a lasting basis. Standard costs represent long-term estimates, cost and prices, therefore, can be fixed, on a long-term basis.
- 6. Promoting Cost consciousness and Efficiency :** Standard costing makes all employees cost conscious because they know that their performance shall be compared with the pre-determined standards. Analysis of variances enables to assess manufacturing efficiency, fix the responsibility for inefficiencies and locate persons responsible for unfavourable variances. This brings about an improvement in efficiency and productivity all round specially if the system of rewards and punishment is also geared to the results.
- 7. Establishing Incentive Schemes :** Standard costing provides the basis of incentive schemes because every incentive scheme is based on certain standards which can be determined easily, if the system of standard costing is in operation. It enables objective judgement of the people.

8. Facilitating Comparison : Standard costing enables cost comparisons for different products and departments. Besides, it also provides a basis for comparison between one period-and another specially when basic standards are used.

Limitations of Standard Costing

Standard costing suffers from some limitations, possibly as a result of misunderstanding on the part of the managers. Possible limitations are as follows :

- (1) As the installation of standard costing requires high degree of skill, the technique of standard costing may not be appropriate to small concerns. Small concerns may not have expert staff capable of operating the system. Moreover, fixation of standards may prove costly for a small concern.
- (2) Exact divisions of variances into controllable and uncontrollable variances is a difficult task.
- (3) This system is not suitable for industries which produce non-standardised products, and for jobs which change according to customers' requirements.

ANALYSIS OF VARIANCES

The distinctive feature of standard costing system is variance analysis. By definition, the term variance means the variation or deviation of the actual from the standard. In standard costing, it implies the difference between the actual cost and standard costs. Variances indicate the extent to which standards set have been achieved. If properly recorded and analysed, these variances become very important and useful tool for managerial control.

Variances by themselves are not the end. They are computed to know the reasons and fix responsibility for deviations of actual performances from predetermined targets so that measures can be taken to correct them in future. All this is covered in variance analysis. Thus, 'variance analysis' is the process of analysing variances by sub-dividing the total variance in such a way that management can assign responsibility for off standard performance. It is a very

useful means of interpreting operating results and spotting situations calling for correction.

Interpretation of Variances – Favourable and Unfavourable Variances

Each variance is interpreted.. By interpretation we mean deciding whether the variance is favourable or unfavourable. When actual cost is less than the standard cost, the difference is termed as 'unfavourable' or 'credit' variance. On the other hand, when actual cost exceeds the standard cost the difference is termed as 'unfavourable', 'adverse' or 'debit' variance. Ordinarily, a favourable variance is a sign of inefficiency. But in variance analysis, this general logic may prove the untrue. For example, favourable labour rate variance may be due to employment of low paid untrained labourers which has resulted an unfavourable labour efficiency variance. In such a case, favourableness of labour rate variance can not be said to be good for the organisation. Hence, all variances should be interpreted in relation to each other and only the net result be reported to, the management for corrective action.

Controllable and Uncontrollable Variances

In variance analysis, controllable variances should be segregated from uncontrollable ones. A variance is said to be controllable if it can be identified as the primary responsibility of a specified person or a department. For example the workers may be held responsible for use of material in excess of standard quantity. The size of controllable variance reflects the degree of efficiency of the person (or department) concerned. Actually it is the controllable variance with which the management is concerned because it is here where corrective action is required.

If variance is due to the factors beyond the control of the concerned person (or department), it is said to be uncontrollable. For example, increase in wage rate due to an award or increases in material prices due to increase in import duty are the examples of adverse uncontrollable variances. No person or department can be held responsible for uncontrollable variances. Actually revision of standards is required to remove such variances in future.

Classification of Variances

There is no unanimity among experts as regards to the number of variances. At one extreme, we can have a 'single variance' for the entire plant whereas at the other extreme we can have almost unlimited variances. The criterion for subdividing the total variance is the value of the additional information to management.

Variances may broadly be classified into two groups, viz., Cost Variances and Sales Variances. In the manufacturing area, it is usual to classify cost variances on the basis of the elements of cost as follows:

1. Direct Material Variances
2. Direct Labour Variances
3. Overhead Variances:
 - (a) Variable Overhead Variances
 - (b) Fixed Overhead. Variances

In variance analysis standard cost of each element of cost is reconciled with actual cost and difference is termed as 'Cost Variance', 'Net Variance' or 'Total Variance'. This cost variance is divided into two parts - 'price variance' and volume variance'. To know the cause of change, the volume variance may further be subdivided into several other variances.

Direct Material Variances

1. Material Cost Variances : It is the difference between the standard cost of materials allowed for the actual output and the actual cost of materials used. It may be expressed as :

$$\text{Material Cost Variance} = \text{Standard Cost} - \text{Actual Cost}$$

$$\begin{aligned} \text{When, SC} &= \text{Actual Output} \times \text{Standard Rate per unit of output} \\ \text{or SC} &= \text{Standard Quantity of Material for Actual Output} \times \\ &\quad \text{Standard Price per unit of material} \end{aligned}$$

$$AC = \text{Actual Quantity Consumed} \times \text{Actual Price per unit of material}$$

A favourable variance would result if “actual cost is less than standard cost and vice versa.

The Material Cost Variance is the sum total of Material Price Variance and Material Usage Variance.

2. Material Price Variance : It is that portion of Material Cost Variance which arises when the price paid for materials is different from the predetermined price. It is calculated by multiplying the actual quantity of materials used with the difference between standard and actual prices, i.e.,

$$\text{Material Price Variance} = \text{Actual Quantity Used} \times (\text{Standard Price} - \text{Actual Price})$$

A favourable variance would result if the actual price is less than the standard price and vice versa.

3. Material Usage Variance : It is also known as Material Quantity Variance or Efficiency Variance. It is that portion of Material Cost Variance which measures the difference in material cost arising from higher or less consumption of materials than the standard material consumption for the actual output. It is calculated by multiplying the standard price with the difference between the standard and actual quantities of materials, i.e.,

$$\text{Material Usage Variance} = \text{Standard Price} \times (\text{Standard Quantity} - \text{Actual Quantity})$$

A favourable variance would result if the actual quantity is less than the standard quantity and vice versa.

Illustration 1 : The production of a certain unit is assumed to require 80 kgs. of material costing Rs. 1.50 per kg. On completion of the production of a unit it was found that 75 kgs. of material costing Rs. 1.75 per kg. has been consumed. Calculate the variances.

Solution :

Computation of Material Variances

1. Material Cost Variance = Standard Cost - Actual Cost
= Rs. 120 – Rs. 131.25 = **Rs. 11.25 Adv.**

Workings : SC = SQ of input × SP
= 80 × Rs. 1.50 = Rs. 120
AC = AQ × AP
= 75 × Rs. 1.75 = 131.25

2. Material Price Variance = Actual Quantity of Input (Standard Unit Price - Actual Unit Price)
= 75 (Rs.1.50 – Rs. 1.75) = **Rs. 18.75 Adv.**

3. Material Usage = Standard Unit Price (Standard Quantity - Actual Quantity)
= Rs. 1.50 (80–75) = Rs. 7.50 Fav.

Verification: Material Cost Variance = Material Price Variance + Material Usage Variance
or Rs. 11.25 Adv. =Rs. 18.75 Adv. + Rs. 7.50 Fav.

Analysis of Material Usage Variance

(A) Material Yield Variance : This variance arises only when the rate of output is known. It is that portion of the direct material usage variance which is due to the difference between standard yield specified and actual' yield obtained. It measures the loss or saving due to wastage of materials. This variance is calculated as follows :

Material Yield Variance = Standard Rate per unit of output
(Standard Yield – Actual Yield)

or Standard Rate per unit of output (Standard Loss - Actual Loss)

$$\text{When, Standard Rate} = \frac{\text{Standard Cost of Standard Mix}}{\text{Standard Output from Standard Mix}}$$

$$\text{Standard Yield} = \frac{\text{Standard Output from Standard Mix}}{\text{Standard Mix Total} \times \text{Actual Mix Total}}$$

It is to be noted that unlike other material variances, yield variance is an output variance and hence, a favourable variance would result if actual yield is more than standard yield and vice versa.

Note : If only one type of material is used in the production of the product (i.e., where 'there is not Mix Variance'), the value of material yield variance will be equal to the Material Usage Variance (see illustration 2). But where several materials are used in the production, in that-case the value of Material Yield Variance will be equal to Material revised Usage Variance.

Illustration 2 : Raja Brothers manufactures a product x. It is estimated that for each ton of material consumed, 1.00 articles should be produced. The standard price per ton of material is Rs. 10. During the first week in January 2002, 100 tons of material were issued to production, the price of which was Rs. 10.50 per ton. Production during the week was 10,200 articles.

Compute the variances from the above.

Solution :

$$\begin{aligned} (1) \quad \text{Cost Variance} &= \text{Standard Cost} - \text{Actual Cost} \\ &= \text{Rs. 1,020} - \text{Rs. 1,050} = \mathbf{\text{Rs. 30 Adv.}} \end{aligned}$$

$$\begin{aligned} \text{Workings :} \quad \text{SC} &= \text{Actual Output} \times \text{Std. Rate per unit of output} \\ &= 10,200 \times 10 \text{ p.} = \text{Rs. 1,020} \\ \text{SR} &= \text{Std. Price per ton} \gg \text{Std. Output per ton} \\ &= \text{Rs. 10} \div 100 = 10 \text{ paise per article} \end{aligned}$$

$$\begin{aligned} AC &= \text{Actual Quantity of Input} \times \text{Actual Rate} \\ &= 100 \times \text{Rs. } 10.50 = \text{Rs. } 1,050 \end{aligned}$$

Alternatively,

$$SC = \text{Std. Qty. of Input of Actual Output} \times \text{Std. Rate per ton of Input}$$

$$= 102 \times \text{Rs. } 10 = \text{Rs. } 1,020$$

$$SQ = \text{Actual Output} \div \text{Standard Output per ton}$$

$$= 10,200 \div 100 = 102 \text{ tons}$$

$$\begin{aligned} (2) \text{ Price Variance} &= \text{Actual Quantity of Input (Std. Price - Actual Price)} \\ &= 100 (\text{Rs. } 10 - \text{Rs. } 10.50) = \text{Rs. } 50 \text{ Ad.} \end{aligned}$$

$$\begin{aligned} (3) \text{ Usage Variance} &= \text{Std. Price (Std. Qty. - Actual Qty.)} \\ &= \text{Rs. } 10 (102 - 100) = \text{Rs. } 20 \text{ Fav.} \end{aligned}$$

$$\begin{aligned} (4) \text{ Yield Variance} &= \text{Std. Rate per unit of output (Std. Yield - Actual Yield)} \\ &= 10 \text{ p. } (10,000 - 10,200) = \text{Rs. } 20 \text{ Fav.} \end{aligned}$$

Workings : SY = Actual Qty. of Material \times Std. Rate of Output per ton.

$$= 100 \times 100 = 10,000 \text{ articles}$$

Verification : Cost Variance = Price Variance + Usage variance

$$\text{Or Rs: } 30 \text{ Adv.} = \text{Rs. } 50 \text{ Adv.} + \text{Rs. } 20 \text{ Fav.}$$

and Usage Variance = Yield Variance

$$\text{Rs. } 20 \text{ Fav.} = \text{Rs. } 20 \text{ Fav.}$$

Illustration 3 : Calculate material cost variance and analyse the same by causes :

Standard material quantity per unit

2 Kg.

Standard price per kg.	Rs. 5
Actual value of material purchased	Rs. 4,800
Closing Stock of material	200 kg.
Actual Usage per unit	2.5 kg.
Finished Stock sold	220 Units
Closing Stock of Finished Units	20 Units

Solution :

$$(1) \quad \text{Material Cost Variance} = \text{Standard Cost} - \text{Actual Cost}$$

$$\text{Rs. 2,400} - \text{Rs. 3,600} = \mathbf{\text{Rs. 1,200 Adv.}}$$

Workings : SC = Actual Output \times SR per unit of output

$$= 240 \text{ Units} \times \text{Rs. 10} = \text{Rs. 2,400}$$

$$\text{AO} = 200 + 20 = 240 \text{ Units}$$

$$\begin{aligned} \text{SR} &= \text{Std. Usage per unit} \times \text{Std. Price per kg.} \\ &= 2 \text{ Kg.} \times \text{Rs. 5} = \text{Rs. 10} \end{aligned}$$

$$\begin{aligned} \text{AC} &= \text{AQ Consumed} \times \text{actual Price per kg.} \\ &= 600 \text{ kg.} \times \text{Rs. 6} = \text{Rs. 3,600} \end{aligned}$$

$$\begin{aligned} \text{AQ Consumed} &= \text{Actual Output} \times \text{Actual Usage per unit} \\ &= 240 \text{ units} \times 2.5 \text{ kg.} = 600 \text{ kg.} \end{aligned}$$

$$\begin{aligned} \text{AP} &= \frac{\text{Actual Value of Material purchased}}{\text{Actual Material Quantity purchased}} \times \frac{\text{Rs. 4,800}}{800 \text{ kgs.}} \\ &= \text{Rs. 6 per kg.} \end{aligned}$$

$$\begin{aligned} \text{AQ Purchased} &= \text{AQ Consumed} + \text{Closing Stock,} \\ &= 600 \text{ Kgs.} + 2200 \text{ Kgs.} = 800 \text{ Kgs.} \end{aligned}$$

$$\begin{aligned} (2) \text{ Material Price Variance} &= \text{AQ Consumed} (\text{SP} - \text{AP}) \\ &= 600 (\text{Rs. 5} - \text{Rs. 6}) = \mathbf{\text{Rs. 600 Adv.}} \end{aligned}$$

(450)

(3) Material Usage Variance = SP (SQ - AQ Consumed)

$$= \text{Rs. } 5 (480-600) = \text{Rs. } 600 \text{ Adv.}$$

Workings : SQ = 240 Units x 2 Kg. = 480 Kgs.

(4) Material Yield Variance = SR per unit of output (SY -AY)

$$= \text{Rs. } 10 (300-240) = \text{Rs. } 600 \text{ Adv.}$$

Workings: SY = Actual Quantity Consumed >> standard Usage Rate

$$= 600 \text{ kg } >> 2 \text{ kg. } = 300 \text{ Units}$$

Verification : M.C.V. = M.P.V. + M.U.V. or M.Y.V.

$$\text{or } \text{Rs. } 1,200 \text{ Adv. } = \text{Rs. } 600 \text{ Adv. } + \text{Rs. } 600 \text{ Adv.}$$

(B) Material Mix Variance : This variance arises only when more than one type of materials are used in manufacturing the product and the quantities of materials issued to production are not in proportion of standard mix. It is defined as that portion of the direct Materials Usage Variance which is due to difference between the standard and actual composition of a mixture. For calculating the Mix Variance, first calculate the quantities of revised standard mix. This is calculated by dividing the total quantities of actual mix in standard mix proportion. In the terminology of standard costing, quantities of revised standard mix are referred to as 'revised standard quantity'. Mix variance is obtained by multiplying the standard price of materials with the difference between revised standard quantity and actual quantity for each material. It may be expressed as follows :

Material Mix Variance = Standard Price (Revised Standard Quantity for each material- Actual Quantity for each material)

$$\text{When, RSQ} = \frac{\text{Std. Qty. for each material}}{\text{Total of Std. Qty. of all types materials}} \times \text{Actual Mix Total}$$

Alternatively, M.M.V. = Std. Cost of Revised Std. Mix - Std. Cost of Actual Mix.

A favourable variance would result if actual quantity is less than revised standard quantity and vice versa.

(C) Material Revised Usage (or Sub-Usage) Variance - This variance represents residue left after segregating Material Mix Variance from Material Usage Variance. Thus, it is that portion of Material Usage variance which is attributable to reasons other than the differences between standard and actual proportion of actual quantity used. This variance is calculated as under:

$$\text{Material Revised Usage Variance} = \text{Standard Price (Standard Quantity - Revised Standard Quantity)}$$

A favourable variance would result if revised standard quantity is less than standard quantity and vice versa.

Note: This variance should be calculated only when it is not possible to calculate Material Yield Variance. That is, if output figures are given then Material Yield Variance is calculated. If Material Revised Usage Variance is calculated in this situation then its value will be equal to Material Yield Variance.

Where weight of standard mix and actual mix are the same :

Illustration 4 : (A) from the following particulars, calculate Material Variances:

	Standard Mix	Rs.	Actual Mix	Rs.
A	55 Kgs. at Rs. 2.00	110	60 Kgs. at Rs. 2.25	135
B	45 Kgs. at Rs. 4.00	180	40 Kgs. at Rs. 3.50	140
	<u>100 Kgs.</u>	<u>290</u>	<u>100 Kgs.</u>	<u>275</u>

(B) Using the same information as in (A) and further assuming that the standard output and actual output are 90 unit's and 81 units respectively, calculate the material variances.

Solution :

$$(A) (1) \text{ Cost Variance} = \text{Standard Cost} - \text{Actual Cost.}$$

$$= \text{Rs. } 290 - \text{Rs. } 275 = \text{Rs. } 15 \text{ Fav.}$$

(452)

(2) Price Variance = Actual Qty. (Std. Price - Actual Price)

$$\begin{array}{l} A : 60 (\text{Rs. } 2.00 - \text{Rs. } 2.25) = \text{Rs. } 15 \text{ Adv.} \\ B : 40 (\text{Rs. } 4.00 - \text{Rs. } 3.50) = \text{Rs. } 20 \text{ Fav.} \end{array} \left. \vphantom{\begin{array}{l} A : 60 (\text{Rs. } 2.00 - \text{Rs. } 2.25) = \text{Rs. } 15 \text{ Adv.} \\ B : 40 (\text{Rs. } 4.00 - \text{Rs. } 3.50) = \text{Rs. } 20 \text{ Fav.} \end{array}} \right\} \text{Rs. } 5 \text{ Fav}$$

(3) Usage Variance = Std. Price (Std. Qty. - Actual Qty.)

$$\begin{array}{l} A : \text{Rs. } 2 (55-60) = \text{Rs. } 10 \text{ Adv.} \\ B : \text{Rs. } 4 (45-40) = \text{Rs. } 20 \text{ Fav.} \end{array} \left. \vphantom{\begin{array}{l} A : \text{Rs. } 2 (55-60) = \text{Rs. } 10 \text{ Adv.} \\ B : \text{Rs. } 4 (45-40) = \text{Rs. } 20 \text{ Fav.} \end{array}} \right\} \text{Rs. } 10 \text{ Fav.}$$

(4) Mix Variance = Std. Price (Revised Std. Qty. - Actual Qty.)

$$\begin{array}{l} A : \text{Rs. } 2 (55-60) = \text{Rs. } 10 \text{ Adv.} \\ B : \text{Rs. } 4 (45-40) = \text{Rs. } 20 \text{ Fav.} \end{array} \left. \vphantom{\begin{array}{l} A : \text{Rs. } 2 (55-60) = \text{Rs. } 10 \text{ Adv.} \\ B : \text{Rs. } 4 (45-40) = \text{Rs. } 20 \text{ Fav.} \end{array}} \right\} \text{Rs. } 10 \text{ Fav.}$$

Workings: Revised Std. Qty. is the actual mix total in standard mix proportion, i.e., For A, $55/100$ of $100 = 55$ kgs. and for B, $45/100$ of $100 = 45$ kgs.

(5) Revised Usage Variance = Std. Price (Std. Qty. - Revised Std. Qty.)

$$\begin{array}{l} A : \text{Rs. } 2 (55-55) = 0 \\ B : \text{Rs. } 4 (45-45) = 0 \end{array} \left. \vphantom{\begin{array}{l} A : \text{Rs. } 2 (55-55) = 0 \\ B : \text{Rs. } 4 (45-45) = 0 \end{array}} \right\} \text{Nil}$$

Verification : C.V. = P.V. + U.V.

or $\text{Rs. } 15 \text{ Fav.} = \text{Rs. } 5 \text{ Fav.} + \text{Rs. } 10 \text{ Fav.}$

and $\text{U.V.} = \text{M.V.} + \text{R.U.V.}$

or $\text{Rs. } 10 \text{ Fav.} = \text{Rs. } 10 \text{ Fav.} + \text{Nil}$

(B) (1) Cost Variance = Standard Cost - Actual Cost
= $\text{Rs. } 261 - \text{Rs. } 275 = \text{Rs. } 14 \text{ Adv.}$

Workings : SC = Actual Output \times SR per unit of output

$$= 81 \times \text{Rs. } 3\frac{2}{9} = \text{Rs. } 261$$

SR = Std. Cost of SM \div Std. Output from SM

$$= \text{Rs. } 290 \div 90 = \text{Rs. } 3\frac{2}{9} \text{ per unit of output}$$

(453)

(2) Price Variance = Actual Qty. (Std. Price - Actual Price)

$$\begin{array}{l} \text{A: } 60 (\text{Rs. } 2 - \text{Rs. } 2.25) = \text{Rs. } 15 \text{ Adv.} \\ \text{B : } 40 (\text{Rs. } 4 - \text{Rs. } 3.50) = \text{Rs. } 20 \text{ Fav.} \end{array} \left. \vphantom{\begin{array}{l} \text{A: } 60 (\text{Rs. } 2 - \text{Rs. } 2.25) = \text{Rs. } 15 \text{ Adv.} \\ \text{B : } 40 (\text{Rs. } 4 - \text{Rs. } 3.50) = \text{Rs. } 20 \text{ Fav.} \end{array}} \right] \text{Rs. } 5 \text{ Fav.}$$

(3) Usage Variance = Std. Price (Std. Qty. - Actual Qty.)

$$\begin{array}{l} \text{A : Rs. } 2 (49.5 - 60) = \text{Rs. } 21 \text{ Adv.} \\ \text{B : Rs. } 4 (40.5 - 40) = \text{Rs. } 2 \text{ Fav.} \end{array} \left. \vphantom{\begin{array}{l} \text{A : Rs. } 2 (49.5 - 60) = \text{Rs. } 21 \text{ Adv.} \\ \text{B : Rs. } 4 (40.5 - 40) = \text{Rs. } 2 \text{ Fav.} \end{array}} \right] \text{Rs. } 19 \text{ Fav.}$$

Workings : $\frac{\text{Std. Qty. for each material}}{\text{Std. Output from Std. Mix}} \times \text{Actual Output}$

$$\text{A : } \frac{55}{90} \times 81 = 49.5 \text{ units}$$

$$\text{B : } \frac{45}{90} \times 81 = 40.5 \text{ units}$$

(4) Mix Variance = Std. Price (Revised Std. Qty. - Actual Qty.)

$$\begin{array}{l} \text{A : Rs. } 2 (55-60) = \text{Rs. } 10 \text{ Adv.} \\ \text{B = Rs. } 4 (45-40) = \text{Rs. } 20 \text{ Fav.} \end{array} \left. \vphantom{\begin{array}{l} \text{A : Rs. } 2 (55-60) = \text{Rs. } 10 \text{ Adv.} \\ \text{B = Rs. } 4 (45-40) = \text{Rs. } 20 \text{ Fav.} \end{array}} \right] \text{Rs. } 10 \text{ Fav.}$$

Working : RSQ is the actual mix total in standard mix proportion

$$\begin{aligned} (5) \quad \text{Yield Variance} &= \text{Std. Rate per unit of output (SY—AY)} \\ &= \text{Rs. } 3 \frac{2}{9} (90-81) = \text{Rs. } 29 \text{ Adv.} \end{aligned}$$

Verification : C.V. = P.V. + U.V.

or Rs. 14 Adv. = Rs. 5 Fav. + Rs. 19 Adv.

and U.V. = M.V. + Y.V.

Or Rs. 19 Adv. = Rs. 10 Fav. + Rs. 29 Adv.

Where weights of the standard mix and the actual mix differ :

Illustration 5 : From the following details of a brass foundry, calculate material Variances :

	Standard Mix	Rs.	Actual Mix	Rs.
C	60 Kgs. @ Rs.. 5 per kg.	300	80 Kgs. @ Rs. 4.50 per kg.	360
Z	40 Kgs. @ Rs. 10 per kg.	400	70 Kgs. @ Rs. 8.00 per kg.	560
	100	700	150	920
	30 (30% Loss)		35	
	70	700	115	920

Solution :

(1) Cost Variance = Standard Cost - Actual Cost

$$\text{Rs. } 1,150 - \text{Rs. } 920 = \text{Rs. } 230 \text{ Fav.}$$

Working: SC = Actual Output \times Std. Rate per unit of output

$$= 115 \times \text{Rs. } 10 = \text{Rs. } 1150$$

SR = Std. Cost of Std. Mix \div Std. Output from Std. Mix

$$= \text{Rs. } 700 \div 70 = \text{Rs. } 10 \text{ per kg.}$$

(2) Price Variance = Actual Qty. (Std. Price - Actual price)

C	:	80 (Rs. 5 - Rs. 4.50) = Rs. 40 Fav.	} Rs.180 Fav.
Z	:	70 (Rs. 10 - Rs. 8.00) = Rs. 40 Fav.	

(3) Usage Variance = Std. Price (Std. Qty. — Actual Qty.)

C	:	Rs. 5(98 $\frac{4}{7}$ - 80) = Rs. 93 Fav.	} Rs. 50 Fav.
Z	:	Rs. 10 (65 $\frac{5}{7}$ - 70) = Rs. 43 Adv.	

Workings: SQ = $\frac{\text{Std. Qty. for each material}}{\text{Std. Output from Std. Mix}} \times \text{Actual Output}$

$$C : 60/70 \times 115 = 98 \frac{4}{7} \text{ kgs.}$$

$$Z : 40/70 \times 115 = 65 \frac{5}{7} \text{ kgs.}$$

4. Mix Variance: Std. Price (Revised Std. Qty. — Actual Qty.)

$$\begin{array}{l} C \quad : \quad \text{Rs. } 5 (90-80) = \text{Rs. } 50 \text{ Fav.} \\ Z \quad : \quad \text{Rs. } 10 (60-70) = \text{Rs. } 100 \text{ Adv.} \end{array} \quad \left. \vphantom{\begin{array}{l} C \\ Z \end{array}} \right\} \text{Rs. } 50 \text{ Fav.}$$

Workings : RSQ = $\frac{\text{Std. Qty. for each material}}{\text{Std. Mix Total}} \times \text{Actual Mix Total}$

$$\begin{array}{l} C \quad : \quad 150 \times 60/100 = 90 \text{ kgs.} \\ Z \quad : \quad 150 \times 40/100 = 60 \text{ kgs.} \end{array}$$

5. Revised Usage Variance = Std. Price (Std. Qty.- Revised Std. Qty.)

$$\begin{array}{l} C \quad : \quad \text{Rs. } 5 (98 \frac{4}{7} - 90) = \text{Rs. } 43 \text{ Fav.} \\ Z \quad : \quad \text{Rs. } 10 (65 \frac{5}{7} - 60) = \text{Rs. } 57 \text{ Fav.} \end{array} \quad \left. \vphantom{\begin{array}{l} C \\ Z \end{array}} \right\} \text{Rs. } 100 \text{ Fav.}$$

6. Yield Variance: Std. Rate per unit of output (Std. Yield - Actual Yield)
= Rs. 10 (105-115) = **Rs. 100 Fav.**

Workings: Std. Yield = Actual Mix Total - Std. Loss
= 150 - 30% of 150 = 105 kgs.

Verification : C.V. = P.V. + U.V.

Or Rs. 230 Fav. = Rs. 180 Fav. + Rs. 50 fav.

and U.V. = M.V. + *either* R.U.V. or Y.V.

or Rs. 50 Fav. = Rs. 50 Adv. + Rs. 100 Fav.

D) Material (Mix) Revision Variance : This variance is calculated in case of deliberate change in original standard mix by the management. In such a case, Material Mix Variance is not calculated. This is an uncontrollable variance. Following formula is used to calculate this variance:

Material (Mix) Revision Variance = Std. Price (Std. Qty. - Revise Std. Qty.)

When, $RSQ = \frac{\text{Revised Proportion of each type of labour}}{\text{Total of Revised Proportions}} \times \text{Std. Qty. Total}$

A favourable variance would result if revised standard quantity is less than standard quantity and vice versa.

Note: When Material (Mix) Revision Variance is calculated, following formula will apply for calculating Material Revised Usage Variance:

M. Revised Usage Variance = Std. Price (Revised Std. Qty. - Actual Qty.)

A favourable variance would result when actual quantity is less than the revised standard quantity and vice versa.

DIRECT LABOUR VARIANCES

1. Labour Cost Variance : It is the difference between the standard direct wages specified (as per standard laid down) for the activity achieved and the actual direct wages paid. This variance is calculated as under:

Labour Cost Variance = Standard Cost - Actual Cost

When, SC = Actual Output × Std. Rate per unit of output

or SC = Std. Hours for Actual Output x Std. Hourly Rate

AC = Actual Hours Paid x Actual Hourly Rate

A favourable variance would result when actual cost is less than standard cost and vice versa.

Labour cost variance is the sum total of Labour Rate Variance, Labour Efficiency Variance, Wage (Rate) Revision variance, Idle Time Variance and Labour Calendar Variance. These variances are discussed below.

2. Labour Rate (or Price) Variance : It is that portion of labour cost variance which is due to the difference between the standard rate specified and actual rate paid. It is calculated by multiplying the actual hours paid with the difference between standard rate specified and actual rate paid, i.e.,

Labour Rate Variance = Actual Hours Paid (Standard Rate - Actual Rate)

A favourable variance would result when actual rate is less than standard rate and vice versa.

3. Labour Efficiency (or Time) Variance : It is that portion of Labour Cost Variance which is due to the difference between the standard labour hours specified for the activity (output) achieved and actual labour hours worked. It is calculated by multiplying standard rate of wages with the difference between standard hours and actual hours worked, i.e.

Labour Efficiency Variance = Standard Rate (Standard Hours – Actual Hours Worked)

A favourable variance would result when actual hours worked are less than standard hours and vice versa.

Illustration 6 : The production of a certain unit is assumed to require 18 hours labour at a rate of Rs. 1.25 per hour. On completion of a unit it was found that the time taken was 16 hours, the wage rate being Rs. 1.50 per hour.

Calculate the Labour Variances.

Solution :

(1) Cost Variance = Standard Cost - Actual Cost

$$= \text{Rs. } 22.50 - \text{Rs. } 24.00 = \text{Rs. } 1.50 \text{ Adv.}$$

Workings : SC = Std.. Hours × Std. Rate per hour = 18×Rs. 1.25 = Rs. 22.50

AC = Actual Hours × Actual Rate per hour = 16×Rs.1.50 = Rs. 24.00

(2) Rate (or Price) Variance = Actual Hours Paid (Std. Rate - Actual Rate)

$$= 16 (\text{Rs. } 1.25 - \text{Rs. } 1.50) = \text{Rs. } 4 \text{ Adv.}$$

(3) Efficiency (or Time) Variance = Std. Rate (Std. Hours - Actual Hours Worked)

$$= \text{Rs. } 1.25 (18-16) = \text{Rs. } 2.50 \text{ Fav.}$$

Verification : C.V. = Rate V. + Eff. V.

Or Rs. 1.50 Adv. = Rs. 4 Adv. + Rs. 2.50 Fav.

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4. Labour or Wage (Rate) Revision Variance : This variance arises when as a result of certain award or an agreement with labour unions, the management have to revise the original standard rates of wages. If the management wants to show the effect of revision separately then only this variance is calculated. It is calculated by applying the following formula :

$$\text{Wages (Rate) Revision Variance} = \text{Standard Hours (Standard Rate - Revised Standard Rate)}$$

This variance is usually an unfavourable one as wage rates are revised mostly for increase. When this variance is calculated, the following formulae will be used for calculating Labour Rate and Labour Efficiency Variances.

$$\text{Labour Rate Variance} = \text{Actual Hours Paid (Revised Standard Rate - Actual Rate)}$$

$$\text{Labour Efficiency Variance} = \text{Revised Std. Rate (Standard Hours - Actual Hours Worked)}$$

Illustration 7 : The original standard rate of pay was Re. 1.00 per hour. Due to an award this rate of pay per hour is increased by 20%. In a certain period 1,000 actual hours were worked in which 900 standard hours were produced. The actual labour cost was Rs. 1,300 (due to some overtime work). Compute labour variances.

Solution :

$$\begin{aligned} (1) \text{ Cost Variance} &= \text{Standard Cost} - \text{Actual Cost} \\ &= \text{Rs. } 900 - \text{Rs. } 1,300 = \mathbf{\text{Rs. } 400 \text{ Adv.}} \end{aligned}$$

$$\begin{aligned} \text{Workings : SC} &= \text{Std. Hours} \times \text{Original Standard Rate} \\ &= 900 \times \text{Rs. } 1 = \text{Rs. } 900 \end{aligned}$$

$$\begin{aligned} (2) \text{ Rate Variance} &= \text{Actual Hours Paid (Revised Standard Rate - Actual Rate)} \\ &= 1,000 (\text{Rs. } 1.20 - \text{Rs. } 1.30) = \mathbf{\text{Rs. } 100 \text{ Adv.}} \end{aligned}$$

Rs.
per

$$\text{Workings: AR} = \frac{\text{Actual Labour Cost}}{\text{Actual Hours paid}} = \frac{1300}{1000} = \text{Rs. 1.30 per hour}$$

$$\text{RSR} = \text{Re. 1} + 20\% \text{ of Re. 1} = \text{Rs. 1.20 per hour}$$

$$(3) \quad \text{Efficiency Variance} = \text{Revised Std. Rate (Std. Hours - Actual Hours Worked)}$$

$$= \text{Rs. 1.20 (900 - 1,000)} = \text{Rs. 120 Adv.}$$

$$(4) \quad \text{Rate Revision Variance} = \text{Std. Hours (Std. Rate - Revised Std. Rate)}$$

$$= 900 (\text{Re. 1} - \text{Rs. 1.20}) = \text{Rs. 180 Adv.}$$

$$\text{Verification : C.V.} = \text{R.V.} + \text{E.V.} + \text{R.R.V.}$$

$$\text{Or} \quad \text{Rs. 400 Adv.} = \text{Rs. 100 Adv.} + \text{Rs. 120 Adv.} + \text{Rs. 180 Adv.}$$

(5) **Labour Idle Time Variance :** It is that portion of labour cost variance which is due to abnormal idle time of workers. This variance is calculated to show separately the effect of abnormal causes affecting production, such as power failure, machine break down, shortage of materials, strike etc. It is calculated as follows :

$$\text{Labour Idle Time Variance} = \text{Idle Hours} \times \text{Standard Hourly Rate}$$

This variance is always an adverse one

(6) **Labour Calendar Variance :** It is that portion .of labour cost variance which is due to the difference between pre-determined (or budgeted) working days and actual working days. It is calculated as follows:

$$\text{Labour Calendar Variance} = \text{Standard Rate per day (Budgeted Working Days - Actual Working Days)}$$

A favourable variance would result when actual working days are more than budgeted working days and vice versa.

Illustration 8 : (a) In the manufacture of a product, 200 employees are engaged at a rate of 50 paise per hour. A five-day week of 40 hours is worked and the
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standard performance is set at 250 units per hour. During the first week in January, six employees were paid at 45 paise an hour and four at 56 paise an hour, the remaining employees were paid at standard rates. The factory stopped production for one hour due to a power failure. Calculate variances.

(b) If during the week, the factory had to close down for one working day for mourning the death of the Prime Minister of the country, show its effect on variances.

Solution

(a) (I) Cost Variance = Standard Cost - Actual Cost

$$= \text{Rs. } 4,000 - \text{Rs. } 3,997.60 = \text{Rs. } 2.40 \text{ Fav.}$$

Workings: SC = Standard Hours × Std. Rate per hour

$$= 8,000 \times 50 \text{ p.} = \text{Rs. } 4,000$$

$$\text{SH} = 200 \times 40 = 8,000 \text{ hours}$$

$$\text{SH} = 200 \times 40 = 8,000 \text{ hours}$$

$$\text{AC} = 190 \text{ employees for } 40 \text{ hours at } 50 \text{ p. per hour} = \text{Rs. } 3,800$$

$$6 \text{ employees for } 40 \text{ hours at } 45 \text{ p. per hour} = \text{Rs. } 108$$

$$4 \text{ employees for } 40 \text{ hours at } 56 \text{ p. per hour} = \text{Rs. } 99.60$$

$$\text{Rs. } 3,800$$

$$\text{Rs. } 108$$

(2) Rate Variance = Actual Hours Paid (Std. Rate – Actual Rate)

$$= 190 \text{ employees} \times 40 \text{ hours} (50 \text{ p.} - 50 \text{ p.}) = 0$$

$$6 \text{ employees} \times 40 \text{ hours} (50\text{p.} - 45\text{p.}) = \text{Rs. } 12 \text{ Fav.}$$

$$4 \text{ employees} \times 40 \text{ hours} (50\text{p.} - 56\text{p.}) = \text{Rs. } 9.60 \text{ Adv.}$$

$$\text{Rs. } 2.40 \text{ Fav.}$$

$$(3) \quad \text{Efficiency Variance} = \text{Std. Rate (Std. Hours - Actual Hours Worked)}$$

$$= 50 \text{ p. } (8,000 - 7,800) = \mathbf{Rs. 100 Fav.}$$

Workings : AH Worked = $200 \times 39 = 7,800$ hours

$$(4) \quad \text{Idle Time Variance} = \text{Idle hours} \times \text{Standard Rate per hour}$$

$$\times 200 \text{ hours} \times 50 \text{ p.} = \mathbf{Rs. 100 Adv.}$$

or $\text{Rs. 2.40 Fav.} = \text{Rs. 2.40 Fav.} + \text{Rs. 100 Fav.} + \text{Rs. 100 Adv.}$

(b) In this case, only Labour Efficiency Variance will be affected and an additional variance known as Labour Calendar Variance will also be calculated.

$$(1) \text{ Labour Efficiency Variance} = \text{St. Rate (Std. Hours-Actual Hours Worked)}$$

$$= 50 \text{ p. } (8,000 - 6,200) = \text{Rs. 900 Fav.}$$

Workings: AH Worked = $31 \times 200 = 6,200$ hours

$$(2) \text{ Labour Calendar Variance} = \text{Std. Rate per day (Budgeted Working Days}$$

$$\text{-Actual Working Days)}$$

$$= \text{Rs. 800 (5-4)} = \mathbf{Rs. 800 Adv.}$$

Workings : SR per day = Budgeted Cost/Budgeted Working Days

$$= \text{Rs. } 4,000/5 = \text{Rs. 890 per day}$$

$$\text{BC} = 200 \times 40 \times 50\text{p.} = \text{Rs. 4,000}$$

Verification : L.C.V. = R.V. + Eff. V. + I.T.V. + Cal. V.

or $\text{Rs. 2.40 Adv.} = \text{Rs. 2.40 Fav.} + \text{Rs. 900 Fav.} + \text{Rs. 100 Adv.} + \text{Rs. 800 Adv.}$

For Setting

Classification of Labour Efficiency Variance

In order to measure the true efficiency of labour, efficiency variance is subdivided as follows :

(A) Labour Mix Variance or Gang Composition Variance : This variance arises only when different types of workers (e.g. women and men workers, trained, semi-trained and untrained workers) are employed in manufacturing. If actual working force of different grades of workers is not in the predetermined ratio then mix variance will occur. This variance shows to the management as to how much of the Labour cost variance is due to the change in the composition of labour force. It is calculated as follows:

Labour Mix Variance = Standard Hourly Rate (Revised Standard Hours – Actual Hours Worked)

Or Standard Cost of revised Standard Mix - Standard Cost of Actual Mix

When, $RSH = \frac{\text{Std. Hours of each type of labour}}{\text{Total of Std. Hours of all types of labour}} \times \text{Actual Hours Total}$

A favourable variance would result when actual hours worked are less than revised standard hours and vice versa.

(B) Labour revised Efficiency Variance : Alike Labour Mix Variance, this variance is calculated only when different grades of workers are employed in manufacturing. It represents residue left after segregating Labour Mix Variance from Labour Efficiency Variance. This variance is the true measure of labour efficiency. It is calculated as follows :

Labour Revised Efficiency Variance = Std. Hourly

(Standard Hours - Revised Standard Hours)

A favourable variance would result when revised standard hours are less than standard hours and vice versa.

Illustration 9 : The future planning budget of labour force of Komal Ltd. for producing article A in one week is :

40 men at 60 paise per hour for 40 hours = Rs. 960

20 women at 40 paise per hour for 40 hours = Rs. 320

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10 boys	at 30 paise per hour for 40 hours =	Rs. 120
		Rs. 1,400

The actual labour force employed during a week was:

30 men	at 60 paise per hour for 40 hours =	Rs. 840
20 women	at 40 paise per hour for 40 hours =	Rs.320
10 women	at 50 paise per hour for 40 hours =	Rs. 200
5 boys	at 30 paise per hour for 40 hours =	Rs. 60
		Rs. 1,420

Analyse the Labour Variances

Solution :

Analysis of Labour Variances

(1) Cost Variance = Standard Cost - Actual Cost

$$= \text{Rs. } 1,400 - \text{Rs. } 1,420 = \mathbf{\text{Rs. } 20 \text{ Adv.}}$$

(2) Rate Variance = Actual Hours Paid (Std. Rate - Actual Rate)

Only 10 women have been paid a rate which differs from standard rate and as a 40 hours week is in operation, 40 hours is the actual time which has been thus paid.

So, Rate Variance = 400 (40 p. – 50 p.) = **Rs. 40 Adv.**

(3) Efficiency Variance = Std. Rate (Std. Hours - Actual Hours Worked)

Men :	60 p. (1,600 – 1,400) = Rs. 120 Fav.	}	Rs. 20 Fav.
Women :	40 p. (800 – 1,200) = Rs. 160 Adv.		
Boys:	30 p. (400-200) = Rs. 60 Fav.		

Workings: SH = Men : 40 × 40 = 1,600 hours

Women : 20 × 40 = 800 hours

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Boys : $10 \times 40 = 400$ hours
 AH = Men : $35 \times 40 = 1,200$ hours
 Women : $30 \times 40 = 1,200$ hours
 Boys : $5 \times 40 = 200$ hours

(4) Mix Variance = Std. Rate (Revised Std. Hours - Actual Hours Worked)

Men :	$60 \text{ p. } (1,600 - 1,400) = \text{Rs. } 120 \text{ Fav.}$	}	Rs. 20 Fav.
Women :	$40 \text{ p. } (800 - 1200) = \text{Rs. } 160 \text{ Adv.}$		
Boys :	$30 \text{ p. } (400 - 200) = \text{Rs. } 60 \text{ Fav.}$		

Workings : RSH is the actual hours total in standard gang hours proportion, i.e. for Men, $2,800 \times 1,600/2,800 = 1,600$ hours; for Women, $2,800 \times 800/2,800 = 800$

(5) Revised Efficiency Variance = Std. Rate (Std. Hours-Revised Std. Hours)

Men :	$60 \text{ p. } (1,600 - 1,600) = 0$	}	Nil
Women:	$40 \text{ p. } (800 - 800) = 0$		
Boys :	$30 \text{ p. } (400 - 400)$		

Verification : C.V. = R.V. + Eff. V.

or Rs. 20 Adv. = Rs. 40 Adv. + Rs. 20 Fav.

and Eff. V. = M.V. + R. Eff. V.

or Rs. 20 Fav. = Rs. 20 Fav. + Nil

(C) Labour Composition (or Mix) Revision Variance or Labour Revised Mix Variance : If due to high, low or non-availability of certain grades of labour or imposition of legal restriction on their employment, the management have to revise the original labour composition, this variance is calculated to measure the effect of this change on labour cost. If this variance is calculated, Labour Mix Variance will not be calculated. This variance is calculated as follows :

$$\text{Labour Mix Revision Variance} = \text{Standard Hourly Rate} \\ (\text{Standard Hours} - \text{Revised Standard Hours})$$

$$\text{When, RSH} = \frac{\text{Revised Proportion of each type of material}}{\text{Total of Revised Proportions}} \times \text{Standard Hours Total}$$

A favourable variance would result when revised standard hours are less than standard hours and vice versa.

Note: Where this variance is calculated, Labour Revised Efficiency Variance will be calculated as follows:

$$\text{Labour Revised Efficiency Variance} = \text{Standard Hourly Rate} (\text{Revised Standard Hours} - \text{Actual Hours Worked})$$

A favourable variance would result when actual hours worked are less than revised standard hours and vice versa.

Illustration 10 : The Ram Metal Works manufactures a product R. In the factory, male and female employees are employed, standard rates of pay being 40 paise and 25 paise an hour respectively. The company operates a five-day week of 40 hours. The budgeted production for the month of May was fixed at 1,600 units. The budgeted labour mix for the month has been set as follows :

8,000 hours at 40 paise per hour	Rs. 3,200
8,000 hours at 25 paise per hour	Rs. 2,000
	Rs. 5,200

During May the company had difficulty in recruiting male workers and as a result was obliged to employ some females on process operations normally undertaken by male employees. The labour mix was revised as follows :

6,000 hours at 40 paise per hour	Rs. 2,400
10,000 hours at 25 paise per hour	Rs. 2,500
	Rs. 4,900

At the end of May, an analysis of wages revealed the following results:

6,600 hours at 45 paise per hour	Rs.	2,970
11,000 hours at 23 paise per hour	Rs.	2,530
		Rs. 5,500

There were 21 working days in May, but one of them was a holiday. Actual results showed that 21, days in fact were worked. Machine breakdowns resulted in the 120 hours (male and female employees) idle time.

Actual production for the month of May was 2,000 units.

Compute variances in respect of product R.

Solution :

$$(1) \quad \text{Cost Variance} = \text{Standard Cost} - \text{Actual cost}$$

$$= \text{Rs. } 6,500 - \text{Rs. } 5,500 = \text{Rs. } 1,000 \text{ Fav.}$$

Workings : SC = Actual Output × Std. Rate per unit of output

$$= 2,000 \times \text{Rs. } 3.25 = \text{Rs. } 6,500$$

$$\text{SR} = \frac{\text{Budgeted Cost}}{\text{Budgeted Output}} = \frac{\text{Rs. } 5,200}{1,600} = \text{Rs. } 3.25$$

$$(2) \quad \text{Rate Variance} = \text{Actual Hours Paid (Std. Rate - Actual Rate)}$$

$$\text{Males} \quad : \quad 6,600 (40 \text{ p.} - 45 \text{ p.}) = \text{Rs. } 330 \text{ Adv.}$$

$$\text{Females} \quad : \quad 11,000 (25 \text{ p.} - 23 \text{ p.}) = \text{Rs. } 220 \text{ Fav.} \quad \text{Rs. } 110 \text{ Adv.}$$

$$(3) \quad \text{Efficiency Variance} = \text{Std. Rate (Std. Hours - Actual Hours Worked)}$$

$$\left. \begin{array}{l} \text{Male} : 40 \text{ p. } (10,000 - 6,480) = \text{Rs. } 1,408 \text{ Fav.} \\ \text{Females: } 25 \text{ p. } (10,000 - 10,880) = \text{Rs. } 220 \text{ Adv.} \end{array} \right\} \text{Rs. } 1,188 \text{ Fav.}$$

$$(4) \quad \text{Idle Time Variance} = \text{Idle Hours} \times \text{Standard Rate}$$

$$\left. \begin{array}{l} \text{Male} \quad : \quad 120 \times 40 \text{ p.} = \text{Rs. } 48 \text{ Adv.} \\ \text{Females} \quad : \quad 120 \times 25 \text{ p.} = \text{Rs. } 30 \text{ Adv.} \end{array} \right\} \text{Rs. } 78 \text{ Fav.}$$

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Verification: C.V. = R.V. +- Eff. V. + I.T.V.

or Rs. 1,000 Fav. = Rs. 110 Adv. + Rs. 1,188 Fav. + Rs.78 Adv.

(5) Revised Mix varaince = Std. Rate (Std. Hours-Revised Std. Hours)

$$\begin{array}{l} \text{Males :} \quad 40 \text{ p. } (10,000 - 7,500) = \text{Rs. } 1,000 \text{ Fav.} \\ \text{Females :} \quad 25 \text{ p. } (10,000 - 1,500) = \text{Rs. } 625 \text{ Adv.} \end{array} \left. \vphantom{\begin{array}{l} \text{Males :} \\ \text{Females :} \end{array}} \right\} \text{Rs. } 375 \text{ Fav.}$$

Workings : SH = $\frac{\text{Budgeted Mix in hours}}{\text{Budgeted Output}} \times \text{Actual Output}$

$$= \text{Males :} \quad \frac{8,000}{1,600} \times 2,000 = 10,000 \text{ hours}$$

$$\text{Females :} \quad \frac{8,000}{1,600} \times 2,000 = 10,000 \text{ hours}$$

RSH = $\frac{\text{Revised Mix in hours}}{\text{Budgeted Output}} \times \text{Actual Output}$

$$= \text{Males :} \quad \frac{6,000}{1,600} \times 2,000 = 7,500 \text{ hours}$$

$$\text{Females :} \quad \frac{10,000}{1,600} \times 2,000 = 12,500 \text{ hours}$$

(6) Revised Efficiency Variance = Std. Rate (Revised Std. Hours – Actual Hours Worked)

$$\begin{array}{l} \text{Males :} \quad 40 \text{ p. } (7,500 - 6,480) = \text{Rs. } 408 \text{ Fav.} \\ \text{Females :} \quad 25 \text{ P. } (12,500 - 10,880) = \text{Rs. } 405 \text{ Fav.} \end{array} \left. \vphantom{\begin{array}{l} \text{Males :} \\ \text{Females :} \end{array}} \right\} \text{Rs. } 813 \text{ Fav.}$$

Workings : Actual Hours worked = Actual Hours Paid – Idle Hours

$$\text{Males :} \quad 6,600 - 120 = 6,480 \text{ hours}$$

$$\text{Females :} \quad 11,000 - 120 = 10,880 \text{ hours}$$

Verification : Eff. V. = M.V. + R. Eff. V.

$$\text{or} \quad \text{Rs. } 1,188 \text{ Fav.} = \text{Rs. } 375 \text{ Fav.} + \text{Rs. } 813 \text{ Fav.}$$

(D) **Labour Yield Variance :** Just like the Material Yield Variance, some accountants prefer to calculate a Labour Yield Variance also. This variance

reveals the effect on labour cost of actual yield being more or less than the standard yield by use of actual hours. Unlike other labour variances discussed earlier, this variance is of output but its value is equal to Labour Revised Efficiency Variance. The following formula is applied for calculating this variance :

$$\text{Labour Yield Variance} = \text{Standard Rate per unit of output} \\ (\text{Standard Yield} - \text{Actual Yield})$$

A favourable variance would result when actual yield is more than standard yield and vice versa.

OVERHEAD VARIANCES

Variable Overhead Variances

The variable overheads are those costs which tend to vary directly in proportion with changes in the volume of productive activity. As such the standard cost per unit of these overheads remains the same irrespective of the level of output attained. As the volume does not affect the variable cost per unit (or per hour), the only factor leading to difference is price. So, in the case of variable overheads, only Price Variance, known as Variable Overhead Expenditure Variance, is calculated and the following formula is applied for the purpose:

$$\text{Variable Overhead Expenditure (or Spending) Variance} = \\ \text{Standard Cost} - \text{Actual Cost}$$

When, $SC = \text{Actual Output} \times \text{Standards Variable Overhead Rate}$

A favourable variance would result when actual cost is less than standard cost and vice versa.

Note: If standard hours and actual hours (or standard output and actual output) differ then "efficiency variance" may be calculated in respect of variable overheads. In that case following variances are calculated:

1. Variable Overhead Cost Variance or Total Variance: This variance shows the difference between standard cost and actual cost of variable overheads,

i.e., Variable Overhead Cost Variance = Standard Cost - Actual Cost

When, $SC = \text{Actual Output} \times \text{Standard Variable Overhead Rate}$

A favourable variance would result when actual cost is less than standard cost and vice versa. This variance is the total of Expenditure Variance and Efficiency Variance described hereafter.

2. Variable Overhead Expenditure or spending Variance: This variance shows the difference between standard variable overheads on hours worked (also known as revised budgeted cost) and actual overheads, i.e.,

$$\text{Variable Overhead Expenditure Variance} = \text{Revised Budgeted Cost} - \text{Actual Cost}$$

$$\text{When, RBC (or Standard Overheads on Hours Worked)} = \text{Actual Hours worked} \times \text{Std. Variable Overheads Rate}$$

A favourable variance would result when actual cost is less than revised budgeted cost and vice versa.

3. Variable Overhead Efficiency Variance: It shows the effect of change in labour efficiency on variable overheads recovery. It is calculated as follows:

Variable Overhead Efficiency Variance =

$$\text{Standard Variable Overhead Rate (Standard Hours - Actual Hours)}$$

or Standard Variable Overhead on Hours worked - Standard Variable

Overhead on Actual Output

or Standard Variable Overhead Rate (Standard Output - Actual Output)

A favourable variance would result when actual hours are less than standard hours and vice versa.

Illustration 11 : The books of a manufacturing company regarding variable overheads revealed the following data :

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Budgeted production for March, 2002	300 units
Budgeted variable overheads	Rs. 7,800
Standard time for one unit	20 hours
Actual Production for March	250 units
Actual hours worked	4,500 hours
Actual variable overhead	Rs. 6,800

Compute the variable overhead variances

Solution :

$$\begin{aligned} \text{Variable Overhead Cost Variance} &= \text{Standard Cost} - \text{Actual Cost} \\ &= \text{Rs. } 6,500 - \text{Rs. } 6,800 = \mathbf{\text{Rs. } 300 \text{ Adv.}} \end{aligned}$$

Workings : SC = Actual Output × Standard Rate

$$= 250 \times 7,800/300 = \text{Rs. } 6,500$$

Alternatively, the following variable overhead variances may be computed to make the position more clear :

$$\begin{aligned} (1) \quad \text{Variable Overhead Expenditure Variance} &= \text{Std. Overheads on Hours} \\ &\quad \text{Worked} - \text{Actual Overheads} \end{aligned}$$

$$\begin{aligned} \text{or} \quad \text{Revised Budgeted Cost} &- \text{Actual Cost} \\ &= \text{Rs. } 5,850 - \text{Rs. } 6,800 = \mathbf{\text{Rs. } 950 \text{ Adv.}} \end{aligned}$$

Workings: Standard Overheads on Hours Worked = Actual Hours × Standard Rate

$$= 4,500 \times \text{Rs. } 1.30 = \text{Rs. } 5,850$$

$$\text{Std. Rate} = \frac{\text{Std. Overhead per unit}}{\text{Std. Time for a unit}} = \frac{7,800 \div 300}{20} = \text{Rs. } 1.30$$

$$\begin{aligned} (2) \quad \text{Variable Overhead Efficiency Variance} &= \text{Std. Overhead on Hours Worked} \\ &\quad - \text{Std. Overhead on Actual Output} \\ &= \text{Rs. } 5,850 - \text{Rs. } 6,500 = \mathbf{\text{Rs. } 650 \text{ Fav.}} \end{aligned}$$

(471)

(3) Variable Overhead Total Variance = Exp. Variance + Eff. Variance
= Rs. 950 Adv. + Rs. 650 Fav. = **Rs. 300 Adv**

Fixed Overhead Variances

In contrast to variable overheads, fixed overheads consist of costs which are not subject to change with the change in the volume of productive activity. The recovery of these overheads is affected by both output during a period and actual overheads during the corresponding period.

The fixed overhead variances may be calculated either on the basis of units of output or on the basis of standard hours. Any of these two bases may be used but usually the first basis is preferred. The following variances are calculated :

(1) Total Overhead Variance or Overhead Cost Variance : This variance shows the difference between the standard cost of fixed overheads allowed for the actual output achieved and the actual fixed overhead cost incurred. The formula is as follows :

$$\text{Total Overhead Variance} = \text{Standard Cost} - \text{Actual Cost}$$

(i) On the basis of units of output :

$$\text{SC} = \text{Actual Output} \times \text{Standard or Budgeted Rate per unit of output}$$

$$\text{SR} = \text{Budgeted fixed Overheads} \gg \text{Budgeted Output}$$

(ii) On the basis of standard hours:

$$\text{SC} = \text{Standard Hours} \times \text{Standard or Budgeted Rate per hour}$$

$$\text{SR} = \text{Budgeted Fixed Overheads} \gg \text{Budgeted Hours}$$

A favourable variance would result when actual cost is less than standard cost and vice versa.

This variance is the total of Expenditure Variance and Volume variance which are described hereafter.

(2) Fixed Overhead Expenditure (or Spending or Budget)

Variance : This variance shows the difference between the budgeted fixed overheads and the actual fixed overheads incurred during a particular period. It is expressed as :

$$\text{Expenditure Variance} = \text{Budgeted Cost} - \text{Actual Cost} .$$

The difference between the two represents either excessive spending or reduced spending. A favourable variance would result when actual cost is less than budgeted cost and vice versa.

(3) Fixed Overhead Volume Variance : This variance measures the over or under recovery of fixed overheads due to deviation of actual output level from the pre-determined output level. It is calculated as follows:

(i) On the basis of units of output:

$$\text{Volume Variance} = \text{Standard Rate} (\text{Budgeted Output} - \text{Actual Output})$$

$$\text{or} \quad \text{Budgeted Cost} - \text{Standard Cost}.$$

When actual output is more than budgeted output, fixed' overhead are over recovered and the variance is favourable. On the other hand, when actual output is less than budgeted output, it shows under-recovery of fixed overheads and the variance is unfavourable.

(ii) On the basis of standard hours :

$$\text{Volume Variance} = \text{Standard Rate per hour} (\text{Budgeted Hours} - \text{Standard Hours})$$

When SH = Actual Output >> Std. Output per hour

A favourable variance would result when standard hours are more than budgeted hour and vice versa.

Classification of Volume Variance :

Volume Variance is analysed as follows :

(A) Efficiency Variance : This variance shows over or under recovery of fixed overheads due to increased or, reduced labour efficiency. It is defined

as that portion of the volume variance which is due to the difference between the budgeted efficiency of production and the actual efficiency achieved. This variance is calculated as follows :

(i) On the basis of units of output :

Efficiency Variance = Standard Rate (Standard Output – Actual Output)

Here, standard output means output at budgeted rate in actual worked. A favourable variance would result when actual output is more than standard output and vice versa.

(ii) On the basis of standard hours :

Efficiency Variance = Standard Rate (Standard Hours – Actual Hours)

A favourable variance would result when actual hours are less than standard hours and vice versa.

(B) Capacity Variance : It is defined as that portion of volume variance which is due to working at higher or lower capacity than budgeted. It shows over or under recovery of fixed overheads due to over or under utilisation of plant and equipment. In case of under utilisation of capacity, this variance is also called as Idle Capacity variance or Idle Time Variance It is calculated as follows :

(i) On the basis of units of output:

Capacity Variance = Standard Rate (Budgeted Output - Standard Output)

A favourable variance would result when standard output is more than budgeted output and vice versa.

(ii) On the basis of standard hours:

Capacity Variance = Standard Rate (Budgeted Hours - Actual Hours)

A favourable variance would result when actual hours are more than budgeted hours and vice versa.

(C) Calendar Variance : This variance arises only when the actual number of working days in the budget period differs from the budgeted number of working days. It is calculated by multiplying the standard daily rate with the difference of budgeted days and actual working days, i.e., Calendar Variance Standard Daily Rate (Budgeted Days and vice versa.

Alternatively, Calender Variance may be calculated on the basis of units of output and standard hours also.

(i) On the basis of units of output:

Calender variance = Standard Rate (Budgeted Output – Revised Budgeted Output)

When, RBO = Budgeted Output for the period $\times \frac{\text{Actual Days}}{\text{Budgeted Days}}$

A favourable variance would result when revised budgeted output is more than budgeted output and vice versa. If Calendar Variance exists, the Capacity Variance will be calculated by applying the following formula:

Capacity Variance = Standard Rate (Revised Budgeted Output – Standard Output)

A favourable variance would result when standard output is more than revised budgeted output and vice versa.

(ii) On the basis of standard hours:

Calendar Variance = Standard Rate (Budgeted Hours - Revised Budgeted Hours)

When, RBH = Budgeted Hours for the period $\times \frac{\text{Actual Days}}{\text{Budgeted Days}}$

A favourable variance would result when revised budgeted hours exceed the budgeted hours and vice versa.

In this case, following formula is applied for calculating the Capacity Variance:

Capacity Variance = Standard Rate (Revised Budgeted Hours - Actual Hours)

A favourable variance would result when actual hours are more than revised budgeted hours and vice versa.

Illustration 12 : The standard overhead rate of a product is developed as follows :

Variable	Rs. 4.00
Fixed (Budgeted Production 10,000 units)	Rs. 6.00

Standard time allowed for production of each unit of product is 5 hours. The following actual data are available for a month:

Production	9,600 units
Time taken	47,900 hours
Overheads :	
Variable	Rs. 38,500
Fixed	Rs. 60,500

Compute overhead variance.

Solution :

Variable Overhead Variance

$$\begin{aligned} \text{Variable Overhead Expenditure Variance} &= \text{Standard Cost} - \text{Actual Cost} \\ &= \text{Rs. } 38,400 - \text{Rs. } 38,500 = \mathbf{\text{Rs. } 100 \text{ Adv.}} \end{aligned}$$

Workings: $SC = 9,600 \times 4 = \text{Rs. } 38,400$

Alternatively -

$$\begin{aligned} \text{(i) Variable Overhead Cost Variance} &= \text{Std. Cost} - \text{Actual Cost} \\ &= \text{Rs. } 38,400 - \text{Rs. } 38,500 = \mathbf{\text{Rs. } 100 \text{ Adv.}} \end{aligned}$$

$$\begin{aligned} \text{(ii) Variable Overhead Expenditure Variance} &= \text{Budgeted Cost} - \text{Actual Cost} \\ &= \text{Rs. } 38,320 - \text{Rs. } 38,500 = \mathbf{\text{Rs. } 180 \text{ Adv.}} \end{aligned}$$

Workings : BC (Standard Overhead on Standard Output)

$$\begin{aligned} &= \text{SO} \times \text{Variable Overhead Rate} \\ &= 9,580 \times 4 = \text{Rs. } 38,320 \end{aligned}$$

(476)

SO = Actual Hours Worked/Std. Hours per unit

$$\text{Rs. } 47,900/5 = 9,580 \text{ units}$$

- (iii) Variable Overhead Efficiency Variance = Variable Overhead Rate
(Std. Output - Actual Output)
= **Rs. 4** (9,580-9,600)= **Rs. 80 Fav.**

Fixed Overhead Variances

- (i) Fixed Overhead Cost Variance = Standard Cost – Actual Cost
Rs. 57,600 – Rs. 60,500 = **Rs. 2,900 Adv.**

Workings : SC = 9,600 × Rs. 6 = Rs. 57,600

- (ii) Fixed Overhead Expenditure Variance = Budgeted Cost - Actual Cost
= Rs. 60,000–Rs. 60,500 = **Rs. 500 Adv.**
- (iii) Fixed Overhead Volume Variance = Budgeted Cost - Standard Cost
= Rs. 60,000–Rs. 57,600 = **Rs. 2,400 Adv.**
- (iv) Fixed Overhead Efficiency Variance = Std. Rate (Std. Output –
Actual Output)
= Rs.6 (9,580–9,600) = **Rs. 120 Fav.**
- (v) Fixed Overhead Capacity Variance = Std. Rate (Budgeted Output
Std. Output)
= Rs. 6 (10,000–9,580) = **Rs. 2,520 Adv.**

SELF ASSESSMENT QUESTIONS

1. Define standard costing and explain its advantages and limitations.
2. What is the essential difference between budgetary control and standard costing?

3. What is Standard Costing? Bring out clearly the relationship between Standards Costing and Budgetary Control.
4. Explain the classification of Direct Material Cost Variance with suitable examples.
5. State the reasons for each of the following variances:
 - (i) Direct Material Usage Variance, (ii) Direct Labour Rate Variance,
 - (iii) Direct Material Mix Variance.
6. What do you mean by 'Variance'? Due to what factors does Profit Variance arise?
7. What is meant by Overhead Variance?
8. From the following particulars compute (a) Material Cost Variance, (b) Material Price Variance, and (c) Material Usage Variance :

Quantity of materials purchased	3,000 units
Value of materials purchased	Rs. 9,000
Standard quantity of materials required per tonne of output	30 units
Standard rate of materials	Rs. 2.50 per unit
Opening stock of materials	Nil
Closing stock of materials	500 units
Output during the period	80 tonnes

[Ans. DMCV Rs. 1,5090 (A); DMPV Rs. 1,250 (A); DMUV Rs. 250 (A)]
9. From the data given below, calculate the Materials Price Variance, the Material Usage Variance and Material Mixture Variance:

Consumption per 100 units of product

Raw Material	Standard	Actual
A	40 units @ Rs., 50 per unit	50 units @ Rs. 50 per unit
B	60 units @ Rs. 40 per, unit	60 units @ Rs. 45 per unit

[Ans. DMPV Rs. 300 (A); DMUV Rs. 500 (A); DMMV Rs. 60 (A); DMRUV Rs. 440 (A)]

10. In a factory section there are 80 workers and average rate of wages per worker is Re 0.50 per hour. Standard working hours per week are 45 and the standard performance is 6 units per hour.

During the four weeks in February, wages paid for 40 workers was Re. 0.50 per hour, for 15 workers Re. 0.60 per hour, and for 25 workers Re. 0.40 per hour. The section did not work for 4 hours due to breakdown for machinery.

Work out the labour rate variance for the section for the 4 weeks.

[Ans. Labour Rate Variance Rs. 180 (F)]

[Hint Standard Wages Rs. 7,200; Actual Wages Rs. 7,020; No note is to be taken of idle time]

11. The following figures are extracted from the books of a company:

Budgeted Overhead	Rs. 10,000	(Fixed Rs. 6,000: Variable Rs. 4,000)
Budgeted Hours	2,000	
Actual Overhead	Rs. 10,400	(Fixed Rs. 6,100: Variable Rs. 4,300)
Actual Hours	2,100	

Compute the Overhead variances.

[Ans. OCV Rs. 100 (F); VOCV Rs. 10 (A); FOCV Rs. 200 (F)]

LESSON : 15

MARGINAL COSTING AND PROFIT PLANNING

Marginal costing is not a method of costing on the lines of Job or process costing, but is a special technique which presents information to management enabling it to measure the Profitability of an undertaking by considering the behaviour of costs. Marginal costing may be used in conjunction with other costing methods like job or process costing or with other techniques such as standard costing or budgetary control.

Fixed and Variable Costs

The classification of costs into fixed and variable is of special interest and importance in marginal costing. The concepts of fixed and variable costs have been described earlier. These two types of cost behave differently with changes in the volume of output. Fixed costs remain largely constant regardless of the actual level of production. Variable Costs, on the other hand, change in proportion to the volume of output. Semi-fixed or semi-variable costs are separated into fixed and variable elements and added to their respective categories.

Under marginal costing, fixed and variable costs are kept separate for all purposes. Only variable costs are taken into account for computing the costs of products and thus are treated as 'Product Costs'. Fixed costs do not find place in the costs of products or in inventory valuation. Such costs are treated as 'Period costs' and are written of in the costing Profit and Loss Account of the period in which they incurred. The following entry is passed through cost journal after analysing production, administration and selling and distribution overheads into fixed and variable components:

Dr. Variable Overhead incurred A/C

Dr. Fixed Overhead incurred A/C

Cr. Production Overhead incurred A/C

Cr. Administration Overhead incurred A/C

Cr. Selling and Distribution Overhead incurred A/c

What is Marginal Cost

Marginal cost is nothing but variable costs. It is clearly composed of all direct costs and variable overheads. The I.C.M.A London has defined marginal costs 'as the amount at any given volume of output by which aggregate costs are changed, if volume of output is increased or decreased by one unit'. In simple words, marginal cost is the additional cost of producing additional units. An important point is that marginal cost per unit remains unchanged irrespective of the level of activity. The following example would further clarify the concept of marginal costs.

Example. A company manufactures 100 radios per month. Total fixed cost per month is Rs. 5,000 and marginal cost per radio is Rs. 150. The total cost per month will be :

	Rs.
Marginal (variable) cost of 100 radios	15,000
Fixed Cost	5,000
	<hr/>
Total Cost	20,000

If output is increased by one radio, the cost will appear as follows :

	Rs.
Marginal cost (101 x 150)	15,150
Fixed cost	5,000
	<hr/>
Total cost	20,150

Thus the additional costs of producing one additional radio is Rs. 150, which is its marginal costs. However, where fixed costs also increase with the

increase in the volume of output, this may be the result of increase in production capacity.

Such increases in fixed costs are dealt with as a part of what is known 'differential cost analysis' discussed separately in this chapter.

What is Marginal Costing

Marginal costing is defined by I.C.M.A. London as 'the ascertainment of marginal costs, by differentiating between fixed and variable costs, and of the effect on profit of changes in volume or type of output'. This definition makes it clear that marginal costing goes beyond the ascertainment of costs. It is a technique concerned with the effect on profit when the volume or type of output changes. In particular, marginal costing studies the effect which fixed cost has on the running of a business.

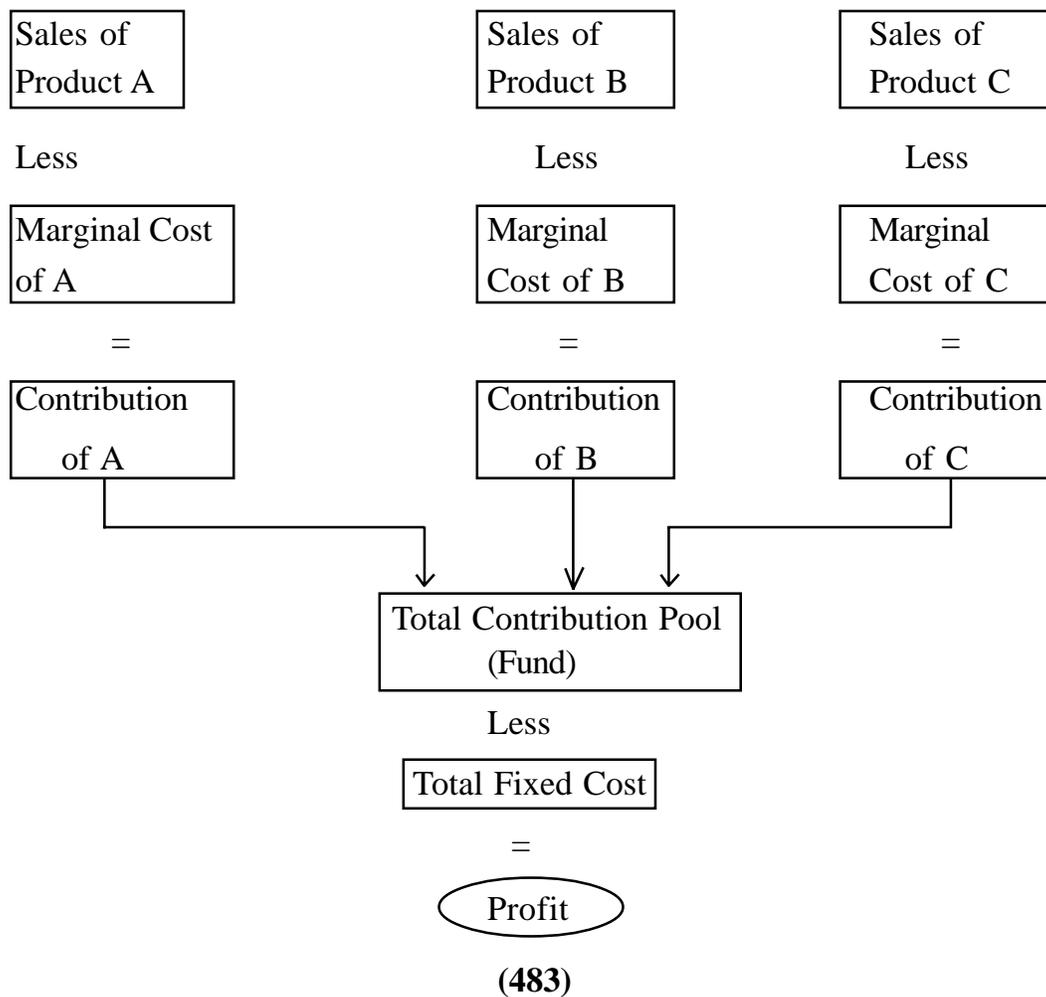
Characteristics of Marginal Costing

The essential characteristic and mechanism of marginal costing technique may be summed up as follows :

- 1. Segregation of costs into fixed and variable elements.** In marginal costing all costs are classified into fixed and variable. Semi-costs are also segregated into fixed and variable elements.
- 2. Marginal costs as products costs.** Only marginal (variable) costs are charged to products costs.
- 3. Fixed costs as period costs.** Fixed costs are treated as period costs are charged to costing Profit and Loss Account of the period in which they are incurred.
- 4. Valuation of inventory.** The work-in progress and finished stocks are valued at marginal costs only.
- 5. Contribution.** Contribution is the difference between sales value and

marginal costs of sales. The relative profitability of products or departments is based on a study of 'contribution' made by each of the products or departments.

6. **Pricing** In marginal costing, prices are based on marginal cost plus contribution.
7. **Marginal costing and profit** In marginal costing, profit is calculated by a two stage approach. First of all contribution is determined for each product or departments. The contributions of various products or departments are pooled together and such a total contributions from all products is called 'Fund'. Then from this fund is deducted the total fixed cost to arrive at a profit or loss. This is illustrated below:



Segregation of Semi-variable Costs into Fixed and Variable Elements:

In marginal costing all costs are classified into fixed and variable. Semi-variable costs are also segregated into fixed and variable elements.

In other words, the extent to which an item of semi- fixed-variable cost is fixed or variable has to be determined. The following methods are used for this purposes :

1. High and Lows Points Method.
2. Comparison of Output and Costs Method.
3. Scatter diagram Method.
4. Simultaneous Equations Method.

All these methods have been explained with the help of the following illustration.

Illustration -I

	Production Units	Semi-Variable Cost Rs.
Jan.	40	1100
Feb.	20	800
March	60	1400
April	80	1700
May	100	2000
June	70	1550

In July, the production is 50 units. Calculate fixed, variable and semivariable costs for this month.

Solution :

1. **High and low points method.** In this method, the difference between the highest and the lowest volume of output and the difference of the

corresponding costs are worked out. Then variable element per unit is computed by applying the following formula:

$$\text{Variable Element per unit} = \frac{\text{Difference in semi-variable costs}}{\text{Difference in production quantity}}$$

The highest production is 100 units in May and the lowest is 20 units in Feb.

Month	Production Units	Semi-variable costs
May	100	2,000
Feb.	20	800
Difference	80	1,200

$$\text{Variable elements} = \frac{\text{Rs. 1,200}}{80 \text{ units}} = \text{Rs. 15 per unit}$$

$$\text{Variable element in Feb.} = 20 \times \text{Rs. 15} = \text{Rs. 300}$$

$$\text{Fixed element in Feb.} = \text{Semi variable costs} - \text{variable element}$$

$$= \text{Rs. 800} - 300 = \text{Rs. 500}$$

Similar calculations for May.

$$\text{Variable cost for May} = 100 \times \text{Rs. 15} = 1500$$

$$\text{Fixed costs} = (\text{Rs. 2000} - 1500) \text{ Rs. } 500$$

$$\mathbf{2,000}$$

In July; when production is 50 units variable and fixed costs are calculated as follows :

	Rs.
Variable costs (50 units @ Rs. 15)	750
Fixed Costs	500
Semi- Variable Costs (Total)	<u>1,250</u>

(485)

2. Comparison of Output and Costs-Method

This method is similar to High and Low Points method except that in this method a comparison is made between levels of output and corresponding costs at any two levels. Variable and fixed elements are computed in the same manner as explained in the first method.

Solution- Let us take the figure of March and April in the Illustration.

Month	Production Units	Semi-variable Costs
March	60	1,400
April	80	1,700
Difference	<hr/> 20 <hr/>	<hr/> 300 <hr/>

$$\text{Variable elements} = \frac{\text{Rs. } 300}{20 \text{ unit.}} = \text{Rs. } 15 \text{ per unit}$$

$$\text{Variable elements in March} = 60 \times \text{Rs. } 15 = \text{Rs. } 900$$

$$\begin{aligned} \text{Fixed elements in March} &= \text{Rs. } 1400 - \text{Rs. } 900 \\ &= \text{Rs. } 500 \end{aligned}$$

For the Month of April.

Variable costs (80 units @ Rs. 15) =	Rs. 1200
Fixed costs	Rs. 500
Semi-variable costs	Rs. 1700

3. Scatter diagram method

This is a graphic method and is explained in the following steps (I) On X-axis represent units of production and on Y-axis represent semi variable costs. (ii) Costs at various levels of production are plotted on the graph thereby

showing various points (iii) A straight line, the line of best fit is then drawn averaging the points plotted. This line represents the trend shown by the majority of these plotted points, (iv) The point where this line of best fit intersects the y-axis marks the fixed costs. A

4. Simultaneous equations method

In this method, two simultaneous equations are used to segregate fixed and variable elements in semi-variable costs. Two equations are used in respect of two periods or levels of production.

The equation is :

$$Y = a + bx$$

Where Y = Total semi-variable costs
 a = Fixed cost
 b = Variable cost per unit
 x = Units of production

Solution - This equation is applied in two periods. Here it is applied in Jan.: and Feb. Thus we get :

$$\begin{array}{rcll} Y & = & a + bx & \\ \text{Jan. 1100} & = & a + 40b & \text{..... (I)} \\ \text{Feb. 800} & = & a + 20b & \text{.....(ii)} \end{array}$$

Subtracting equation (ii) from (I), we get

$$\begin{array}{rcl} 300 & = & 20b \\ \therefore b & = & \frac{300}{20} \\ b & = & \text{Rs. 15} \end{array}$$

Thus variable cost per unit is Rs. 15

Putting the value of b in equation (I)

$$1100 = a + 40 \times 15$$

$$a = \text{Rs. } 500$$

The result will be the same when value of b is put in equation (ii)

$$\text{Thus in Jan. - Fixed Costs} = \text{Rs. } 500$$

$$\text{Variable Costs} = \text{Rs. } 600 \text{ (i.e. } 400 \times 15)$$

$$\text{Semi - variable costs} = \underline{\underline{1,100}}$$

It is interesting to note that results obtained under the various methods are identical. This because there is a linear relationship between output and variable overhead costs i.e., for each unit of output, the same amount of variable overhead cost is incurred. In practice, it may not always be so and final separated figures for and variable elements may differ widely under different methods.

The methods discussed above are used not only for determining the fixed and variable elements in semi-variable costs but also for segregating the fixed and variable costs when total costs is given.

Illustration - II The following information is given :

Production (Nos.)	6000	8000
Labour Costs (Rs.)	15,000	19,000
Overhead Costs (Rs.)	1,17,000	1,47,000

Determine the fixed costs element and available cost element, by using comparison of output and costs method.

$$\begin{aligned} \text{(I) Variable overhead per unit} &= \frac{\text{Difference in overhead cost}}{\text{Difference in production}} \\ &= \frac{1,47,000 - 1,17,000}{8,000 - 6,000} \end{aligned}$$

(488)

	30,000
	2,000 = Rs. 15 per unit.
	Rs.
Overhead cost.	1,17,000
Less: Variable cost (600 x Rs. 15)	90,000
Fixed cost	27,000
(ii) Variable labour cost per unit = $\frac{\text{Difference in labour cost}}{\text{Difference in production}}$	
= 1900 – 15000	4000
8,000 – 6,000	2000
= Rs. 2 per unit	
	Rs.
Labour cost	15,000
Less: variable cost (6000 × Rs. 2)	12,000
Fixed cost	3,000

Marginal Costing and Absorption Costing - A comparison

It has been seen above that in marginal costing only variable costs are charged to products. Stocks are also valued at variable cost only. Fixed cost is charged to Costing Profit and Loss Account of the Period.

As distinct from marginal costing, absorption costing is a total cost technique. Under absorption costing total cost i.e. fixed and variable is charged to production. Stocks are also valued at total cost.

The Points of distinction between marginal costing and absorption costing as summarised as follows :

1. Treatment of Fixed and Variable costs

In marginal costing, only variable costs are charged to products. Fixed costs are treated as period costs and charged to profit and loss account of the

period. In absorption costing all costs (both fixed and variable) are charged to products.

2. Valuation of stock

In marginal costing, stocks of work - in- progress and finished goods are valued at marginal cost only.

In absorption costing, stocks are valued at total cost which includes both fixed and variable costs. Thus stock values in marginal costs are lower than that in absorption costing.

3. Measurement of Profitability

In marginal costing, relative profitability of products or departments is based on a study of relative contributions made by respective products or departments. The managerial decisions are thus guided by contribution.

In absorption costing, relative profitability is judged by profit figures which is also a guiding factor for managerial decisions.

Difference in profit under marginal costing and absorption costing.

Profit under the two systems may be different because of difference in the stock valuation. Position in this regard is summarised as follows :

- (i) When there are no opening and closing stocks, profit/loss under the two system will be equal.
- (ii) When opening stock is equal to closing stock, then also/profit loss under the two systems will be equal provided the fixed cost element in opening and closing stocks is the same amount.
- (iii) When closing stock is more than opening stock, profits shown by absorption costing will be more than that shown by marginal costing.
- (iv) When closing stock is less than opening stock, profits shown by marginal costing will be more than that shown by absorption costing.

Illustration -III From the following information prepare a Statement of cost under :-

- a) Marginal Costing
- b) Absorption Costing

	Products		
	X	Y	Z
	Rs.	Rs.	Rs.
Direct materials	7500	30,000	3,000
Direct wages	9000	9000	1,500
Factory Overhead – Fixed	3000	1500	1,500
– Variable	3900	9000	1,500
Selling Overhead – Fixed	1500	900	600
– Variable	2100	6000	3,000
Sales	32000	61000	16000

Solution :

a) **Statement of Cost (Marginal costing)**

	Products			Total
	X	Y	Z	(x+y+z)
	Rs.	Rs.	Rs.	Rs.
Sales (A)	32000	61000	16000	1,09,000
Variable costs :				
Direct Materials	7,500	30,000	3000	40500
Direct Wages	9,000	9,000	1500	19500
Variable overhead:	3900	9000	4500	17,400

(491)

Factory	2100	6000	3000	11,100
Selling				
Marginal costs (B)	22500	54000	12000	88500
Contribution (A-B)	9,500	7000	4000	20,500
Less : Fixed cost (Total)				9000
Profit				11,500

(b) Statement of Cost (Absorption costing)

	Products			Total
	X	Y	Z	(x+y+z)
	Rs.	Rs.	Rs.	Rs.
Direct Materials	7500	30000	3000	40500
Direct Wages	9000	9000	1500	19500
Prime Cost	16500	39000	4500	60000
Factory overhead				
- Fixed	3000	1500	1500	6000
- Variable	3900	9000	4500	117400
Cost of Production	23400	49500	10500	83400
Selling Overhead				
- Fixed	1500	900	600	3000
- Variable	2100	6000	3000	11100
Total Cost	27000	56400	14100	97500
Profit	5000	4600	1900	11500
Sales	32000	61000	16000	10900

It may be noted from the above that profit under the marginal costing and absorption costing is the same. This is because there are no opening and closing stocks of finished goods or work-in-progress.

Illustration IV

The monthly costs figures for production in a manufacturing company are :

	Rs.
Variable costs	1,20,000
Fixed costs	35,000
Total	<u>1,55,000</u>

The normal monthly sales figures is Rs. 2,00,000. Actual sales figures for three months are :

	First month	Second month	Third month
	Rs. 2,00,000	1,65,000	2,35,000

Under a system of marginal costing, stocks are valued as under :

	First month	Second month	Third month
opening Stock	Rs. 105800	108500	135625
Closing Stock	Rs. 108500	135625	108500

You are required to :

- a) Prepare a Marginal Cost Statement.
- b) Cost Statement under absorption costing.
- c) Comment on the comparative profits.

Solution :**(a) Marginal Cost Statement**

	Months			
	1	2	3	Total Rs.
	Rs.	Rs.	Rs.	
(A) Sales	2,00,000	165000	235000	600000
Opening Stock	84000	84000	105000	273000
Add: Variable costs	120000	120000	120000	360000
Less: Closing Stocks	204000	204000	225000	633000
	84000	105000	84000	273000
(B) Marginal Cost	120000	99000	141000	360000
(C) Contribution (A-B)	80000	66000	94000	240000
(D) Fixed Cost	35000	35000	35000	105000
Profit (C-D)	45,000	31000	59000	135000

**(b) Statement of Cost
(Absorption Costing)**

	Months			
	1	2	3	Total Rs.
	Rs.	Rs.	Rs.	
Opening Stock	108500	108500	135625	352625
Variable costs	120000	120000	120000	360000
Fixed Costs	35000	35000	35000	105000
Less costing stocks	263500	263500	290625	817625

	108000	135625	180500	352625
Costs of sales	155000	127875	182135	465000
Profit	45000	37125	52875	13500
Sales	200000	165000	235000	600000

(c) Comments

- 1. First month.** When opening and closing stocks are the same, profit/loss under the two system is the same.
- 2. Second month.** When closing stock is more than opening stock (i.e. production is more than sales), profits show by absorption costing is more than that shown by marginal costing.
- 3. Third month.** When closing stock is less than opening stock (i.e. sales more than production, profits shown by marginal costing is more than that shown by absorption costing.

CONTRIBUTION

As stated earlier, contribution is the difference between sales and the marginal (variable) cost of sales. It is also known as contribution margin (Cm) or gross margin. Thus contribution is calculated by the following formula :

$$\text{Contribution} = \text{sales} - \text{variable costs}$$

$$\text{Or } C = S - V$$

Also contribution = Fixed cost + Profit

$$\text{Or } C = F + P$$

From this following marginal cost equation is developed :

$$S - V = F + P$$

If any three of the above four factors in the equation are known, the fourth one can be easily found out. Thus:

$$P = S - V - F$$

Or $P = C - F$

$$F = C - P$$

Example

Sales	=	Rs. 12,000
-------	---	------------

Variable Costs	=	Rs. 7,000
----------------	---	-----------

Fixed cost	=	Rs. 4,000
------------	---	-----------

Thus

C	=	S - V
	=	12,000 - 7,000
	=	5,000

P	=	C - F
	=	5,000 - 4,000
	=	1,000

Thus profit is Rs. 1000

If sales figure is not given, but contribution is given then sales can be found out as follows.

S	=	C + V
S	=	5,000 + 7,000
S	=	Rs. 12,000

When fixed cost is not given ; then:

$$\begin{aligned} F &= C - P \\ F &= 5,000 - 1000 \\ F &= \text{Rs. } 4000 \end{aligned}$$

When variable cost is not given, then:

$$\begin{aligned} V &= S - C \\ V &= 12,000 - 5,000 \\ V &= \text{Rs. } 7,000 \end{aligned}$$

The concept of contribution is extremely helpful in the study of break-even analysis and management decision making.

PROFIT VOLUME RATIO (P/V Ratio)

The Profit/volume ratio, better known as contribution/sales ration (C/S ratio), express the relation of contribution to sales, symbolically:

$$\begin{aligned} \text{P/V ratio} &= \frac{C}{S} \\ \text{Or} &= \frac{S - V}{S} \end{aligned}$$

By transposition, we have

(i) $C = S \times \text{PN ratio}$

(ii) $S = \frac{C}{\text{P/V ratio}}$

Example

Sales = Rs. 10,000

Variable cost = Rs. 8000

$$\begin{aligned} \text{Then P/V ratio} & \times \frac{C}{S} = \frac{S-V}{S} = \frac{10,000 - 8000}{10000} \\ & = \frac{2000}{10,000} = \frac{2}{10} = 20\% \end{aligned}$$

When P/V ratio is given, the contribution can be quickly calculated from any given level of sales. In the above example, if only sales and PN ratio were given, contribution can be calculated as under :

$$C = S \times \text{P/V ratio}$$

$$C = 10,000 \times 20\%$$

$$= \text{Rs. 2,000}$$

P/V ratio may also be computed by comparing the change in contribution to change in sales or change in profit to change in sales. Any increase in profit will mean increase in contribution because fixed costs are assumed to remain constant at all levels of production. Thus :

$$\text{P/V ratio} = \frac{\text{change in contribution}}{\text{Changes in sales}} = \frac{\text{Change in profit}}{\text{Change in sales}}$$

Example

Year	Sales Rs.	Net Profit Rs.
1990	20,000	1,000
1991	22,000	1,600

Ascertain P/V ratio.

$$\text{P/V ratio} = \frac{\text{Change in profit}}{\text{Changes in sales}} = \frac{1600 - 1000}{22,000 - 20,000} \times 100$$

$$\text{P/V ratio} = \frac{600}{2000} \times 100 = 30\%$$

Uses of P/V ratio

P/V ratio is one of the most important ratios to watch in business. It is an indicator of the rate at which profit is being earned. A high PN ratio indicates high profitability and a low ratio indicates low profitability in the business. The profitability of different sections of the business, such as sales areas, classes of customers, product lines, methods of production, etc., may also be compared with the help of profit-volume ratio. The PN ratio is also used in making the following type of calculations :

- (a) Calculation of break-even point.
- (b) Calculation of profit at a given level of sales.
- (c) Calculation of the volume of sales required to earn a given profit.
- (d) Calculation of profit when margin of safety is given
- (e) Calculation of the volume of sales required to maintain the present level of profit if selling price is reduced.

Importance of P/V ratio

As P/V ratio indicates the rate of profitability; any improvement in this ratio without increase in fixed costs, would result in higher profits. As a note of caution, erroneous conclusions may be drawn by mere reference to P/V ratio and, therefore, this ratio should not be used in isolation.

P/V ratio is the function of sales and variable costs. Thus it can be improved Y by widening the gap between sales and variable cost. This can be achieved by :

- (a) Increasing the selling price.
- (b) Reducing the variable cost
- (c) Changing the sales mix i.e. selling of those products which have larger P/V ratio, thereby improving the overall PN ratio.

LIMITING OR KEY FACTOR

The aim of a business is to achieve maximum profitability. Unfortunately, it is not always easy to achieve because profit earning is affected by a variety of factors. For example, an undertaking may have sufficient orders on hand, ample skilled labour and production capacity, but may be unable to obtain all the quantity of material it needs over a period for the manufacture of maximum quantities which could be sold. Thus material is the factor which limits the size of output and prevents an undertaking from maximum profit. Similarly, sometimes a business is not able to sell that it can produce. In such a case, sales is the limiting factor.

A limiting or key factor may thus be defined as “the factor in the activities of an undertaking, which at a particular point in time or over a period will limit the volume of output” Examples of limiting factors include :

- (i) Sales,
- (ii) Materials,
- (iii) Labour (particular skill),
- (iv) Production capacity, and
- (v) Financial-resources

The purpose of the limiting factor technique is to indicate the most profitable course of action in all such cases where alternatives are possible.

Contribution per Unit of key factor

When no factor is in short supply, the choice will lie with accepting an order which yields the highest contribution, if however, a factor of production for instance, material is in short supply, the order which yields the largest contribution per unit of material consumed should be accepted. In other words, when a key factor is operating, the best position is reached when contribution

per unit of key factor is maximum. For instance, if a choice lies between accepting an order A which yields a contribution of Rs. 15 per unit and an order B which yield a contribution of Rs. 20 per unit, without any limiting factor, order B would be more profitable.

If, however, order, A takes 3 units of material (which is a limiting factor) and order B takes 5 units, the respective contributions per unit of the limiting factor of material would be :

$$\text{Order A} = 15 \div 3 = \text{Rs. } 5$$

$$\text{Order B} = 20 \div 5 = \text{Rs. } 4$$

Order A, which gives the greater contribution in terms of limiting factor should be acceptable.

Illustration V

The following data is given :

	Product A	Product B
	Rs.	Rs.
Direct material	24	14
Direct labour @ Rs. 3 per hour	6	9
Variable overhead @ Rs. 4 per hour	8	12
Selling price	100	110
Standard time	2 hrs.	3 hrs.

State which product you would recommend to manufacture when :

- (a) labour time is the key factor
- (b) Sales is the key factor

Solution :

	Product A	Product B
	Rs.	Rs.
Selling price	100	110
Direct material	24	110
Direct labour	6	14
Variable overhead	8	12
Marginal cost	38	35
Contribution	62	75
a) Contribution per labour per hour	$62 \div 2$	$75 \div 3$
b) Contribution per rupee of sales value	$= 62 \div 100$	$75 \div 110$
	$= 62 \text{ paise}$	68 paise

Conclusion

- a) Thus product A is- recommended when labour time is the key factor because contribution per hour of product A is more than that of product
- b) When sales is the key factor, product B is recommended because contribution per rupee of sales value of product B is more than that of product A.
- c) When key factor is not considered, product B is more profitable because its contribution per unit is larger than that of product A.

Advantages and Disadvantages of Marginal Costing

Advantage

The following advantages are claimed for marginal costing over total absorption

costing:

1. *Help in managerial decisions.* The most important advantage of marginal costing is the assistance that it renders to management in taking many valuable decisions. Information regarding marginal cost and contributions provided by marginal costing facilities making policy decisions in problems like fixing selling prices below cost, make or buy, introduction of a new product line, utilisation of spare plant capacity, selection of the most profitable product mix, etc. This has become discussed in detail later in-the chapter.
2. *Cost control* Greater control over cost is possible. This is so because by classifying costs into fixed and variable costs which are generally controllable and pay less attention to fixed costs which may be controlled only by the top management and that too, to a limited extent.
3. *Simple technique* Marginal costing is comparatively simple to operate because it avoids the complications involved in allocation, apportionment and absorption of fixed overheads, which is, in fact, arbitrary division of indivisible fixed costs.
4. *No under and over-absorption of overheads.* In marginal costing, there is not problem of under or over -absorption of overheads.
5. *Constants cost per unit.* Marginal costing takes -into account only variable costs which remain the same per Unit of product irrespective of the volume of output. It, therefore avoids the effects of varying cost per unit as it ignores fixed costs which are incurred on a time basis and have no relation with the size of production.
6. *Realistic valuation of stocks.* In marginal costing, stock of work-in progress and finished goods are valued only at variable costs. Thus no fictitious profits can arise due to fixed cost being absorbed and capitalised in unsold stock. This because marginal costing prevents the carry forward in stock valuation of some portion of current year's fixed costs. Stock

valuation in marginal costing, is, therefore more realistic and uniform.

7. Aid to profit planning. To aid profit planning, marginal costing technique enables data to be presented to management in such a way as to show cost-volume profit relationship. Graphic presentation in the form of break even charts and profit-volume charts are also used to facilitate planning future performance.
8. *Valuable adjunct to other techniques.* Marginal costing is a valuable adjunct to standard costing budgetary control.

Disadvantage

The main disadvantages of marginal costing are as follows:

1. *Difficult analysis.* Marginal costing assumes that all cost can be analysed into fixed and variable elements. In practice, however, it may be difficult to segregate all costs into fixed and variable components. Certain costs are caused purely by management decisions and cannot be strictly classified as fixed or variable, e.g. amenities to staff, bonus to workers., etc.
2. Ignores time factor By ignoring fixed costs, time factor is also ignored. For instance, marginal cost of two jobs may be identical, but if one job takes twice as long to complete as the other, the true cost of the job taking longer time is higher than that of the other. This is not disclosed by marginal costing. Production cannot be achieved without fixed costs but marginal costing creates an illusion that fixed costs have nothing to do with production.
3. Difficult in application. It is difficult to apply marginal costing technique in industries where large stock of work-in progress are locked up. Thus in ship-building or construction contracts, if fixed overheads are not included-in the valuation of work-in-progress, there may be huge profits. Such fluctuations in profits can be avoided if total absorption costing its employed.

4. Less effective in capital intensive industries. In capital industries, the proportion of fixed costs (like depreciation, maintenance, etc.) is large. The marginal costing technique, which ignores fixed cost, thus proves less effective in such industries. With the increased automation in industries, marginal costing is, therefore, left with limited scope.
5. Improper basis of pricing. Where prices are fixed by completion, marginal costing gives the impression that so long as prices exceed marginal costs, production is profitable. It ignores the danger of too much sales being made at marginal cost plus some contribution as it may result in overall losses. Although in certain circumstances product may be sold at less than total cost, prices in the long run must cover total cost as otherwise profit cannot be earned.

PROFIT PLANNING

The success of business is measured in terms of profit and profit is dependent on three basic factors:

- a) Cost of production;
- b) Selling prices;
- c) Volume of sales.

These three factors are inter-dependent because cost determines selling price to arrive at the desired level of profit; the selling price affects the volume of sales, the volume sales directly affects the volume of production and volume of production in turn influences cost. An understanding of the interrelationship between these factors is extremely useful to management in budgeting and profit planning. This is because profit planning helps in predicting the probable effect of change in any of these factors on the remaining factors.

BREAK-EVEN ANALYSIS

The study of cost-volume profit analysis is often referred to as break-even analysis. Break-even analysis is an extension of the marginal costing

principles. It is interpreted in narrow as well as broader sense. In its narrow sense, break even analysis is concerned with finding out the break even point i.e. the point of no profit and no loss. When used in broader sense, it is a system of analysis that can be used to determine probable profit/loss at any given level of output.

Assumptions Underlying Break-even Analysis

1. All costs can be separated into .fixed and variable components.
2. Variable cost per unit remains constant and total variable cost varies in direct proportion to the volume of production.
3. Total fixed cost remains constant.
4. Selling price does not change as volume changes.
5. There is only one product or in the case 0 multiple products, the sales mix does not change. In other words, when several products are being sold, the sale of various products will always be in some predetermined proportion.
6. There is synchronisation between production and sales.
7. Productivity per worker does not change.
8. There will be no change in the general price level.

Calculations in Break-even Analysis

Break-even point. The break-even point is the volume of output at which total cost is exactly equal to revenue. It is a point of no profit and no loss. This is the minimum point of production at which total cost is recovered and after this point profit begins.

The fundamental formula to calculate break -even point is :

$$\text{Break -even point (in units)} = \frac{\text{Total Fixed Cost}}{\text{Contribution per unit}} = \frac{F}{S-V}$$

$$\text{Break-even point (in Rupees)} = \frac{\text{Total Fixed Cost}}{\text{Contribution}} \times \text{Sales}$$

$$\text{Or B.E. points (in Rupees)} = \frac{\text{Total Fixed Cost}}{\text{P/V ratio}}$$

Example

$$\text{Total fixed cost} = \text{Rs. 12,000}$$

$$\text{Selling price} = \text{Rs. 12 per unit}$$

$$\text{Variable} = \text{Rs. 9 per unit}$$

Thus:

$$\begin{aligned} \text{Contribution} &= \text{S-V} \\ &= 12-9 = \text{Rs. 3 per unit} \end{aligned}$$

$$\text{P/V ratio} = \frac{\text{C}}{\text{S}} \times 100 = \frac{3}{12} \times 100 = 25\%$$

$$\text{B.E. points (in units)} = \frac{\text{Fixed cost}}{\text{Contribution per unit}} = \frac{12,000}{3} = 4,000 \text{ units}$$

$$\text{Break-even point (in Rs.)} = \frac{\text{Total Fixed Cost}}{\text{Contribution}} \times \text{Sales} = \frac{\text{F} \times \text{S}}{\text{S} - \text{V}}$$

$$= \frac{12,000}{3} \times 12 = \text{Rs. 48,000}$$

Also

$$\begin{aligned} \text{Break-even point (in. Rs.)} &= \frac{\text{Total fixed cost}}{\text{P/V}} \\ &= \frac{\text{Rs. 12,000}}{25\%} = \text{Rs. 48,000} \end{aligned}$$

$$\text{Break-eve point (in Rs.)} = \frac{\text{Total fixed cost}}{\text{—————}}$$

$$1- \frac{\text{Variable cost}}{\text{Selling price}}$$

$$\frac{12000}{1-9/12=3/12}$$

$$= \frac{12000}{3/12}$$

Break-even point may be verified as follows

Total cost = Fixed cost + Variable cost

Total cost = Rs. 12,000 + (4000 × 9)

= Rs. 48,000

The sales value and total cost at break-even point are exactly equal.

Additional Calculations

In addition to the calculation of break-even point, the above formulae can also be used in making certain additional calculations. These are :

1. Calculation of Profit for different sales volumes.
2. Calculation of sales for desired profit.

Finding missing figures.

Example The following data is given :

Fixed cost	-	Rs. 12,000
Selling price	-	Rs. 12, per unit
Variable cost	-	Rs. 9 per unit.

Calculation of Profit for Different Sales Volumes

What will be the profit when sales are (a) 60,000; (b) Rs. 1,00,000 ?

$$P/V \text{ ratio} = \frac{C}{S} = \frac{3}{12} = 25\%$$

(508)

(a) When sales = Rs. 60,000

$$\begin{aligned}\text{Contribution} &= \text{Rs. Sales} \times \text{PN ratio} \\ &= \text{Rs. } 60,000 \times 25\% \\ &= \text{Rs. } 15,000\end{aligned}$$

$$\begin{aligned}\text{Profit} &= \text{Contribution} - \text{fixed cost} \\ &= \text{Rs. } 15,000 - \text{Rs. } 12,000 \\ &= \text{Rs. } 3,000\end{aligned}$$

(b) When sales = Rs. 1,00,000

$$\begin{aligned}\text{Contribution} &= \text{Rs. } 1,00,000 \times 25\% \\ &= \text{Rs. } 1,00,000 \\ &= \text{Rs. } 1,00,000 \times 25\% \\ &= \text{Rs. } 25,000 \\ &= \text{Rs. } 25,000 - \text{Rs. } 12,000 \\ &= \text{Rs. } 13,000\end{aligned}$$

Calculation of Sales for Desired Profits

Continuing the same figures, what will be the amount of sales if it is desired to earn a profit of (a) Rs. 6000; b) Rs. 15,000 ?

$$\text{Sales for desired profit} = \frac{\text{Fixed cost} + \text{Desired profit}}{\text{P/V ratio}}$$

$$\text{a) } = \frac{\text{Rs. } 12,000 + \text{Rs. } 6,000}{25\%} = \text{Rs. } 72,000$$

$$\text{b) } = \frac{\text{Rs. } 12,000 + \text{Rs. } 15,000}{25\%} = \text{Rs. } 1,08,000$$

Calculation of Missing Figures

Example

Given :	Break -even point	=	Rs. 30,000
	Profit	=	Rs. 1,500
	Fixed cost	=	Rs. 6,000

What is the amount of variable cost?

Solution,	Contribution	=	Fixed cost + profit
		=	Rs. 6000 + Rs. 1500
		=	Rs. 7500

$$\text{Break-even point} = \text{Fixed cost} \times \frac{\text{Fixed cost}}{\text{Contribution}} \times \text{Sales}$$

$$\text{Rs. 30,000} = \frac{6000}{7500} \times \text{Sales}$$

$$\text{Sales} = \frac{7500}{6000} \times 30,000 = \text{Rs. 37,500}$$

$$\text{P/V ratio} = \frac{\text{Contribution}}{\text{Sales}} \times 100 = \frac{7500}{37,500} \times 100 = 20\%$$

$$\text{VC} = 100 - \text{P/v ratio}$$

$$\text{VC} = 100 - 20$$

$$= 80\%$$

∴ Variable cost (80% of sales) = Rs. 37500 × 80% = Rs. 30,000
Variable cost at break-even sales = Rs. 30,000 × 80% = Rs. 24,000

Example

Sales = 4000 unit @ Rs. 10 per unit

Break even point = 1500 units.

Fixed cost = Rs, 3000

What is the amount of (a) variable cost; and (b) profit ?

Solution :

$$\text{Break -even point (units)} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

$$1500 = \frac{\text{Rs. 3000}}{\text{Contribution per unit}}$$

$$\text{Contribution per unit} = \frac{\text{Rs. 3000}}{1500 \text{ units}}$$

$$= \text{Rs.2}$$

$$\text{a) Variable Cost} = \text{Selling Price} - \text{Contribution}$$

$$= \text{Rs. 10} - \text{Rs. 2}$$

$$= \text{Rs. 8 per unit}$$

Illustration VI The following data is given :

Fixed expenses Rs. 1,00,000, variable expenses Rs. 10 per unit, selling price Rs. 15 per unit.

Indicate the number of units to be manufactured and sold (1) To brake even; (2) To earn a profit of Rs. 10,000

Solution :

$$\text{Contribution} = \text{S-V}$$

$$= 15-10 = \text{Rs. 5}$$

$$\text{(i) B.E. Point} = \frac{\text{Fixed Cost}}{\text{Contribution}} = \frac{1,00,000}{5}$$

(ii) Sales to earn a profit of Rs. 10,000

$$= \frac{\text{Fixed Cost} + \text{Desired Profit}}{\text{Contribution}}$$

$$= \frac{1,00,000 + 10,000}{5} = 22,000 \text{ units}$$

(511)

Illustration VII You are given the following information :

Fixed Cost	Rs. 4,0000
Break even Sales	Rs. 20,000
Profit	Rs. 1,000
Selling price	Rs. 20 per unit

Calculate Sales and marginal cost of sales

At break -even point, contribution is equal to fixed cost.

$$\text{Thus P/V ratio } \frac{C}{S} = \frac{4,000}{20,000} = 20 \%$$

Therefore variable cost is 80% of sales

$$\begin{aligned} \text{Sales} &= \frac{\text{Fixed cost} + \text{Profit}}{\text{P/V ratio}} \\ &= \frac{4,000 + 1,000}{20\%} \quad \text{Rs. 25,0000} \end{aligned}$$

$$\text{Marginal or variable cost} = 25,000 \times 80\% = \text{Rs. 20,000}$$

Illustration VIII The following data is given :

	Rs.
Sales Price	20 per unit
Variable manufacturing costs	11 per unit
Variable selling costs	3 per unit
Fixed factory overheads	5,40,000 per unit
Fixed selling costs	2,52,000 per year

You are required to compute :

- (i) Break – even point expressed in amount of sales in rupees;
- (ii) Number of units that must be sold to earn a profit of Rs, 60,000 per year ;

(iii) How many units must be sold to earn a net income of 10% sales ?

Solution

$$P/V \text{ ratio} = \frac{S-V}{S} = \frac{20-14}{20} = \frac{6}{20} = 30\%$$

(i) Break even point = $\frac{\text{Fixed}}{P/V} = \frac{5,40,000 + 2,52,000}{30\%} = \frac{\text{Rs. } 7,92,000}{30\%}$
 = Rs. 26,40,000

(ii) Units to be sold to earn profit of Rs. 60,000

$$= \frac{\text{Fixed cost} + \text{Desired profit}}{\text{Contribution per unit}}$$

$$= \frac{7,92,000 + 60,000}{6} = 1,42,000 \text{ units}$$

Contribution = S – V = 20 – Rs. 14 = Rs. 6

(iii) Suppose unit to be sold to earn 10% profit = ‘X’

Total Sales = Selling price = Units = 20x

Total sales = Total cost + profit = V+F+P

$$20 \times 14x = 7,92,000 + 2x$$

Thus 4 x = 7,92,000

X = 7,92,000 ÷ 4

X = 1,98,000

Thus Sales to earn a net income of 10% on sales = 1,98,000 unit.

MARGIN OF SAFETY (M/S)

Margin of safety may be defined as the defined between actual sales and sales at break-even point. In other words, it is the amount by which actual volume of sales exceeds the break -even point. Margin of Safety may be expressed in absolute money terms or as percentage of sales.

Thus M/S = Actual sales – Break even point

Example :

	Company X	Company Y
Actual Sales	1,20,000	60,000
Less: Break even point	40,000	40,000
Margin of Safety	80,000	20,000

$$\begin{aligned} \text{Margin of Safety as percentage of Sales} &= \frac{80,000}{1,20,000} \times 100 \quad \frac{20,000}{60,000} \times 100 \\ &= 66\frac{2}{3} \% \quad 33\frac{1}{3} \% \end{aligned}$$

The size of the margin of safety indicates soundness of a business. When margin of safety is large, it means the business can still make after a serious fall in sales. In such a situation, the business stands better chance of survival in times of depression. A large margin of safety usually indicates low fixed overheads. When margin of safety is low, any loss of sales may be a matter of a serious concern.

Margin of Safety is directly related to profit. This is shown below :

$$\text{Profit} = \text{Margin of safety} \times \text{Profit - Volume ratio}$$

$$P = M/S \times P/V \text{ ratio}$$

Or

$$M/S = \frac{P}{P/V \text{ ratio}}$$

If profit is 105 and P/V ratio is 40%, then

$$M/S = \frac{10\%}{40\%} = 25 \%$$

When profit is not known but M/S is known, then

$$P = M/S \times P/V \text{ ratio}$$

$$P = 25\% \times 40\%$$

$$P = 10\%$$

When margin of safety is not satisfactory, the following steps may be taken to improve it :

- a) Increase the volume of sales
- b) Increase the selling price
- c) Reduce fixed cost
- d) Reduce variable cost.
- e) Improve sales mix by increasing the sales of products with larger P/V ratio.

Illustration IX

The profit/volume ratio of Escorts Ltd. is 50% and the margin of safety is 40%. You are required to work the net profit and the break -even point if sales volume is Rs. 10,00,000.

Solution :

	Rs.
Sales	10,00,000
<i>Less:</i> Margin of safety (40% of sales)	4,00,000
Break-evenpoint	6,00,000

Contribution = P/V ratio \times sales

$$\text{Contribution at B.E. point} = \frac{50}{100} \times 6,00,000 = \text{Rs. } 3,00,000$$

Thus fixed cost = Rs. 3,00,000

At break-even point, the entire amount of contribution is fixed cost since there is no profit at this point.

Profit = Contribution – Fixed Cost.

Contribution on sales of Rs. 10,00,000 = 10,00,000 – 50%
= Rs. 5,00,000

Profit = 5,00,000 – 3,00,000 = Rs. 2,00,000

Profit % = $M/s \times P/V$
= 40% × 50% = 20% of sales

Profit = 10,00,000 × 20% = Rs. 2,00,000

THE PROFIT VOLUME CHART

The profit volume chart or profit graph portrays the profit and loss at different levels of sales and is an alternative presentation of the facts illustrated in the break-even chart. Such a chart can be constructed from the same basic data from which a break -even chart can be drawn.

Construction of Profit- Volume Chart

The following steps should be taken to construct a profit – volume chart.

- 1. Select a scale on horizontal axis.** The horizontal axis in the profit volume graph represents sales. This horizontal axis in the profit volume graph represents sales. The horizontal line. Known as sales line divides the graph into two parts.
- 2. Select a scale on vertical axis.** The vertical axis show fixed cost and profit. The fixed cost are market below the sales line on the left hand vertical line and profit is shown above the sales on the right hand side vertical line.
- 3. Plot fixed cost and profit.** Point are plotted for the given-fixed cost and profit. These points are connected by a diagonal line which crosses the sales line a break even-point.

Example

Fixed Cost Rs. 5,000

Sales Rs. 20,000 (1,000 units @ Rs. 20)

Variable cost Rs. 10,000 (1000 units @ Rs. 10)

Calculations

$$\begin{aligned}\text{Profit - Volume ratio} &= \frac{S-V}{S} \\ &= \frac{20,000 - 10,000}{20,000} \times 100 = 50\%\end{aligned}$$

$$\begin{aligned}\text{Break - even point} &= \frac{\text{Fixed cost}}{\text{P/V ratio}} \\ &= \frac{\text{Rs. 500}}{50\%}\end{aligned}$$

$$\text{Profit} = S - F - V = 20,000 - 5,000 - 10,000 = \text{Rs. 5,000}$$

Uses of Break -Even Analysis

Some of the important uses of break-even analysis are summarised below :

1. Determination of the break even point
2. Determination of the selling price which will give the desired profit.
3. Fixation of the sales volume to earn a desired profit or return on capital employed
4. Determination of the cost and revenue at different levels of output.
5. Determination of the most profitable sales mix.
6. Determination of comparative profitability of each product line.
7. Study of the effect of change in selling price or of price differentiation in different markets e.g. home market and foreign market.

8. Impact of increase or decrease in fixed variable costs on profits.
9. Determination of the effect on profits and break even points of high proportion of variable costs with low fixed cost and vice- versa.
10. Comparison of profitability of various firms.
11. Aid in management decision making e.g. in make or buy decisions, discontinuance of a product line, acceptance of special job, etc.
12. Determination of cash requirements at different levels of operation with help of cash-break - even charts.

Limitations of Break- Even Analysis

Although break-even analysis is an invaluable tool of management, there are some limitations from which the technique suffers. These limitations of breakeven analysis arise from certain assumptions on which the analysis is based and which are, in effect, not true. Thus “break even analysis is based on a simplified model of a business which is unrealistic.” “It must be applied an intelligent discrimination, with an adequate grasp of assumptions underlying the technique surrounding its practical applications.”

1. The assumption that all cost can be clearly separated into fixed and variable components is not possible to achieve accurately in practice, thereby resulting in inaccurate break -even analysis.
2. The assumption that variable cost per unit remains constant and that it gives a straight line chart is also not always true. In practice, many of the variable costs do not observe this tendency. Most of the variable costs, no doubt move in sympathy with the volume of production not necessarily in direct proportion to the volume.

3. Similarly, the assumption that fixed costs remains constants is also unrealistic. Fixed costs are constant only within a limited range of output and tend to increase by a sudden jump when additional plant and machinery is introduced.
4. The assumption regarding selling prices remaining unchanged as volume changes is also not true. In practice, selling prices do not remain fixed and change in prices affects demand. Any increases in output can be sold only by effecting a reduction in selling price which would effect the sales line.
5. The assumption that only one product is being produced or that product mix will remain unchanged is also not found in practice. The sales of various products manufactured is not always in a predetermined proportion.
6. It is assumed that production and sales are synchronised. This is not always so Sales may fall short of production or may be capable of increase to much production only by effecting a reduction a reduction in selling prices.
7. The break even analysis completely ignores the consideration of capital employed which may be an important factor the study of profit analysis.

In spite of these-limitations, break-even analysis is a very useful management device, provided it is used only by those who are fully aware of its limitations because the alone the technique can be used more effectively.

EXERCISE QUESTIONS :

1. What is marginal costing? What are its advantages and disadvantages?
2. Explain the concept of contribution. How it related to profits?

3. How are variable and fixed costs treated in marginal costing?
4. What is PN ratio and Margin of Safety? Explain their uses.
5. What do you mean by profit planning? Draw a break-even chart with imaginary
6. Explain the practical uses of marginal costing.
7. Define marginal costing. Is it possible or desirable at times to reduce selling price below total cost. If yes, narrate the circumstances wanting such action.

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BBA - 304

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